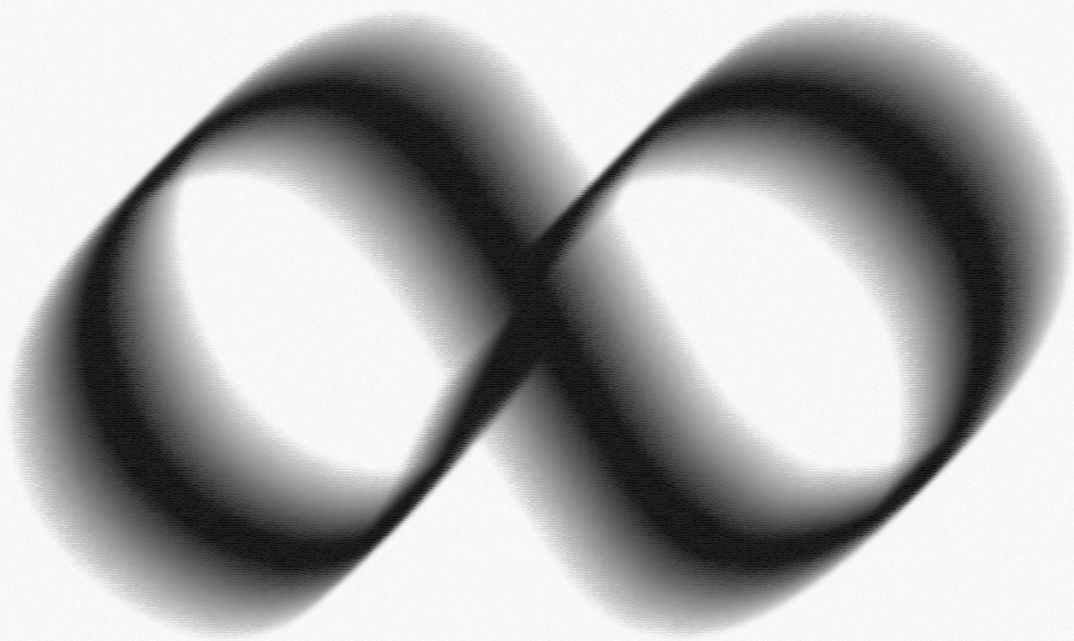


*Design for
Regeneration:*
a shift to a
post-anthropocentric
mindset



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to my parents and Maria. For the unwavering support they have given me, the countless sacrifices they've made, and for consistently inspiring me to strive for excellence. Their gift of freedom and independence in my actions has been invaluable. Their words, "If you believe it's the best path for you, we're here to stand by you," echo in my heart. I am eternally thankful for the privileged environment in which I was raised.

to Inês, "namorida", friend and comrade. In moments of exhaustion and frustration, she remains my refuge. Her patience in times of uncertainty, often expressed through the consolation of silence, speaks for itself. Her heart overflows with kindness and humbleness. Every day, I wish for more moments of love and companionship.

to my grandmother and the memory of my grandfather. They taught me the values of simplicity and compassion. They allowed me to experience the earth under my bare feet and taught me how to plant potatoes. They were the driving force behind my deep connection with the natural world.

to my supervisor, Dirk. His unwavering support and boundless patience were fundamental. He believed in me and gave me constant motivation. His relentless pursuit of knowledge has been inspiring, making him a truly exceptional model to me.

to my co-supervisor, Inês. Her dedication and willingness to share knowledge were crucial. The factual information and data she provided were fundamental in guiding my work. I will continue to follow her work closely.

finally, to nature! This thesis is an ode to my deep love for the natural world - a tribute to its breathtaking magnificence. My affinity with nature and its wonders has shaped the direction of my study. With a heart full of gratitude, I feel responsible for safeguarding its well-being. Thank you, wonderful Gaia!

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The design field is at a crossroads in a world facing unprecedented environmental and social challenges. This dissertation embarks on a transformative journey, challenging deep-rooted anthropocentrism and advocating a paradigm shift.

The research begins by analysing the current state of design, tracing its historical origins in Western humanism and Cartesian dualism and revealing the symbiotic relationship between design and economic growth. In response, transitional design is explored, with the emergence of new mental models that embrace systemic thinking and offer alternative paths based on axes of change. These visionary approaches illuminate a post-anthropocentric future and force an ontological reformulation of design. It is a shift towards recognising the interconnectedness and agency of non-human entities. These philosophical foundations challenge conventional notions of design, paving the way for a more inclusive and ecologically attuned practice.

New economic theories become the guiding compass as we delve deeper into degrowth, doughnut and circular economies. These theories enrich the undeniable link between design and the economy, providing a roadmap for a regenerative future. With this new knowledge, research is moving towards Design for Regeneration, a transformative approach that transcends traditional sustainability. New fundamental principles underpin this methodology, charting a regenerative course for design practice.

This dissertation presents a visionary framework for the future of design, calling for a profound shift in mindset that recognises the interconnectedness of all things. It envisions design as a powerful force for regeneration and offers hope to a world needing healing.

keywords

Regenerative Design; Degrowth; Anthropocene; Ontological Dualism; Transition.

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Num mundo que enfrenta desafios ambientais e sociais sem precedentes, o design encontra-se numa encruzilhada. Esta dissertação embarca numa viagem transformadora, desafiando o antropocentrismo profundamente enraizado e defendendo uma mudança de paradigma.

A investigação começa por analisar o estado atual do design, traçando as suas origens históricas no humanismo ocidental e no dualismo cartesiano e revelando a relação simbiótica entre o design e o crescimento económico. Em resposta, é explorado o design de transição, com o surgimento de novos modelos mentais que abraçam o pensamento sistémico e oferecem caminhos alternativos baseados em eixos de mudança. Estas abordagens visionárias iluminam um futuro pós-antropocêntrico e forçam uma reformulação ontológica do design. Trata-se de uma mudança no sentido do reconhecimento da interconexão e da agência das entidades não humanas. Estes fundamentos filosóficos desafiam as noções convencionais de design, abrindo caminho para uma prática mais inclusiva e ecologicamente sintonizada.

Novas teorias económicas tornam-se a bússola orientadora à medida que aprofundamos conceitos como as economias do decrescimento, do donut e circular. Estas teorias enriquecem a ligação inegável entre o design e a economia, fornecendo um roteiro para um futuro regenerativo. Com estes novos conhecimentos, a investigação culmina no Design para Regeneração, uma abordagem transformadora que transcende a sustentabilidade tradicional. Novos princípios sustentam esta metodologia, traçando um rumo regenerativo para a prática do design.

Esta dissertação apresenta um quadro visionário para o futuro do design, apelando a uma mudança profunda de mentalidade que reconheça a interligação de todas as entidades. Prevê o design como uma força poderosa de regeneração e oferece esperança a um mundo que precisa de ser curado.

Palavras-chave

Design Regenerativo; Decrescimento; Antropoceno; Dualismo Ontológico; Transição.

This dissertation addresses a wide range of issues. However, promoting the construction of a comprehensive approach to the way of being, thinking and acting in design proves to be challenging and complex. It is essential to note that a narrowly disciplinary approach would not meet the transdisciplinary perspective intended by the dissertation. Furthermore, my academic background does not include advanced economics, philosophy or politics studies. Therefore, there may be limitations concerning particular objects of study. For this reason, I apologise if certain subjects have not been explored in the depth they deserve. The search for greater depth may become a focus of future research.

I also recognise the use of scientific content from certain entities, including the philosopher Martin Heidegger, who may have had controversial political positions. It is important to note that the references made in this study are for constructive purposes only and do not reflect the political orientation of any of those involved. I want to emphasise that the core of the research is not based on positions that tolerate or collude with inflexible views that do not consider the vast diversity to which we belong.

Finally, this dissertation promotes a connection between the reader and the topic, using an informal tone and active voice. Academic writing often promotes the use of the passive voice, which introduces distance between the action and the protagonist («Nature», 2016), hindering the desired promotion of action and change intended by this research. Likewise, even though this dissertation represents the culmination of my master's degree (João Barroso), the pronoun we in the first person plural was predominantly used in the discourse, rather than the singular I. This deliberate choice reflects the collaborative nature of this work, emphasising the principles of collective construction and knowledge sharing addressed in this dissertation.

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I Introduction

It's sad that air is the only thing we share,
No matter how close we are there's always air between us.
It's also nice that air's something we all share,
No matter how far apart we are an air links us.

(Yoko Ono, 1967)

Background and research environment

We are living in a time of emergency. Since the beginning of industrialisation, we have exploited our planet's finite resources like they were unlimited, depleting and destabilising the very ecosystems on which we depend for our livelihoods, economies, food, health and quality of life. Climate change is now a terrifying force and is already impacting the lives of the world's poorest communities. Sea levels are rising, and biodiversity is declining at an unprecedented rate. In only fifty years, we have lost more than half of the world's wildlife, and we do not even know what that will mean for the food chain. The gap between the rich and the poor is widening in many countries, and neoliberal economics is one of the main obstacles to increased equality. The global number of refugees has been at its highest since the Second World War, and climate change will only increase the need for migration in the following decades.

The gravity of the situation has prompted the United Nations to establish a special task force for *Biodiversity and Ecosystem Services* (Gustafsson et al., 2020). In 2019, they released the first extensive report, a landmark evaluation of the planet's living species, based on a compilation of fifteen thousand research studies from across the globe and representing the consensus of hundreds of scientists. The report disclosed an unprecedented, escalating rate of global biodiversity decline and indicated that approximately one million species are threatened with extinction, some within just a few decades (IPBES, 2019).

As outlined in the *IPCC Sixth Assessment Report* (2022), the Earth is on track to warm beyond 1.5 degrees celsius, which scientists warn is a critical threshold for the Earth's existing ecosystems (*Sixth Assessment Report*, 2022). Environmental and social degradation continue increasing to the extent that "we are in a state of planetary emergency" (Lenton et al., 2019, p. 595). This means that if we continue on our current path, we will produce irreversible damage to the conditions that sustain life on this planet.

At the same time that studies suggest that we have exceeded some of the critical limits of the planet (Steen et al., 2011), new challenges seem to accumulate. In 2020, the world faced one

of the most severe pandemics in recent history - *COVID-19* pandemic - forcing people to change their behaviour rapidly and creating new problems or increasing existing ones, such as the rise of social inequalities (Buheji et al., 2020). The pandemic revealed the weaknesses in our systems and led to a demand for solutions, but these take time and effort to implement. At the same time, it showed us that humanity is suffering from these adversities. The outdated concept of us versus them in politics, business, and among individuals must be left behind (Albright, 2021). Humanity faces imminent climate chaos and the failure of ecosystem functions that are vital for the survival of our species and many others. Solving these problems requires a shift away from our current faulty perspectives and assumptions that led to these issues in the first place. A new way of thinking, a new awareness, and a new design practice must be built to effectively address the root causes of the crisis effectively. If we go into action without questioning deeply, we will probably treat the symptoms instead of the causes (Wahl, 2016). This will only prolong and deepen the crisis rather than solve it. Paul Hawken (2007) highlights the path towards a more equitable and sustainable future where humanity can flourish and embrace a regenerative culture instead of one that is destructive:

“(...) we are at a threshold in human existence, a fundamental change in understanding about our relationship to nature and each other. We are moving from a world created by privilege to a world created by community. The current thrust of history is too subtle to be labelled, but global themes are emerging in response to cascading ecological crises and human suffering. These ideas include the need for radical social change, the reinvention of market-based economics, the empowerment of women, activism on all levels, and the need for localised economic control. There are insistent calls for autonomy, appeals for a new resource ethic based on the tradition of the commons, demands for the reinstatement of cultural primacy over corporate hegemony, and a rising demand for radical transparency in politics and corporate decision-making” (p. 194).

It is becoming increasingly clear that human actions must align with the fundamental principles of life. To achieve sustainability, the underlying worldviews and paradigms must be addressed head-on, and sustainability's goals can and should transcend narrow anthropocentrically focused aims to become more holistic, inspiring, ambitious, and motivational (González-Márquez & Toledo, 2020).

There is now a general consensus on the need for action to seek pathways beyond simply reducing the global carbon footprint to achieve a genuinely regenerative response (Attia, 2018). In recent decades, environmental considerations have been integrated into the design process, mainly through using natural resources more efficiently, reducing environmental impact, or focusing on circular resource management models. However, as Pamela Mang and Bill Reed (2013) have argued, the vast majority of what gets built still falls below the line of neutral environmental impact. Therefore, most development is part of a degenerative cycle that varies in speed and scale (Mang & Reed, 2013). While progress has been made, there is still substantial room for the design field to pursue more regenerative approaches that aim to restore and renew rather than merely reduce damage.

For this reason, in the context of a fast-accelerating climate and biodiversity emergency, sustainability is not some ultimate endpoint but a continuous process of learning and adaptation. Design for sustainability needs to be, ultimately, design for human and planetary health (Wahl, 2006) because “healthy human societies cannot exist on a dying planet” (Life-Centric from Human-Centric, 2022, para. 16). We must move beyond our current thinking and actively contribute to regenerate and restore what human activities have radically deteriorated over decades. To achieve this, humans need to live in conscious alignment with the living system’s principles of integrity, change and relationship (Gibbons, 2020).

Adopting a regenerative approach could provide a new worldview, paradigm, and processes to enable transformative change in sustainability and society. Several areas need expansion and reshaping to support the shift to a *post-anthropocentric, regenerative mindset*. One such area is design, which could act as an integrator and facilitator (Becuwe et al., 2016) in finding ways to encourage all life to thrive. Design is not the sole solution, but it will likely be part of the solution, just as it has been part of the problem.

“Maybe sustainability is not a journey, but a state of equilibrium, based on giving as much as we take (...) On the positive side, to do more good, we open doors to restore environments and communities and to create and enable conditions for environmental, social and economical regenerative growth”
(Brown, 2018, p. 8)

Design issues are complex and challenging precisely because the threats are global, long-run, interconnected, uncertain and potentially irreversible (Lenton et al., 2019). To combat this destructive force and help restore living and social systems, it is essential to adopt a radical reframing of the design activity. This task requires an ontological shift in how we see design acting in our world.

The design discipline bears significant responsibility, so designers must be aware of the complexities of their position. *Regenerative design* (RD) is a process-oriented way of designing systems in partnership with nature. It roots its knowledge in ecology, *living systems thinking*, and permaculture. Until recently, the term *regenerative* was mainly used to describe forms of agriculture closely aligned with permaculture principles. Now, though, it is increasingly applied to products, buildings, and companies as well (Newton et al., 2020). With its approaches that focus on eco-literacy, health and wellbeing, place-based thinking, *co-evolution*, and whole systems, RD and its ecological worldview could shift development from sustainable to regenerative (Gibbons, 2020).

Design teams must be informed with a richer understanding of RD principles that go beyond sustainable and circular design principles to actively promote a multi-species approach where human and non-human species co-habit holistically (Attia, 2018). Designers should focus on applying design principles and strategies for positive impact instead of perpetuating an *anthropocentric mindset*, which leads to the depletion of our underlying life-support systems, and develop competencies to understand the long-term systemic effects of their creations.

The quest for sustainability has moved society forward in important ways, but it is now time to embrace a new regenerative approach to design and development. As a globalised society, we urgently need to reach the turning point in human civilisation where everything we do positively impacts the environment and society. It is time to shift from merely mitigating negatives to optimising positives.



Aims and research question

This dissertation aims to understand and highlight the critical environmental, social, and economic issues facing the world today. The research focuses on framing the current global situation to analyse it and offer new perspectives actively. This dissertation aims to promote the crucial critical thinking that design - and other disciplines - must engage in. This constant questioning will help establish boundaries and keep designers within a code of conduct that respects human and non-human dynamics. It will require understanding new design and development concepts that seek to plan for healthy, positive socio-ecological systems to promote the common good. It is essential to provide practical guidelines and strategies for designers to transition to *regenerative* and *post-anthropocentric* design practices. The intention is to create a theoretical framework that encourages an ontological reformulation of design practice and pedagogy. In this way, once we question reductive narrative constructions, we will recognise a world much bigger than the one we know. This dissertation aims to provide a new vision based on diversity, acceptance and curiosity by exposing this new world. This attitude calls for an end to the deep-rooted effects of extractivism, colonialism and *capitalism* that have impoverished communities and lands while extinguishing traditions and ecosystems. Therefore, the dissertation attempts to confront this devastating present by reframing more pluriversal notions of design and identifying emerging practices that allow us to act in a *regenerative* way in everyday life. To embrace a *Design for Regeneration* ethos that restores ecosystems, reconnects divided communities, and improves the interdependent health of people, places and planet, we must address the following question:

How can we reshape design practice to move beyond an anthropocentric mindset, restore humanity's relationship with the natural world, and promote a regenerative future?

Methods and Structure of the dissertation

The dissertation is divided into four fundamental parts: the introductory one, with an overview of the issues that will be developed; the contextualisation and critical analysis of the current state of design that seeks to study its origins and its impacts through an analysis of the literature; the argumentative and constructive part that investigates and identifies new regenerative and *post-anthropocentric* possibilities of looking at design in the form of analysing the literature and developing guiding conclusions; and the concluding part, which is intended to summarise, assertively and schematically, the issues addressed and summarise the guidelines, principles and guides studied. Below is a summary of each part:

Part I - Introduction

This part introduces the dissertation to the reader and aims to capture and present the fundamental theme to the reader so that they are aware of the object of study. The *first chapter* presents some facts that show the relevance and urgency of the research and raises some questions that will be answered later.

Part II- The State of Design

This part recognises that the design discipline is in crisis and that there is an urgent call for change. This change can only come from understanding the true state of the art, since reorienting design implies understanding why design is in crisis. The reflection addresses the interaction between *humanism*, *cartesian dualism*, *capitalism* - and its unbridled growth - and how these have shaped modern design and led to significant environmental and social challenges.

In *chapter 2*, we focus on a critical analysis of the homogenisation of the world, where *humanism* was the main promoter behind the notion of a universal and hegemonic Europe. This idea defines a pattern

of exclusion that influences *western* design models. Such thinking leads us to later explore René Descartes' mind-matter dichotomy and its impact on the human perception of the world. *Cartesian dualism*'s influence was foundational in the creation of modern individualism and the dominant economic model. The free trade doctrine, based on Adam Smith's proposals, and its emphasis on economic growth provide the basis for a sustained critique of capitalist consumer societies. The impact of the economic model, the growth of individualism and *anthropocentric* thinking are some of the explanations presented in the chapter for the emergence of a new geological epoch.

Part III - Another Design is Possible

The *third part* responds to the urgency of developing new ways of being and thinking, becoming a practice of existence that fully recognises *post-anthropocentrism* as the necessary paradigm shift in the manifestation of our futures, along with alternatives to the humanist perception of the human species in the context of dualism. Therefore, at this stage, it is argued that an urgent response lies in design and, specifically, through a theoretical and pragmatic *post-anthropocentric* shift in the current perception of the human being. This study is premised on the notion that diverse theoretical positions across disciplines can inform and inspire rethinking of basic assumptions about how design functions, produces value, and undertakes core activities outside *anthropocentric* logic.

We begin this part with *chapter 3*, which explores the concept of system thinking and justifies the importance of creating new mental models. To apply this type of thinking, the Transition Design methodology is studied. This chapter concludes with guidelines to help structure the rest of the research. Each of the other four chapters corresponds to one of the four dimensions of Transition Design - visions; mindset and posture; theories of change; new ways of designing. *Chapter 4* looks at future-oriented design visions intended to inform and inspire current projects. The chapter presents six axes for

reorienting the design vision, based on the work of Arturo Escobar, and concludes with a framework of oriented visions that challenge the status quo. *Chapter 5* analyses the importance of adopting a new mindset and posture in the field of design. The chapter analyses the impact of ontological dualism and calls for a paradigm shift in design towards recognising the interconnectedness of all life forms. New ontological theories are also presented as useful strategies for understanding agency beyond human-centred perspectives. The chapter sets the stage for further exploration of a pluriversal design practice aligned with new economic transitions. *Chapter 6* looks at how designers can address the challenges of the *Anthropocene* through a holistic approach integrating economic theories with design practices. Designers are urged to consider the ecological and social impacts of their interventions and to align with concepts - such as *degrowth*- in order to create positive futures.

Finally, *Chapter 7* offers an initial critique of current sustainability practice. A transition to regenerative visions is proposed, based on reshaping design methodologies. This new design approach aims to ensure outcomes become evolutionary, mutually beneficial between human and natural systems, and promote holistic regenerative solutions.

Part IV - Futures for Design

The final part, ending with *chapter 8*, concludes the dissertation by summarising the main ideas and some of the current and future limitations. The conclusions - previously summarised at the end of each chapter - are presented as tables and intended to be the basis for a regenerative *post-anthropocentric* design. They define the direction for a set of principles, strategies and practical guidelines that can be used to begin the work of transformation and transition. The reader may disagree with some of the positions taken here. The point is that the study is not closed, but open to criticism, progression and change. It should be *co-evolutionary*.

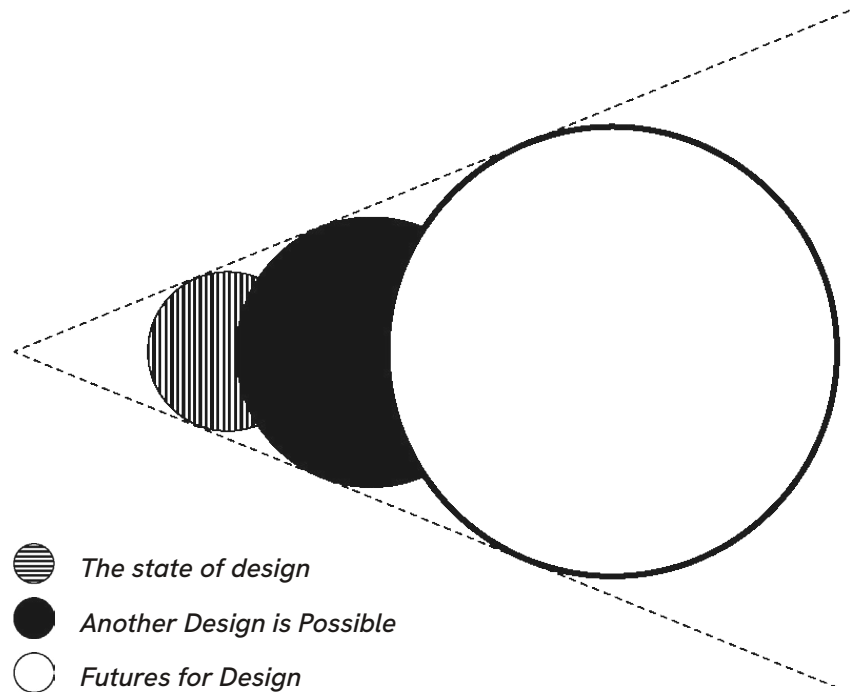


Figure 1. Illustration of the dissertation structure

1.4 Motivation

“Throughout history, the real fundamental changes in societies have come about not from the dictates of governments or the results of battles but through vast numbers of people changing their minds-sometimes only a little bit. ... By deliberately changing the internal images of reality, people can change the world” (Harman, 1998, p. 156).

My motivation to write this dissertation began with my experiences and observations of design’s capacity for world-making and my disappointment at how narrow that capacity is typically applied. In my thinking and work, in every attempt to try to imagine design truly remaking the world into something more egalitarian, democratic, and sustainable.

I have come at this dissertation from the perspective of a designer who has grown increasingly dissatisfied with both ways in which design is practised and how design is portrayed, discussed, and perceived in an academic context and by society.

I observed that the education of most designers is typically confined within four walls, substantiated by bits of history and theory, hand-picked and decontextualised, and focused on delivering outcomes translated into more goods and services to an ever-growing, ever-wealthier and more materialistic global population. I kept running into the same issues: the lack of social sensibility of design education; the lack of awareness of political, social or economic concerns in design practice; and the insistence on a design practice that focuses only on the human condition and forgets all the surrounding environment.

“The main trouble with design schools seems to be that they teach too much design and not enough about social and political environment in which design takes place” (Papanek, 1985, p. 100).

As designers, I believe we must find new ways of working that systematically address both the current climate change and the social justice crisis. The *anthropocentric* mentality is directly tied to these crises, and it is the same one that directs and contains a vast quantity of design activity. In response, I have long wanted to work on a proposal to modify discipline that seeks regeneration and puts the planet and people at the centre of the equation.

As we move into the post-COVID era, ways of living, being, and doing remain affected. However, I think this is also an opportunity for rethinking and reshaping design that truly delivers on its promise to make a better world. We are entering a new global paradigm, and this dissertation is meant to provide hope and inspiration to all kinds of designers, to promote a shift in the paradigmatic model of contemporary design.

II The state of design

“We are what we do, especially what
we do to change what we are”

(Galeano, 1983, p. 175)

2. *Critical analysis of the state of design*

2.1

Western Humanism legacy

For centuries, *Western* architecture and design have used the human as a perfect reference point, an object, and a model. Throughout *Western* modernity, the idea of a hierarchy of beings where a human is placed above other animals and plants has been prevalent. The Greek philosopher Protagoras constructed the hierarchy of beings from plants to humans according to their *anthropocentric* possession of a “Man” as “the measure of all things” (Bailey et al., 2019, p. 1). This thinking was later renewed in Leonardo da Vinci’s Renaissance *Vitruvian Man* design (see Figure 1) (Braidotti, 2013, p. 13). An ideal of bodily perfection that underpins a very specific vision of what is human. Moreover, it unequivocally affirms that humans have a nearly unlimited capacity to strive for both individual and social perfection.

This iconic image is the emblem of *Humanism* as a doctrine that combines the discursive and moral expansion of human capacities into an idea of ordered and rational progress. This belief in the unique, self-regulating and intrinsically moral power of human reason forms an integral part of the thinking that essentially influenced the ideals of the Italian Renaissance (Braidotti, 2013). This model set standards for both individuals and their cultures. *Humanism* was the engine of a model of civilisation, which shaped a particular idea of a universal and hegemonic Europe (Lloredo Alix, 2023). This view assumes that Europe is not just a geopolitical location, but a universal attribute of the human mind that can lend its quality to any suitable object. This has made *Eurocentrism* more than just a matter of attitude; a structural element of our cultural practice, which is embedded in theory and institutional and pedagogical practices (Braidotti, 2013). As a civilisational ideal, *Humanism* fuelled ‘the imperial destinies of nineteenth-century Germany, France and, supremely, Britain’ (Davies, 2008, p. 23). This Eurocentric paradigm has grown the dialectic of self and other, and the notion that we are “right and all others wrong” (The UNESCO Courier, 2011, p. 9). Insofar as difference signifies inferiority, it acquires essentialist and lethal connotations for people who are labelled as “others”. Usually “sexualised, racialised, and naturalised”, are reduced to “the less than human” and “disposable bodies” (Braidotti, 2013, p. 15). Tony Davies (2008) expresses these ideas clearly: “All Humanisms so far have been imperial. They speak of the human in the accents and interests of a class, a gender, a race, a genome. Its embrace stifles those it does not ignore. It is almost impossible to think of a crime that has not been committed in the name of

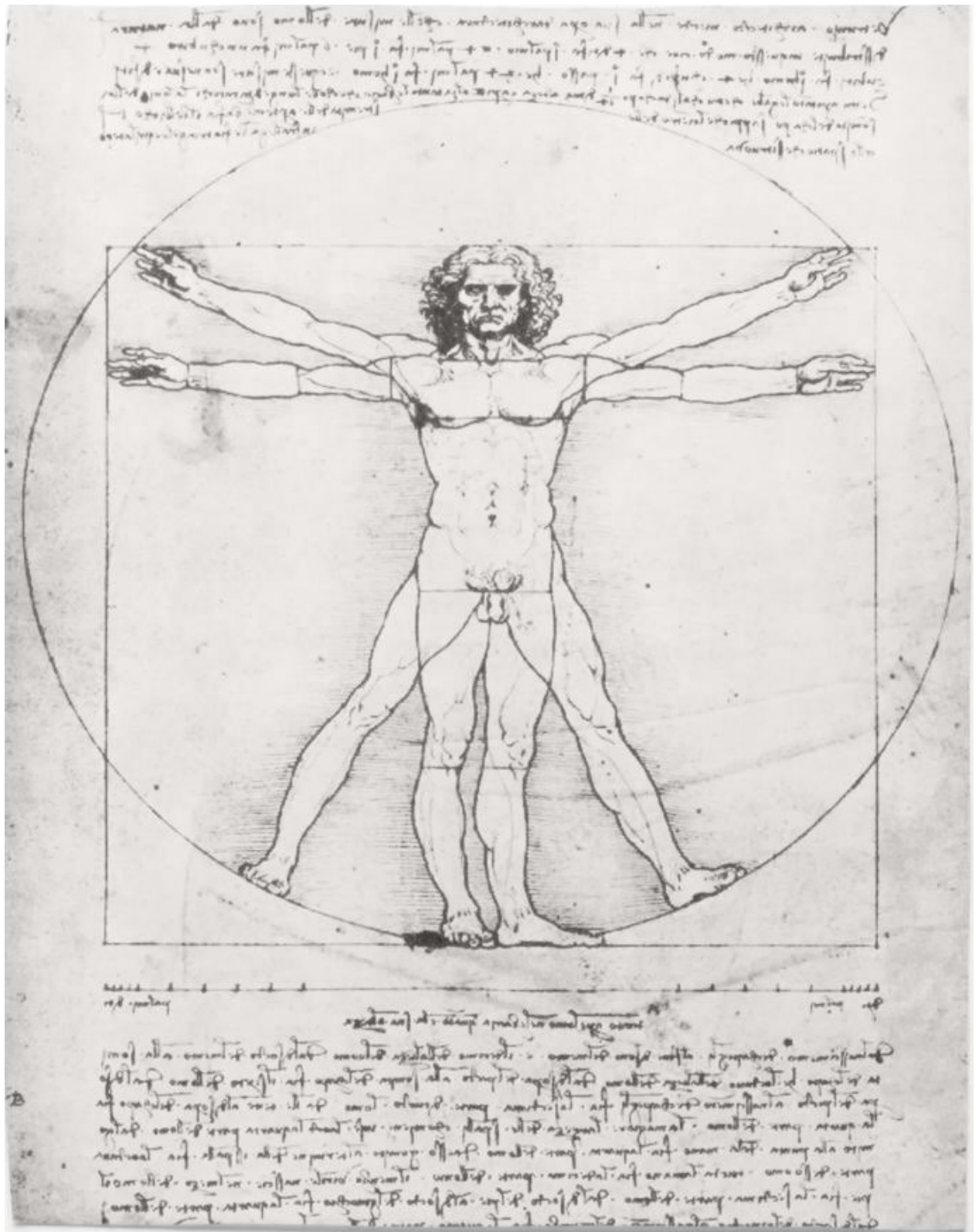


Figure 2. Vitruvian Man, Leonardo da Vinci (1490) (Vitruvian Man, 2023)

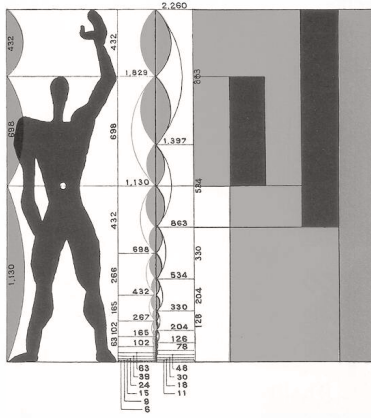


Figure 3. Modulor, Le Corbusier (1948) (Le Corbusier et al., 1999).

1.

Modulor's measurements reflect those of a Caucasian man of 1.83 metres. It marks the history of architecture because it built an understanding of the disconnection of the body caused by industry and its constant attempts to standardise the human (Arellano, 2018).

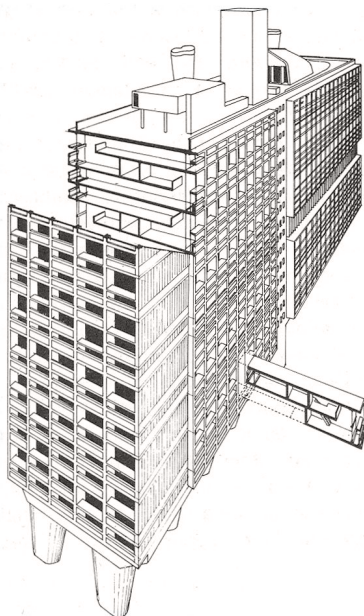


Figure 4. Drawing of the Unité d'Habitation in Marseille, Le Corbusier (1952) (Frampton, 2007)

humanity” (p. 141). A *humanism* in the shape of a universal *Man*, implicitly assumed to be male, white, urbanised, speaking a standard language and heterosexual (Irigaray, 1985). This constant white male model was part of the 20th century, influencing architecture and design. It was first described by Adolf Loos in his 1908 essay *Ornament and Crime* where, with a colonialist and racist discourse, he portrayed the history of design as a great Darwinian march of progress that begins in the “desire for ornament” of tribal cultures and ends in contemporary industrial society with its “lack of ornament”. He considered “the evolution of culture is synonymous with the removal of ornament from objects of everyday use”, adding “we have overcome ornament, we strive to reach a state without ornament” (Loos & Opel, 1998, p. 15). Some years later, Le Corbusier used Loos’ thought in a system of proportions elaborated for his 1951 work *Le Modulor*¹ (see Figure 2) (Dulić & Aladžić, 2016).

Architect Le Corbusier is considered one of the founders of modern aesthetics, bringing together many design ideologies in his influential modernist grand narrative (Rosińska, 2019). Le Corbusier’s central premise, which served as the foundation for his conception of the modernist revolution, was that during the industrial revolution, people no longer appreciate colour and decoration, as they are “of a sensory and elemental order (...) suited to simple races, peasants and savages” and prefer harmony and proportion which “incite the intellectual faculties and arrest the man of culture” (Le Corbusier, 1986, p. 143). Following Loos’ argument for removing the decorative element from design, Le Corbusier believed that the modern surface thus created is more suited to the more civilised modern man, and that it is a superior and universal aesthetic for which we should strive. The architect incorporated this new modern aesthetic centred on an athletic, but not universal, man of the future in his design for the *Unité d’Habitation in Marseille* (see Figure 3).

The restricted definition of *humanism*, which limits the concept of humanity to a specific type of human, significantly impacted design practice and is integral to understanding how we got to the current climate and social crisis. What remains is to question anthropocentrism as such. After all, the word *anthropocentric* indicates: “interpreting or regarding the world in terms of human values and experiences” (*Definition of Anthropocentric*, 2023, para. 2). This anthropocentrism is problematic because it focuses on a hegemonic perception of a particular human being, as explained above, and argues for the separation of the human and non-human experience. The disconnection results in the domination of one over the other, which is one of the primary reasons why the current climate crisis has arisen (Parenti & Moore, 2016).

2.2

Cartesian dualism and the birth of individualism

To understand the history of separation, between human and nature, it is necessary to go back to the 17th century when René Descartes argued that there was a unique dichotomy between mind and matter. Human beings are unique among all creatures in having minds. Plants and animals have no spirit or agency, no intention or motivation (Smit & Hacker, 2020).

The continuum between human beings and the rest of the living world was cut off in this clear dichotomy. Latour (1993) notes that this predisposition to classify and dichotomise, is a fundamental characteristic of the “modern critical position,” which creates “two entirely distinct ontological zones: that of human beings, on the one hand, and that of nonhumans, on the other” and establishes “a division between a natural world” and “society” (p. 11). This view became known as *cartesian dualism* and was a central theory to the culture of *capitalism* (Grosfoguel, 2011). Dualism established a desire for deviation between human beings and nature, between subject and object. It is a form of relationalism but one that, at the heart of our Eurocentric and capitalist culture, assumes the “preexistence of distinct entities whose respective essences” are not seen as “dependent on their relation to other entities” but rather as existing “in themselves” (Escobar, 2018, p. 101).

Bruno Latour addresses the impact of *cartesian dualism* on modern design in *A Cautious Prometheus? A Few Steps Toward a Philosophy of Design* (2012). In this article, he argues that by separating mind from matter and subject from object, designers have been trained to see themselves as objective observers rather than active agents who engage in co-creation with design materials. This attitude leads to a disconnect between the designer, the user ² and the context, as the designer focuses primarily on the form of the object. Latour suggests that this has promoted a division between the design and the remaining process, as the designer is seen as the creative force behind the object ³ while, for instance, the manufacturer is merely responsible for producing it. According to Latour this emancipation of the subject has led to a number of problems, including the neglect of the social and ethical dimensions of design, the lack of attention to the ecological impact of design, and the failure to recognise the complex interdependencies between humans and non-humans ⁴ (Latour, 2012).

2.
Here we cover the wide range of human, non-human and more-than-human users.

3.
This vision is frequently associated with star designers who have achieved fame and success through their work in the design industry. They are often regarded as trendsetters, and their work is sought after as a way to boost business. The influence of Cartesian thinking is evident as it emphasises the importance of the individual mind and its ability to reason and create. This focus on individualism has led to the notion that specific individuals possess a unique talent or genius that distinguishes them from others. This belief has been applied to the design world, where some individuals, such as Phillipe Starck, are seen as having an innate ability to create innovative and appealing designs (Quental, 2015).

4.
In the United States of America, around one billion birds are killed because of collisions with buildings. Simply because birds can not see the glass windows (Crook , 2022). This proves the failure to recognise non-human entities as a fundamental element of the design process.

Finally, in a broader social perspective, with the rise of dualistic modalities, Descartes influenced the hegemony of a subject who saw liberation as the individual liberty to realise oneself as a legitimate authority of a free subject. A mentality and practice supported by economic liberalism based on the rise of free trade and free market that was used as a “justification for colonisation, war and the subordination of other values, and the people who held them” (Fry, 2020, p. 54). These philosophical and political manifestations comprised modern individualism and the dominant capitalist economy.

2.3 Economy and Design driven by growth

Today, *capitalism* serves as the dominant economic model for most nations, becoming the standard for economic and material progress. This model stems from the free trade doctrine advocated by Adam Smith in his famous 1776 treatise, *An Inquiry into the Nature and Causes of the Wealth of Nations* (Smith, 1976). Smith’s core thesis was that trade should not face restrictions, that self-improvement occurs through diligent work, that this labor accumulates financial and human capital, and that such individual betterment automatically improves society overall (Hunt & Lautzenheiser, 2015). Over time, Smith’s depiction of self-interest facilitating market functionality was expanded and oversimplified, resulting in the caricature defined by Raworth as *Homo economicus*. In *Doughnut Economics*, Raworth (2017) criticizes the history of the notion of *Homo economicus* as an iconic portrait of humans which assumes them to be fundamentally individualistic, competitive, and rationally calculating. Raworth names Paul Samuelson (1925-2009), considered the *Father of Modern Economics*, as one of the primary creators of a hubristic illusion, stating: “The trouble, however, lies in what it leaves invisible...It makes no mention of the energy and materials on which economic activity depends, nor of the society within which those activities take place: they are simply missing from its cast of characters. Did Samuelson

omit them on purpose?” (p. 58).

The MIT economist, who drew the famous *Circular Flow Diagram* (see Figure 5), simplified economics to the point where social and environmental costs were no longer considered (Boehnert, 2018). Raworth examines the work and damage done by Samuelson’s famous diagram, which depicts technology and innovation as input that pumps through the economic system, generating investment that pushes along wages, creating public savings that stimulate consumption and boosts businesses, and all of this efficiently circulating back into technology and investment.

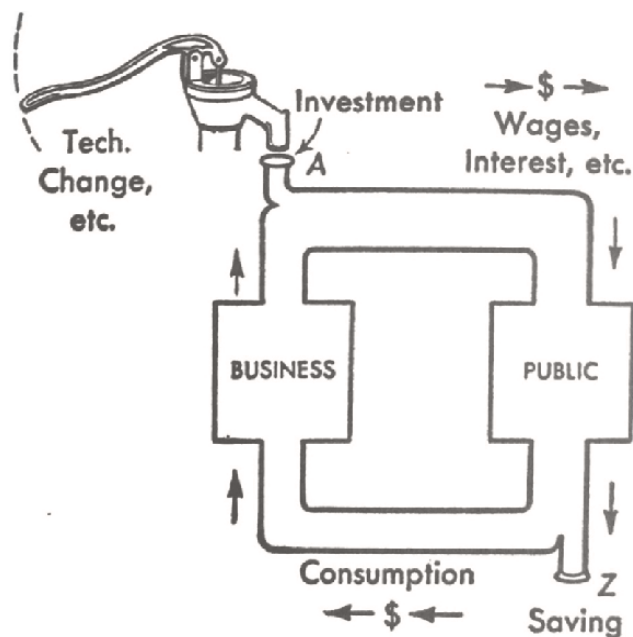


Figure 5. Circular Flow Diagram, Paul Samuelson (1948) (Giraud, 2010)

5. Externalities occur when the production or consumption of a good causes an impact on third parties not directly involved in the transaction (Externalities - Definition, 2023). Externalities often negatively affect those with nothing to do with their creation: air pollution, landfills, climate change - all externalities of our modern economic system.

6. According to *Oxfam report* (2020), the 2,153 wealthiest richest people in the world controlled more money than the 4.6 billion poorest combined in 2019 (Oxfam, 2020). In the same report, it is possible to read that “economic inequality is out of control” (pag 9), and this is due to the failure of the economic system that privileges the wealth of the few, mostly men, in favour of 2.5 billion hours of work combined every day without pay or recognition by adult and young women around the world.

But Samuelson’s vision conveniently excludes *externalities*⁵ (Raworth, 2017) - like environmental degradation or a social factors and invisible unpaid actors, as women’s work.⁶ We can observe the connection of modern and capitalist economic thinking to *cartesian dualism*, for making us believe that the world is not really alive, and certainly not part of us, but is just an object, an externality, to be extracted and discarded - and again, in the (non-)humanistic *Western-centric* view, this also means that the majority of human beings are not included (see Figure 6).

The consolidation of capitalist consumer societies was the consecration of the constant increase in productivity due to the increase in consumption as a central element for capital accumulation. There is an urgent need to recognise and address

TIME TO CARE

The world's billionaires, only **2,153 PEOPLE** in 2019, have more wealth between them than **4.6 BILLION PEOPLE**.



The combined wealth of the world's **22 richest men** is more than the wealth of all the women in Africa.



If you saved \$10,000 a day since the building of the pyramids in Egypt you would have only one-fifth the average fortune of the 5 richest billionaires.

The world's **RICHEST 1%** have more than twice as much wealth as **6.9 BILLION PEOPLE**.



The monetary value of **UNPAID CARE WORK** globally for women aged 15 and over is at least \$10.8 trillion annually –three times the size of the world's **TECH INDUSTRY**.



Taxing an additional 0.5% of the wealth of the richest 1% over the next 10 years is equal to investments needed to create:



117 MILLION JOBS

in education, health and elderly care and other sectors, and to close care deficits.

Figure 6. Time to care, Oxfam (Coffey et al., 2020)

note: This image accompanies Oxfam's 2020 report *Time to Care: Unpaid and underpaid care work and the global inequality crisis*. In this image we can see the three areas that the report addresses: wealth and inequality trends; unpaid care work; taxes and paying the care deficit.

7.

One of the historical examples in which design has been instrumentalised in favour of a strategy centred on individual human benefit was planned obsolescence. *Planned obsolescence* refers to intentionally producing a product with a limited lifespan. One of the most astonishing historical examples comes from the history of light bulbs. The world's oldest lightbulb hangs at a fire station in Livermore, California. It has been there almost without interruption since 1901 (Livermore's centennial light bulb, 2014). In 1924, a group of light bulb manufacturers, including *General Electric* and *Phillips*, formed a cartel to take control of their trade. They created a plan to respond to declining sales, agreeing to produce only light bulbs designed to last a maximum of 1000 hours rather than the 2500 hours they might normally run (Rivera & Lallmahomed, 2016). This meant that the manufacturers could use cheaper materials and produce more bulbs at lower costs, and their customers would have to buy new ones over the years. The current industrial and economic scenario encompasses a historical perspective that was not always evident but has now come to light. This perspective exposes a culture of individualism and consumption, which clashes with planetary and social concerns.

the fact that environmental and social problems result from political economies that systematically prioritise profit-driven options - for example, *planned obsolescence*⁷ - over more sustainable options. In his critique of consumer culture, *The Waste Makers*, Vance Packard (2011) identified both *functional obsolescence*, in which the product loses quality quickly, and *emotional obsolescence*, in which products are designed to become obsolete in “the mind” of the consumer, even sooner than the components used (p. 68).

Tony Fry (2020) describes the profound implications of modern individualism in terms of design characterising advanced industrial society as an aspect of *defuturing*, a term defining evolution that has created systemic unsustainability and made other possible futures impossible. Inevitably associated with war and technology, for him defuturing became a worldwide impulse with the rise of industrialism, productivism, Americanism or Fordism (Fry, 2020). We can look at the effects of *defuturing* by analysing the Figure 7.

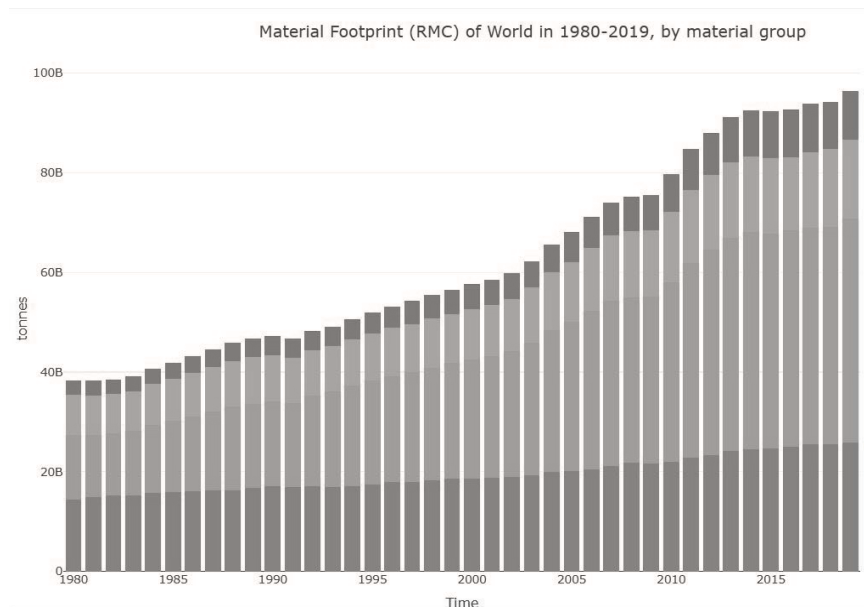


Figure 7. Global Material Footprint 1980-2019, Material Flows (Material Footprint , 2023).

As gross domestic product (GDP) growth becomes entrenched as a core political objective around the world (Hickel & Kallis, 2020), material use explodes: it reaches 38 billion tons by 1980, hits 60 billion tons by 2002, and then screams up to 97 billion tons by 2019. There is no doubt that some of this increase represents important improvements in people's access to necessary goods - what Karl Marx defined as

8.

For Karl Marx, the value of a commodity has two necessary aspects: *use value* and *exchange value*. *Use value* refers to needs and wants, *exchange value* is based on having use value for others, social use value (Marx et al., 1981). For example, the value of wheat. Whatever its social form, for Marx wealth always consists of use-values. From the taste of wheat, it is not possible to know who produced it. Although use values serve social needs and therefore exist in the social framework, they do not express the social relations of production. Different use values have different measures appropriate to their physical characteristics. So, the use value is the physical entity in which a determined economic relationship is expressed - the exchange value.

9.

Bringezu (2015) suggests a safe target of 25-50 billion tons. It is difficult to define an aggregate limit for the materials footprint, since different materials have different impacts (e.g., the impact of extraction varies depending on the technologies used to manage it). However, there is a consensus around 50 billion tons as a reasonable maximum limit value (Bringezu, 2015).

*use-value*⁸ (Marx et al., 1981). But at what price? Scientists estimate that the planet can support a total material footprint of about 50 billion tons per year⁹ (The SDG's Report, 2019). This is regarded as the safe upper limit, but, as we can read on the chart, we are almost exceeding it twice over. And virtually all of this excess is being driven by overconsumption in high-income countries (see Figure 8) - consumption that is organised not around *use value*, but the *exchange value*.

Material footprint per capita, 2000 and 2017 (metric tons per person)

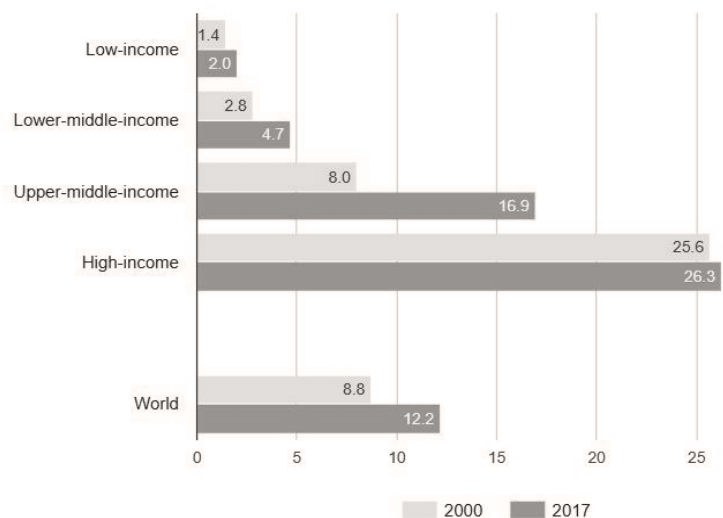


Figure 8. Material footprint per capita 2000 - 2017, United Nations (The Sustainable Development Goals Report, 2019).

The influential 1972 book *The Limits to Growth* demonstrated that if humanity continued pursuing economic growth—as measured by GDP—without accounting for environmental costs, global society would sharply decline in the first half of the 21st century, potentially culminating in collapse (Meadows & Club of Rome, 1972). The authors, Meadows, Meadows, Randers and Behrens III, predicted that under Business as Usual (BAU) conditions, available food, living standards, and ultimately, human population would decline without changes (Meadows et al., 2004). As part of the *Earth4All project*, Herrington's 2022 report *The Limits to Growth Model: Still Prescient 50 Years Later* compared empirical data to the *World3 model*'s 1992 projections, recalibrating to verify the real consequences of maintaining the *status quo* and define possible future scenarios (see Figure 9).

The BAU represents the attitude of ever-increasing growth that is “tacitly ubiquitous in society” (Herrington, 2022, p. 3). In the

BAU chart, the demand for growth continues until the collapse caused by resource scarcity.

The Business as Usual 2 (BAU2) scenario also represents business as usual but with twice as many natural resources. This scenario was added to respond to the actual reality of a larger supply of natural resources compared to the 1970s. But more abundant resources do not prevent collapse since “the cause of the collapse merely changes from a resource scarcity crisis to a pollution crisis” (Herrington, 2022, p. 4). BAU2 tells the story of the ecosystem collapse due to accumulated pollution and thus can be considered as the approximate climate change scenario.

Comprehensive Technology (CT) (Fig. 9) represents the belief in technology and humanity’s ability to innovate beyond environmental constraints. In this scenario, the assumptions include unprecedented technological innovation in a world that otherwise does not change its ultimate goal of growth. Technological solutions do indeed help to avoid a total meltdown but still result in declines because “so many resources need to be diverted towards technological innovation that not enough remain for agricultural production and health and education services”(Herrington, 2022, p. 4).

In the Stabilised World (SW) (Fig. 9), humanity consciously renounces continuous expansion as its ultimate pursuit. We have shifted societal priorities from “material consumption and industrial growth towards health and education services, as well as pollution abatement and resource-efficient technologies”(Herrington, 2022, p. 4). Essentially, society limits its material footprint and changes priorities to meet human needs and protect the environment. This prevents collapse and leaves humanity at the highest levels of well-being.

After this analysis, we observe that the BAU2 (Fig. 9), the scenario that most closely represents the current state, shows that until then, continuous increase in global levels of well-being should stop around the year 2030 and the collapse will happen around 2040. Therefore, we can conclude that infinite growth on a finite planet is impossible (Herrington, 2022).

Several economists argue that contemporary markets are heavily reliant on economic growth fueled by the extraction and consumption of fossil fuels, which has led to significant environmental degradation. This development model, characterized by pollution and depletion of natural resources, has resulted in the destabilization of planetary systems to an alarming extent. Renowned economist Lord Nicholas Stern (2007) has referred to climate change as the most significant and far-reaching example of market failure ever witnessed (Stern, 2007).

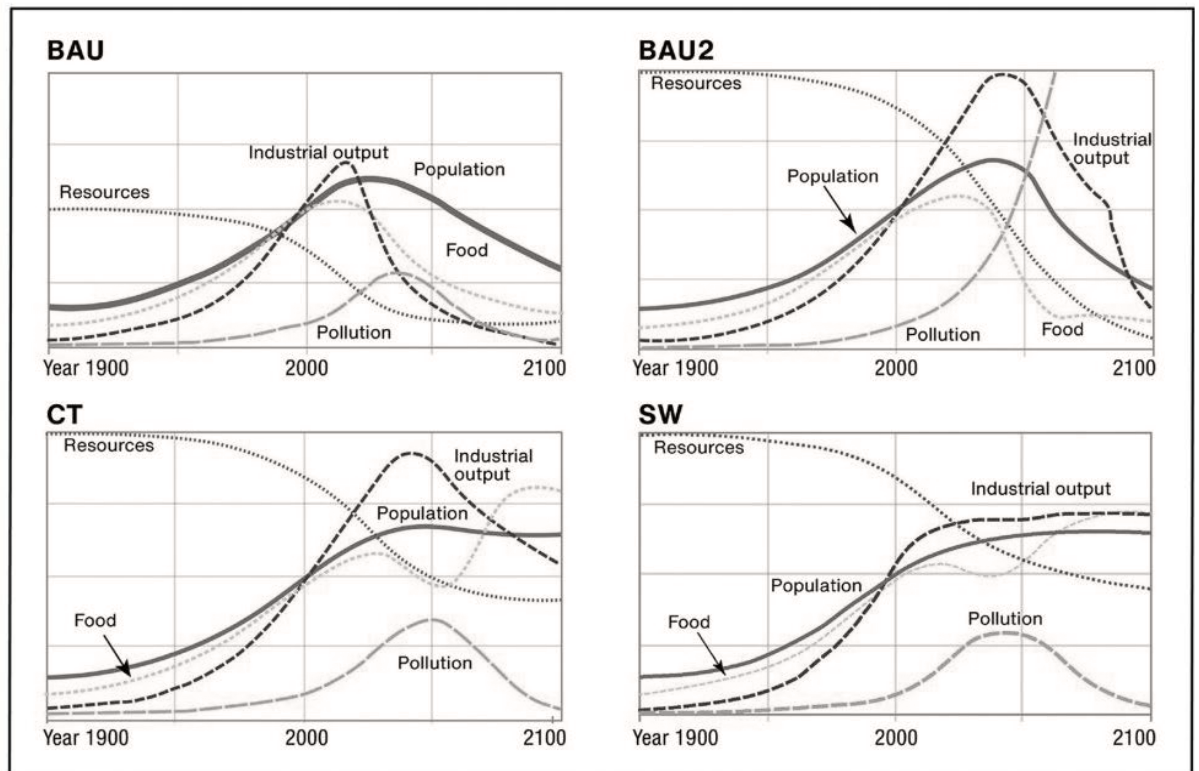


Figure 9. BAU, BAU2, CT and SW scenarios of the 2004 *The Limits to Growth* book (Meadows et al., 2004)

The reason for this is the fact that *capitalism* inherently promotes the destruction of natural habitats and social systems in order to perpetually satisfy the demands of the market. In this quest to fulfil the fundamental principle of modernity, the design disciplines have been pivotal in supporting and perpetuating it.

Today, designers continue to confuse terminology such as *use value* and *exchange value*. Although they recurrently describe their function as creators of value for users (use value), the real purpose of their work is ultimately to design for profitability and growth (exchange value). Design has emerged as a highly profitable strategy for differentiating products, primarily aimed at enhancing the volume and frequency of consumption upon which *capitalism* and consumer culture rely. Designers employ their skills to optimise human-system performance, making products more desirable, feasible, and viable while maintaining a central focus on growth. Consequently, the production of goods and services is subordinated to the expansion of capital (Wood, 2017). Such unsustainable practices have become integral to daily life, leading to irreparable environmental damage and social inequality. The phenomenon resulting from these practices, climate change, poses significant threats to various aspects of human life, including health, livelihoods, food security, water supply, and overall human security (IPCC, 2023).

For this reason, by relying on a traditional reductionist ontology, the design supports this generalised devastation by aligning itself with the neoliberal framework and its empty concept of progress (Escobar, 2018).

2.4 The Anthropocene

Many indicators suggest that an unseen era in Earth's history has emerged. The preceding era of the *Holocene* - the current interglacial period that began about 10,000 years ago (Bova et al., 2021), was relatively stable. However, now the life support systems of our planet have started to fail rapidly. Studies show that, especially after the two world wars, several social-ecological indicators ¹⁰ (see Figure 10) start to exceed *planetary boundaries* (Steffen et al., 2015).

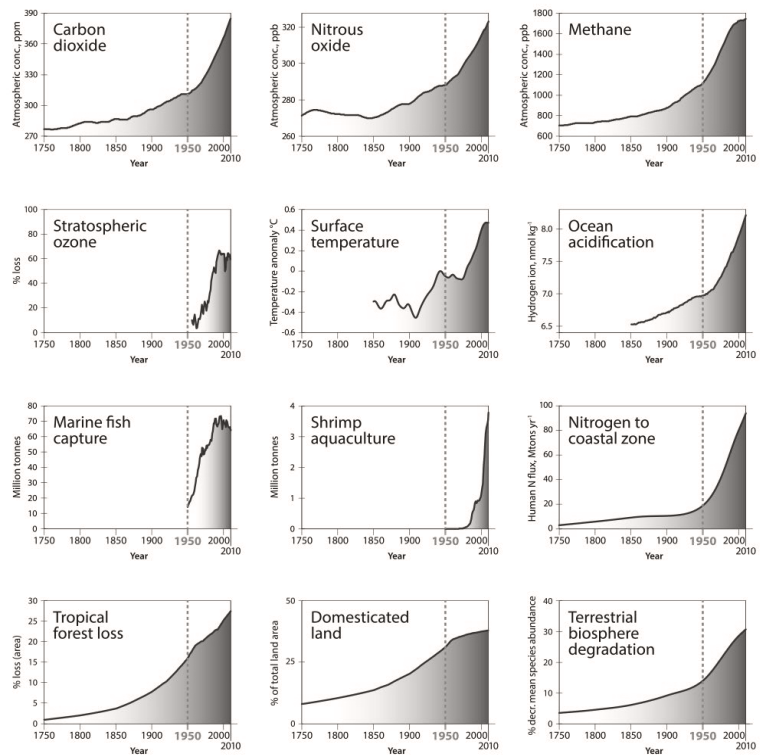
The *Planetary Boundaries* approach (see figure 11) is a example that attempts to define a safe operating space for humanity by analysing the intrinsic dynamics of the Earth System and identifying points or levels relating to critical global-scale processes beyond which humanity should not go. According to Rockström (2009), the concept identifies nine biophysical boundaries that, if crossed, could cause irreversible environmental changes for human well-being. These include climate change, ocean acidification, stratospheric ozone, biogeochemical nitrogen and phosphorus cycle, global freshwater use, land system change, atmospheric aerosol loading and the rate at which biological diversity is lost (Rockström et al., 2009).

Socioeconomic indicators imply that human well-being has improved since the onset of the *Great Acceleration* ¹¹ (Steffen et al., 2015). However, this progress has significant consequences, as evidenced by the infringement upon *planetary boundaries*. It has been established that the modern world, characterised by its focus on economic growth, reliance on fossil fuels, and high consumption patterns, is systematically degrading natural systems (Wiedenhofer et al., 2020).

10.
The biosphere, the Earth's life layer, is made up of all the planet's ecosystems. This together with human systems form socio-ecological systems. These include the economic, political, cultural and technological aspects of humanity and accompany the ecological aspects of the earth. The socio-ecological indicators can help us understand the interactions between humans and nature (Folke et al., 2016).

11.
The period after 1950 has witnessed a significant surge in human population growth, energy consumption, and emission of greenhouse gases, among other trends that have far-reaching implications for the environment and socio-economic conditions. This rapid acceleration of human-induced trends is commonly referred to as the *Great Acceleration* (Shoshitaishvili, 2021).

Earth system trends



Socio-economic trends

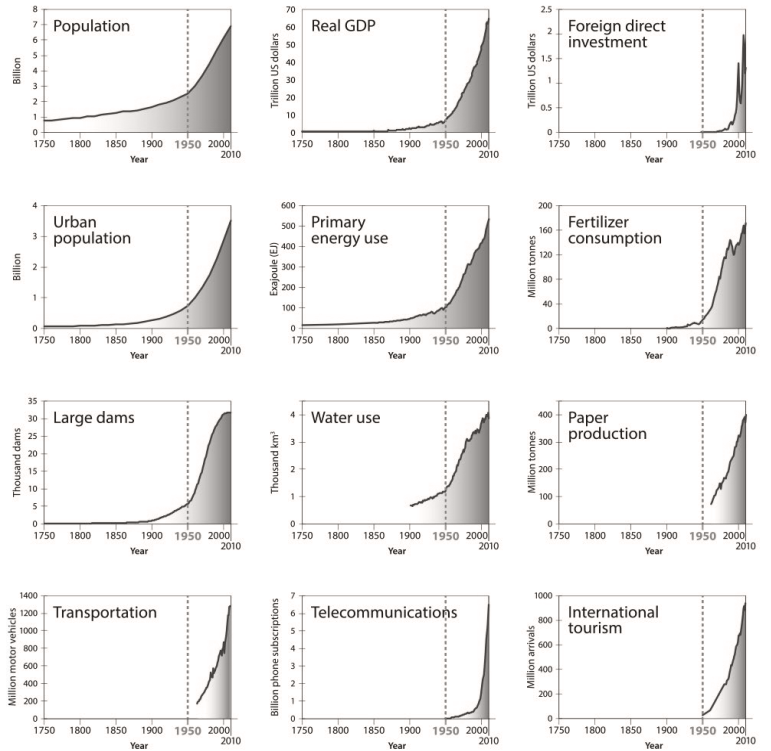


Figure 10. Socio-economic and earth system trends after the Great Acceleration (Steffen et al., 2015).

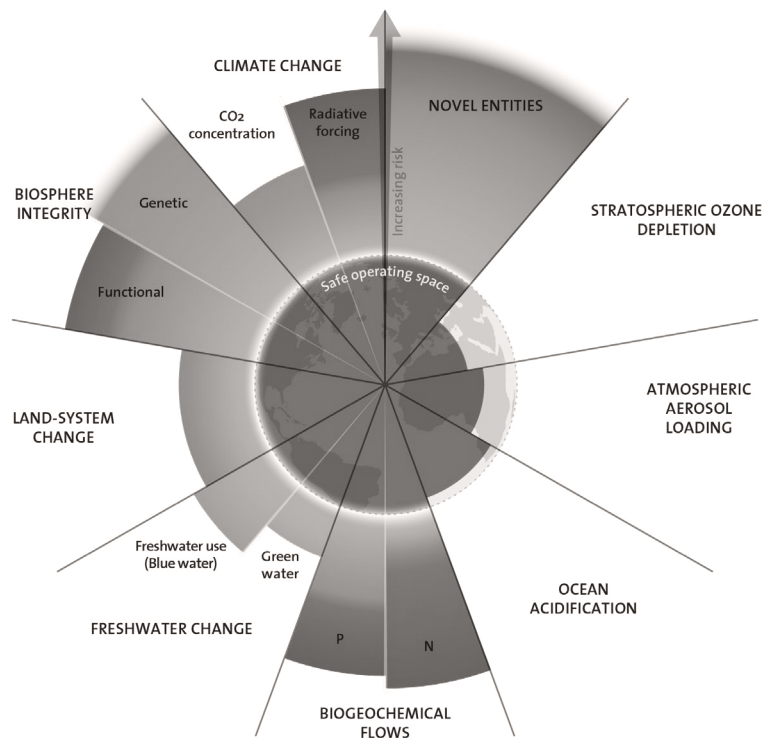


Figure 11. The state of the planetary boundaries (Richardson et al., 2023).

Consequently, six of these *planetary boundaries* have already been breached (novel entities, climate change, biosphere integrity, land-system change, freshwater change and biogeochemical flows) (Richardson et al., 2023). In contrast, the others are under severe threat. This underscores the urgent need to reassess and reorient our development models to ensure the long-term sustainability of our planet and its inhabitants.

The drastic changes in social and ecological systems witnessed during the last century show that the ecology and geology of our planet are being pushed to the limit. Humanity has become the most fearsome force of nature. We are in a new geological epoch, called the *Anthropocene*, where human activity has negatively impacted individual ecologies and the entire system of our environmental interactions (Böhm et al., 2022).

The term *Capitalocene* has been proposed by some scholars to denote a new ecological epoch characterized by capital accumulation, the pursuit of power, and the exploitation of nature across successive historical periods (Moore, 2018). Under this perspective, the *Capitalocene* represents more than just a new era of ecological challenges. It also signifies a period marked by *anthropocentric* and individualistic ideologies that have shaped society and, as a result, significantly influenced design practice. The *Capitalocene* links ecological crises to broader political, economic, and cultural forces, contextualizing

current sustainability challenges facing design within more comprehensive socio-historical processes. Rather than viewing environmental problems as solely technical issues, the *Capitalocene* viewpoint sees them as connected to capitalist drives for capital accumulation and power relations that lead to environmental exploitation. This framework understands modern attitudes centred on human interests and individualism as factors that have impacted the relationship between human civilization and nature, with implications for design's responsibilities. Thus, The *Capitalocene* prompts questions about design's role in perpetuating or transforming unsustainable systems and mindsets.

2.5 Conclusions

In short, contemporary design seeks to confront its modernist heritage founded on colonialist and imperialist principles. As a practice deeply intertwined with the rise of *capitalism*, mass industrial culture, and the exploitation of natural resources and human labour, design has contributed to the oppressive, productive, and extractive logic of *Western* modernity. In parallel with this effort to critique the past, design is also undergoing a profound reassessment of its traditional ontology (Buchanan, 2001), stemming partly from the urgent discourse around the *Anthropocene*.

In the awakening to the realities of the *Anthropocene*, where material resources are finite and ecological impacts are undeniable, fundamental questions arise about the future of design. Given the characterizations of design's legacy, the relation between crisis and problematic ontology has become evident. To shape design's future path, we must ask:

How can design evolve to stop serving individual and economic interests? What would constructing a *post-anthropocentric* design entail? Should design practices consider both human and non-human experiences? What will it take for designers to seek ideas from the social and environmental justice perspective? Furthermore, what limits will they need to set for their practices?

By raising these questions, the *Anthropocene* challenges traditional design assumptions and prompts reflection on reconstructing design in more sustainable, just, and *post-anthropocentric* ways.

III Another design is possible

“Above all, we have to learn two things:
to learn what an extraordinary place
the world is and to learn to be
wide enough inside for the
whole world to enter.”

(Agostinho da Silva, 2006)

3.

Mental Models for a Changing World

3.1

System thinking based on mental models

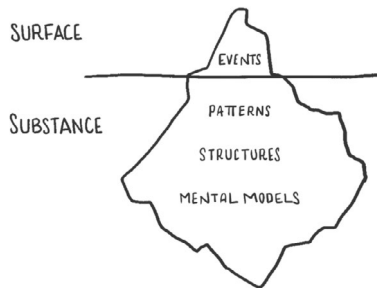


Figure 12. Iceberg model from Goodman (1997), adaptation by Unschool (Acaroglu , 2020)

12.

Some fashion brands promote sustainable fashion lines but sometimes focus mainly on superficial aspects, such as using organic or recycled materials while overlooking more significant issues like the high consumption rate, poor labour practices or intensive and unsustainable cotton cultivation (Pucker, 2022).

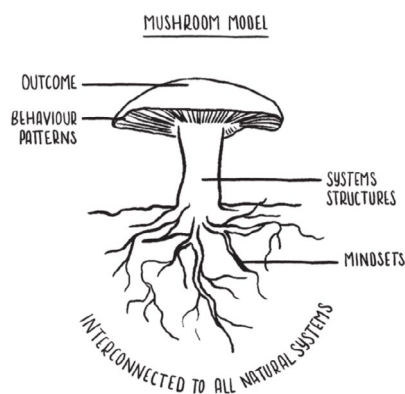


Figure 13. Mushroom model by Unschool (Acaroglu , 2020)

The urgent and global challenges presented above require the construction of new paradigms of conception, relationship and action that operate from a mental model level. The concept of *mental models* was initially coined by psychologist Kenneth Craik (1967) to explain a set of attitudes or mental dispositions that predetermine how we understand the world. They not only shape what we think and how we know, but also the connections and opportunities we see (Craik, 1967). So better understanding how mental models internally represent complex and dynamic systems and how these representations change over time will allow us to develop mechanisms to improve the effective management and use of natural resources (Jones et al., 2011). Consistent with this, Kania et al. (2018) state that the importance of working at the mindset level is key to ensuring lasting change (Kania et al., 2018). To understand the importance of actions in terms of mental models, we can use the adaptation (see figure 12) of the representation created by Michael Goodman in 1997.

The *iceberg model* is a classic systems thinking tool used to discuss the root and visible dimensions of a problem (Goodman, 1997). Like the iceberg, in systems thinking most of what is happening we cannot see. The image shows that what is visible above the waterline, the tangible 20% of a proposed solution, can only be sustainable in time if what lies below the surface, the 80% of the system, supports the surface actions (Baron & Ghelich Khani, 2021). Some of the recent approaches to environmental conservation operate only at the surface level, offering technical solutions independent from the lower levels.¹² This is why more solutions are needed that integrate the various relational levels and go all the way down to the mindset.

Later we will address the need to recognise the interconnection of everything, but first it is also relevant to mention the *Mushroom Model* (see figure 13), a redesign by Leyla Acaroglu (2020) of the *Iceberg Model*. She argues that, like the iceberg, much of what sustains a forest is not visible to us (Acaroglu , 2020). We can see a mushroom, but not the complex network of mycelium that runs underground and acts as a link in the system. The mushroom we see appearing is just the emergent result of

the whole system. So the mushroom is an "emergent property of the complex hidden system of mycelium" (Acaroglu, 2020, para. 6). This alternative to the *Iceberg model* demonstrates the interconnected relationships that reinforce the systems around us through the metaphor of how the system, through the mycelium, communicates, shares resources, and flourishes.

Based on these models, this chapter aims to be the beginning of the reformulation of design practice, assuming that we must act at the level of mental models. To this effect, the research was structured following the vision proposed by *transition design*.

3.2 What is Transition Design?

In the course of this research, it has been evidenced that a new design approach is urgently needed to address the *wicked problems*¹³ confronting societies in the 21st century (Hughes & Steffen, 2013). An approach that seeks to seed and catalyse social transitions to more sustainable and desirable long-term futures (Porritt, 2013).

Most *wicked problems* already mentioned - such as climate change, crime, political polarisation, or biodiversity loss - are system problems, have multiple root causes, and are linked to other problems¹⁴ (Jones, 2014). So they are a challenge for several reasons:

- involve multiple stakeholders with conflicting agendas;
- go beyond disciplinary boundaries;
- the challenges are not clearly defined and stakeholders rarely share a common understanding of the problem;
- the problem is continually changing and evolving;
- problems exist at multiple levels of scale and are interdependent and interconnected;
- any attempted solution in one part of the system has unpredictable ramifications in other parts; interventions can take a long time to evaluate, and problems a long time to resolve (McNall et al., 2011).

In the field of design, systems thinking is an approach that encompasses an analysis of the components of a system, taking

13. In contemporary design, *wicked problems* can be understood as complex systemic problems. Wicked problems are composed of diverse constituencies and stakeholders with conflicting agendas and concerns and exist at various levels of spatio-temporal scale. This problem cannot be understood or solved from a single discipline. Similarly, multiple interventions over time will likely result in a vague solution or solutions (McNall et al., 2011).

14. For example, homelessness in many cities can be directly linked to other problems, such as the financial crisis, opioid addiction, gentrification, racial profiling and a lack of access to education. Issues such as racial profiling can arise from within the city and its neighbourhoods, but others, like the financial crisis or the national opioid epidemic, originate at the national or global level.

into account their interdependencies, the dynamic changes of the system over time and its interactions with the wider environment (Design Council, 2021). This design methodology seeks to address authentic needs, contribute substantially to solving difficult situations and facilitate progress towards a sustainable society.

An emerging area of design that draws on systems thinking is *Transition Design* (TD). Gideon Kossoff (2015) introduced *Transition Design* by arguing that the transition to sustainable futures is a design process that requires a new vision, an integration of knowledge and a need to think and act at different levels (Kossoff, 2015) - with regard to the intricate relationships, connections and contextual differences. In other words, design transitions are complex processes that take time and are fundamentally about actively changing ways of thinking and behaving. In other words, TD constantly seeks to recognise the need for solutions based on new and more sustainable socio-economic and political paradigms. So, how can *transition design* be a solution to the system problems we currently face?

As shown in Figure 14, TD can be positioned at the end of the spectrum, where speculative, long-term visions of sustainable lifestyles challenge existing paradigms and serve to inspire and inform the design of short and medium-term solutions ¹⁵ (Irwin, 2015). It believes social, economic and political change is intrinsic to design, that global problems must be addressed locally, and that the transition to new conjunctures is not only urgent but inevitable (Escobar, 2018).

For this to be established, TD assumes that due to the high level of complexity of today's challenges, they cannot be solved by a single group of people or discipline (Irwin, 2019).

15. While *Service Design* works within existing paradigms and *Design for Social Innovation* challenges existing paradigms, *Transition Design* proposes radically new paradigms (Irwin, 2015).

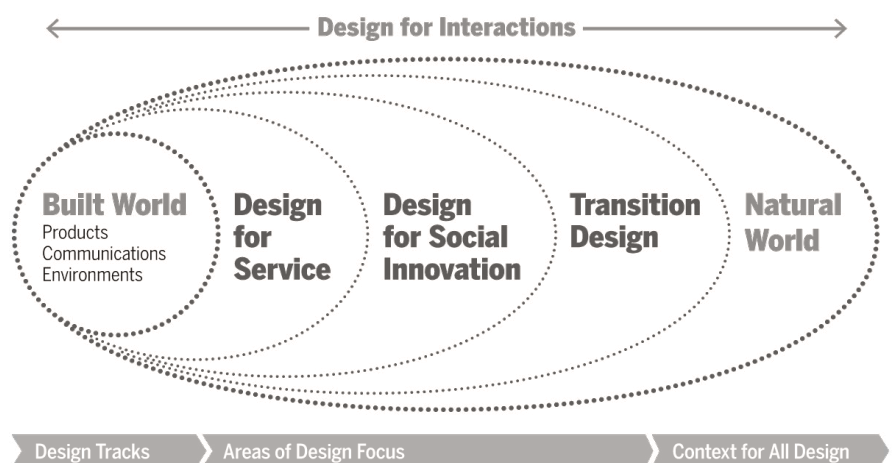


Figure 14. Design for Interactions, Carnegie Mellon School of Design (Design for Interactions, 2023).

Solving these problems requires collaboration and interaction across many domains and disciplines (Irwin, 2018). Design is, therefore, both the meeting point between “science, philosophy, psychology, social science, anthropology and the humanities” (Irwin, 2015, p. 3), and open to the knowledge and perspectives of stakeholder groups connected to and affected by the problem (Irwin, 2018). In short, design, which for a long time was centred on an *anthropocentric* and individual perspective, is now focused on the interactions with people, the built world and the natural world.

Although TD is seen as a complementary pathway and draws on a myriad of other design approaches - for example, providing greater “leverage for projects undertaken in the service and social innovation sectors” (Irwin, 2015, p. 232) - we can and should consider the following foundations for a transition project:

16.

Living systems theory explores events in terms of dynamic patterns of relationships between organisms and their environments. Principles such as self-organisation, emergence, resilience, symbiosis, holarchy and interdependence are leverage points for initiating and catalysing change in complex systems (McNall et al., 2011). A unique essence distinguishes all living systems, and all have, based on this uniqueness, an inherent potential from which they are moving or away, depending on their state of integrity and vitality or health (Mang & Reed, 2012).

17.

For example, at the household level, the need for affection would be satisfied by long-term relationships, often biologically based; at the neighbourhood level, the same need would be satisfied with more accessible and varied relationships and quicker and more spontaneous contacts (Kossoff, 2015). So, the exact needs can be satisfied, but in different ways at each level of scale and time.

18.

A community-based approach can integrate different existing or emerging solutions. The objective is to reconstitute the domains to reintegrate and recontextualise community knowledge (Kossoff, 2015). It is an endeavour to enable communities to regain their resilience and autonomy.

- Draw on *living systems theory*¹⁶ as an approach to address wicked problems;
- Propose solutions that protect and restore social and natural ecosystems;
- Consider lifestyles as the fundamental context for design;
- Advocate place-based and globally interconnected solutions;
- Design solutions for variable time horizons and for various levels of scale;¹⁷
- Build on existing solutions so that they become steps in a broader transition vision;
- Extend emerging and baseline solutions;¹⁸
- Base solutions on maximising satisfaction for the broadest possible range of needs;
- See the designer’s mindset as an essential component of the design process;
- Call for the integration of transdisciplinary knowledge (Kossoff et al., 2015).

The above points suggest multiple specific skill sets for a new design perspective, which aims to go beyond social innovation that typically “challenges existing socio-economic and political paradigms” but often fails to take a systemic and long-term view (Fuller et al., 2015, p. 8).

3.3 Dimensions of Transition Design

As the ecological and social challenges of today become more complex and interconnected, traditional design methods need to be revised to address them effectively. TD represents a relevant contribution to design discourse and education in a moment when design schools and designers are feeling the pressure to adapt. The initiative to create a *transition design* perspective is an attempt to reorient design, providing a knowledge basis for designers to navigate through the uncertainties inherent in the transition to more positive futures (Escobar, 2018). TD is summarised in a *Carnegie Mellon School of Design* (CMU) framework (see Figure 15) that provides a logical basis for bringing together the relevant transdisciplinary knowledge, skill sets and practices to understand, seed and catalyse systems-level change (*Transition Design Seminar CMU*, 2023). The framework consists of four mutually reinforcing dimensions: visions; theories of change; mindset and posture; and new ways of designing (Fuller et al., 2015). The rest of this research will be based on studying and complementing each of these dimensions so that, in the end, we can define key changes to reorient design towards a *post-anthropocentric* and *regenerative* path. These changes will also be the starting point for a new design context of action, towards which we aim to move.

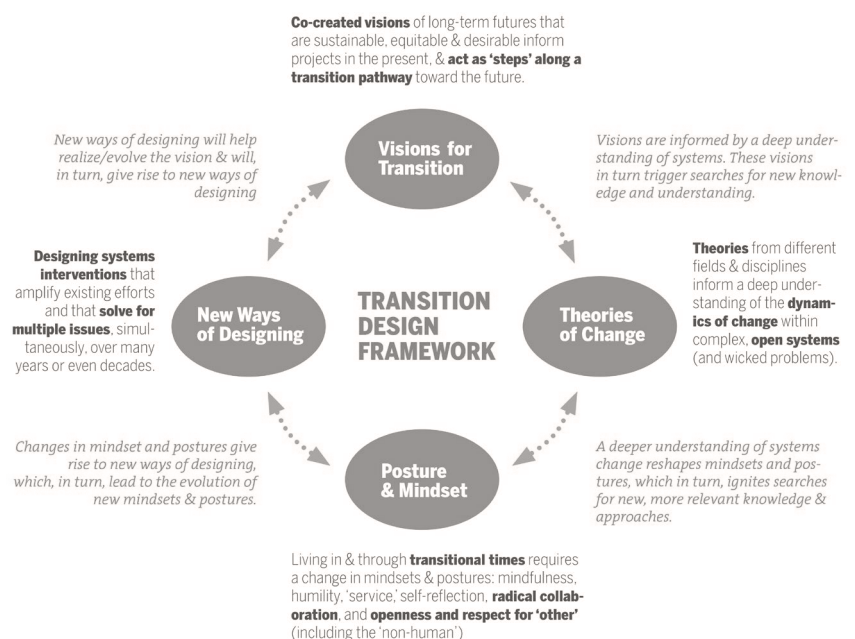


Figure 15. The Transition Design Framework, Carnegie Mellon School of Design (Transition Design Seminar CMU, 2023).

4.

Visions of transition rooted in Axes of change

4.1 Visions

Transition Design proposes that design should be focused on more compelling future-oriented visions to inform and inspire projects in the present, and “that can serve as measures against which to evaluate design moves, but visions that are also modifiable according to the changing situation” (Tonkinwise, 2014, p. 14). This approach requires us to suspend disbelief, forget how things are now, and wonder how things could be, creating spaces for discussion and debate about alternative futures and new ways of being (Dunne & Raby, 2013). TD creates visions of the future that deny a one-size-fits-all process, and that emerge from local conditions and remain open and speculative (Fuller et al., 2015). Thus, design practice is a “circular, iterative, and error-friendly process” (Irwin, 2015, p. 234) that seeks to speculate radical new ideas for the future to inform solutions in the present.

The following attributes should be considered when defining transition visions:

- Open-ended - embracing the social, economic and environmental dimensions, highlighting the interconnectedness of systems. Future visions of preferable worlds would “continually change and evolve” (Fuller et al., 2015, p. 233). They seek to consider the impacts of decisions on future generations¹⁹ based on knowledge gained from projects and initiatives in the present.

- Conceive Locally - emphasises the imperative of *cosmopolitan localism*²⁰ due to its grounding in distinct cultural, historical, and ecological context. The proposal involves fundamentally restructuring societal behaviors wherein essential necessities are fulfilled within the local or regional domain, while the economy operates to satisfy needs rather than pursuing growth as an end in itself (Irwin, 2015).

The vision of sustainable futures provides a picture through which existing lifestyles and design interventions are assessed and critiqued against a desired future state (Margolin, 2007). Through the diversification of design, we encourage the ability to imagine the future and inspire short, medium and long-term solutions. In this research, the main approach will converge in exploring RD thinking. But first, we must define principles that help us frame more specific visions for collective action. The next content will explore six axes for transition thinking.

19.

This dissertation considers that neglecting the very long-term future is a serious mistake. An alternative perspective is provided by longtermism, according to which we should be particularly concerned with ensuring that the distant future goes well (Greaves & MacAskill, 2019). It is an ethical point of view according to which altruism is the primary motivation for reducing existential risks for humanity (Moorhouse, 2021).

20.

Wolfgang Sachs coined the term *cosmopolitan localism*, defining it as a place-based lifestyle in which solutions to global problems are designed for local circumstances and adapted to specific social and ecological contexts while being globally connected in their exchange of information, technology and resources (Sachs, 1999).

Six axes for reorienting design vision

The following research provides a schematic outline of the six axes for thinking about transition strategies proposed by Arturo Escobar (2022). Escobar argues that these axes are strongly interrelated and equally important, with no single strategy taking precedence (Escobar, 2022). Each of the axes is linked to pressing issues and open questions, regarding the “spread of the patriarchal and capitalist ontology of hierarchy, domination, appropriation, control, and war” (p. 27), which are the result of the dominant worldview ²¹. Thus, the discourse that follows involves an analysis of these six axes: The re-communalisation of social life; The Re-Localisation of Social, Economic, and Cultural Activities; The Strengthening of Autonomy; The Simultaneous Decolonisation, De-Patriarchalisation, and De-Racialisation of Social Relations; The Re-Integration with the Earth; The Construction of Meshworks Among Transformative Initiatives and Alternatives (Escobar, 2022).

21.

A dominant worldview, or just a particular mode of existence, is what Arturo Escobar refers to as a historically specific way of being, thinking and doing, based on the *Western* model - explored in part *The State of Design* - that aims at the domination of a single, individualistic and patriarchal life model (Escobar et al., 2022).

The re-communalisation of social life

Globalisation has entailed destroying what is communal and collective by creating a social perspective of consumers who see themselves as individuals who make decisions only individually and in market terms. Yet history teaches us that human experience has been largely community-based. For example, according to activists in Oaxaca, we must adopt the principles of love, care and compassion as an ethic of life, starting with our home, place and community (Esteva & Guerrero, 2018).

Re-communalisation is not based on isolation, but rather on the condition for greater sharing and interconnectedness that is rooted in a collective and integrated fabric of life with the entire spectre of non-humans (Escobar, 2022). We should bring this orientation of sharing into our thoughts and actions when we want to deepen our understanding of something, or when we want to create entirely new projects. Thus, each social group and each locality must create its unique set of re-communalisation strategies, in harmony with place, landscape and diversity. Recommunalisation might be

translated into design guidelines for resilient communities, or in terms of life projects in communities of place that are at once rooted, open, and mobile (Manzini, 2019). Design will move towards the shared realisation of multiple real and possible futures (Escobar, 2018), countering anthropocentric global thinking.

The Re-Localisation of Social, Economic, and Cultural Activities

The phenomenon of displacement, which refers to the forced movement of individuals away from their original locations, has increased exponentially in recent years, resulting in substantial social and ecological ramifications (Third Committee, 2022). Given the profound costs associated with this contemporary global situation, it is imperative to expedite the process of relocalizing multiple activities.

Numerous ongoing endeavors are dedicated to relocalise activities²² and reclaim a degree of autonomy over eating²³, learning, healing, dwelling, and energy. This undertaking requires a significant reorientation of the environments we inhabit (Escobar, 2022). It demands transformative changes in production systems, the reevaluation of *commons*, and the reestablishment of connections between rural and urban areas. Although these initiatives primarily operate at the local and regional levels, they possess the potential to instigate profound transformations on national and international scales (Escobar et al., 2022).

The Strengthening of Autonomy

In the absence of autonomy, it becomes difficult to achieve a substantial level of successful re-communisation and re-localisation (Escobar et al., 2022). Autonomy implies rethinking systems²⁴ as processes that emerge from the relationships of human beings with each other and with the earth, oriented towards the reconfiguration of power in a less hierarchical way, based on principles such as “sufficiency, mutual aid, and the self-determination of the norms of living” (Escobar, 2022, p. 35). Design can refocus on the autonomous production of life and livelihoods by returning to the notion that each community practices the design of itself.

22.

We have the example of the *Commonsverse* which draws on the “deeper wisdom of the *commons*, which accepts the idea of distributed, local and diverse acts of communion, whose very liveliness produces the creativity and commitment to develop solutions adapted to each context” (Bollier & Helfrich, 2019, p. 205).

23.

Food is one of the most crucial areas, and it is also where a great deal of community innovation is taking place in many regions of the world.

24.

Relocalising, recomunalising and strengthening autonomies involves restructuring the economy concept - contemporary movements in defence of the *commons*, social solidarity and *degrowth* all point in the same direction. We will explore alternative economies in the following chapters

The Simultaneous Decolonisation, De-Patriarchalisation, and De-Racialisation of Social Relations

Patriarchy is so embedded in our personal thoughts and desires - being part of the social, economic, cultural and political system - that we can see it as an ontology that privileges separation, hierarchy, appropriation, denial of the other, control and, sometimes as a justification for violence and war (Maturana & Verden-Zöllner, 2012). This is why we have to question and challenge the patriarchal assumptions that are a normalised part of our lives (Escobar et al., 2022).

De-patriarchalising and de-racialising social relations means practising a feminist and anti-racist politics centred on the collective production and reproduction of life. These feminist and relational politics needs to be incorporated into design practices in order to create systems in which we are all equal, based on interdependence and care (Svampa et al., 2021).

The Re-Integration with the Earth

We must necessarily reconsider our relationship with the Earth as crucial to any transition process (Escobar et al., 2022). As we will see in the course of this research, it is important to recognise the fact that we live on a planet of interdependencies (Escobar, 2018). We must seek a reintegration with the Earth. Be in search of new paradigms of the relationship between humans, the Earth and non-human beings; and of cultures and ontologies that have lived with a strong consciousness of earth²⁵ (Escobar, 2022). Design needs to reconnect with the earth, making it a central part of the process.

25.
Here, we must include the indigenous wisdom that was and is forgotten by design professionals (Watson, 2022).

The Construction of Meshworks Among Transformative Initiatives and Alternatives

This last axis points to the need to promote the convergence and articulation of genuinely transforming alternatives (Escobar, 2022), if possible from below.²⁶ If transitions necessarily imply articulation initiatives of various kinds, there is a growing recognition of the need to build bridges between alternatives, favouring those based on relational and pluralist worldviews (Escobar et al.,

26.
As mentioned in the iceberg model - promote the alternatives starting with the 80 per cent of the system that supports the actions.

2022). Thus, building the conditions for such innovative imaginings becomes one of the most important intellectual and political tasks in which design can operate (Escobar, 2022). Design can help take paths towards direct forms of political and economic democracy, localised self-reliance, social justice and equity, cultural and knowledge diversity, and ecological resilience.

In summary, the six axes offer a holistic and integrated framework for reimagining design approaches in the context of global challenges. By recognising the complementarity of the axes and integrating them into design practices, we can work towards a more inclusive, sustainable and equitable future that embraces the complexities of our interconnected world. These axes offer a roadmap for transformative strategies, each uniquely contributing to desirable changes. However, these changes can be unpredictable, which emphasises the need for a better understanding of potential horizons.

4.3 Three Horizon Thinking

Working with systemic challenges requires us to befriend uncertainty, change and unpredictability in order to engage communities in dialogues and ask the right questions to drive transformation and continuous learning. Designers need tools and practices that help them to understand what might be possible under dynamic or uncertain conditions.

Three horizon thinking (see Figure 16) developed by Bill Sharpe, is an effective method for dealing with uncertainty and visioning distinct perspectives of the future (Sharpe et al., 2016). The model not only makes us think about interactive patterns but, more importantly, “it draws attention to the three horizons always existing in the present moment, and that we have evidence about the future in how people (including ourselves) are behaving now” (Sharpe, 2020, p. 2).

The first, horizon one (H1), represents business as usual, characterised by long-established ways of doing things and, in many cases, no longer suited to the current context (Wahl, 2016). It is characterised by incremental innovation that maintains the *status quo* (Sharpe et al., 2016).

The third, horizon three (H3), represents a “viable world” vision (Wahl, 2016, p.66). The H3 change is transformative, bringing into existence a new pattern that is beyond the reach of the H1 system (Sharpe, 2020). Sharpe’s intention was to help groups, which may include visionaries, pragmatists and conservatives, to have more constructive conversations and, for example, to agree on the aspects of H1 that should be retained or the ideas of H3 that are not yet ready to be implemented but should nevertheless be considered as an end state (Sharpe et al., 2016).

Finally, horizon two (H2) represents the world in transition, which means it responds to the failures of the first horizon and anticipates the possibilities of the third horizon (Wahl, 2016). New ways of doing things emerge disorderly through a combination of deliberate action and opportunistic adaptation in the light of circumstances. The moment H2 become more effective than existing H1 practices, they begin to replace aspects of ‘business as usual’. However, some of these innovations are absorbed into H1 without leading to fundamental and transformative change, while others can be considered as a possible bridge between H1 and H3 (Sharpe, 2020).

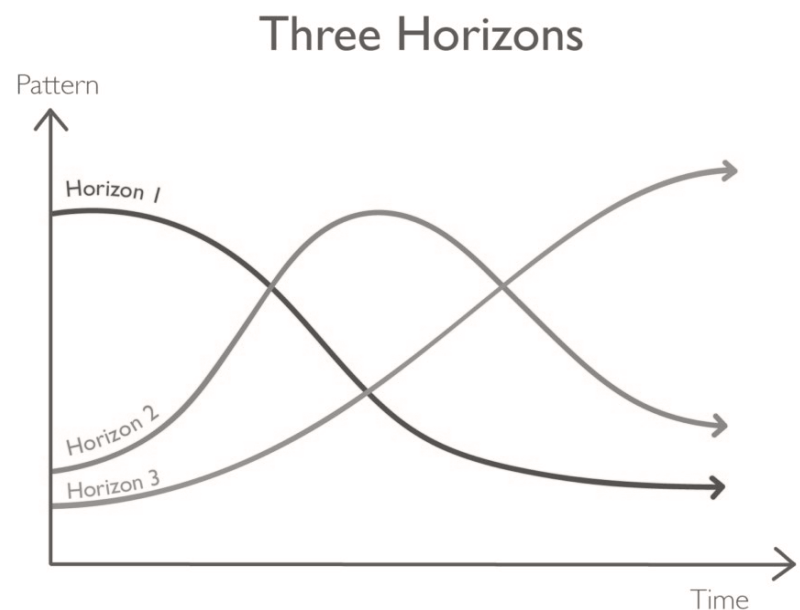


Figure 16. Three Horizons Thinking from Bill Sharpe (2016), adaptation by H3Uni (Seeing and Thinking in Three Horizons, 2023).

In the context of *transition design*, the axes aim to create a new design vision and will act as an “antidote against globalocentric thinking” (Escobar, 2022, p. 33). Design faces a tremendous challenge to escape this seductive model and develop solutions that allow cultural, social and ecological reintegration, returning a meaningful connection to people, place and planet. Based on the axes, we can summarise the thinking into six central pillars for visions in design:

Community vision

Local vision

Autonomy-oriented vision

Feminist vision

Integrated Earth Life vision

Interrelational vision

By using these pillars as a value bias in our use of the Three Horizons methodology, the solutions to be created will be favourable to the standards we want. Then we can start constructing a series of questions that can serve as a guiding framework throughout the process:

1

how can we restore communal and collective life? How can the principles of love, care, and compassion be integrated into the design process?

2

Can we reshape local, regional, and national solutions to promote relationships, the commons and local life? How can re-localisation initiatives help to address these challenges?

3

How can design be used to promote local autonomy? What are the challenges to autonomy? And what are some key strategies that should guide these efforts?

4

How can we challenge patriarchal assumptions and promote feminist and anti-racist politics? What are some practical steps that could be taken? and how can design be used to support these?

5

How can we promote reintegration with Earth? and what are some key practices, and knowledge that can help support this goal?

6

Why is it imperative to promote convergence and articulation of these alternatives? How can building relationships lead to more equitable and resilient communities? and what role can design play in this process?

However, in combining all factors, it is crucial to emphasise that designers can only develop effective visions if they seek participatory processes with various stakeholders, truly incorporate local knowledge and promote shared visions (Tonkinwise, 2014). These visions have the capacity to serve as a way of assessing if we are making the right design decisions, but never forgetting that they are also adaptable depending on the situation. In this process with emergent, slow and patience results, the design of systems-level change will require fundamentally different mindsets and postures (Irwin et al., 2020).

5.

Exploring a new ontology of design as a driver of a new Mindset and Posture

A new proposal for a transition period implies self-reflection and adopting a new way of “being” in the world (Irwin, 2015, p. 235). Transformative changes are frequently triggered by a shift in perspective or worldview, leading to fresh approaches to interacting with others (Irwin, 2015). The IPCC, for example, has recognised that transformative change “often involves a paradigm change and may include shifts in perception and meaning, changes in underlying norms and values” (O’Brien et al., 2012, p. 465). Looking at individual and collective mindsets is about considering the beliefs, values, assumptions and expectations that result from individual and shared experiences, cultural norms, religious and spiritual convictions, and the socio-economic and political frameworks that shape our lives (Fuller et al., 2015).

While not enough attention is given to our Mindset and Posture as designers, these profoundly impact “how we look at a problem; what kind of contexts we frame it within - social or environmental concerns; how we attempt to solve it.” (*Transition Design Seminar CMU*, 2023, sec. 5). TD argues that transition solutions will be better conceived within the framework of a more holistic mentality of the world that can inform new, more collaborative and responsible postures (Irwin, 2015). The characteristics of a more holistic mindset will be mirrored in postures that consequently result in new attitudes ²⁷.

27.

For example, our mindset shifts towards seeing human beings as part of an interconnected and interdependent web of life. In that case, we will have a posture of humility and reverence for nature (Irwin, 2015).

If we look at the title of this dissertation - *Design for Regeneration: A shift to a post-anthropocentric mindset* - there is an explicit consideration of the importance of changing our mindset. This chapter is not intended to be closed upon itself because constructing a new mindset depends on the general understanding of the content studied. We also place our proposal in evolution from *sustainable* to *regenerative*, which will be explored in later chapters. With this in mind, designers will see themselves as agents of change, be ambitious in their desire to transform systems and lifestyles, and understand that transition requires a commitment to iterative work, at various scale levels and over long time horizons (Irwin, 2015). As a result of this chapter, we intend to set out guidelines to drive transformation.

As previously highlighted, ontological dualism has resulted in a fundamental separation between humans and non-human entities, mainly due to the priority given to humans (Berry, 2015). This dichotomy has created a disconnection that impedes the ability to recognise and appreciate the interconnectedness and interdependence of all living beings.

Moreover, the current social structure, often referred to as “heteropatriarchal capitalist colonial modernity” (Escobar, 2022, p. 25), represents a dominant worldview that is characterised by self-imposed assumptions about life, knowledge and the world. This worldview has shaped our practices, institutions and social structures, and is based on historical and contemporary associations with the modern West. These concepts reflect a particular way of being, thinking and acting that has become deeply ingrained in our social fabric (Escobar, 2018). It is essential to recognise and understand these structures in order to assess their impact on society and the environment. Only then can we begin to address the urgent ecological and social crises that our world faces today.

The connection of these reductionist worldviews to the contemporary crises of climate change, energy, poverty, and inequality continues to resonate strongly in design practices today. Therefore, if we desire design futures that prioritize social, cultural, and political participation and ecological sustainability, we must begin by acknowledging that we do not inhabit a world made up of a singular reality but rather multiple and plural existing worlds (Escobar, 2018). As Tony Fry (2015) aptly argued, “while the planet is singular, the world is plural—for it is formed and perceived in difference—as are we.” (p. 21). This contradicts the notion of a homogeneous world, which is still widely assumed in many disciplines and practices.

The sensitivity to difference is crucial because it contributes to the argument that what needs to be sustained is not total consensus but the formation of plural agreements that accommodate a diverse range of needs and experiences. Being sensitive to differences means recognizing and respecting various perspectives, values and needs between groups, cultures and individuals. Rather than assuming universal experiences or working towards a complete agreement, sensitivity to difference

values the uniqueness of each voice. It seeks partial agreements that make room for plurality and diversity. Accommodating this range of needs and experiences requires attention to difference, not homogenization or universality. Sensitivity to navigating and defending differences while finding common ground is an essential skill. This capacity must also recognize that there are worlds beyond human systems (Knappett & Malafouris, 2008). Arturo Escobar (2018) argues that “all living, human or not, takes place within a relational matrix” and that it is time to build a notion of the “interconnectedness of all life” (p. 12) as a central part of ecology and transition narratives. The call for civilizational transitions designates the complex movement from the dominance of a single model of life to the coexistence of a multiplicity of models: the *pluriverse*.

The design field is currently undergoing a comprehensive reassessment of its traditional ontology, much of which has been prompted by the urgent discourse surrounding the *Anthropocene*. Scholars of ontological design, including Tony Fry and Anne-Marie Willis, contend that design is not merely a unidirectional means of creating worlds, but rather a reciprocal process of co-constitution that disrupts notions of causality and non-human *agency* (Fry, 2012). Willis argues in his article *Ontological Designing* (2006) that design is fundamental to human existence, shaping both us and our creations (Willis, 2006). From this perspective, it becomes imperative to challenge the universalist notion of “the human”²⁸ (Rees, 2018, p. 40) and move towards a posthuman or more-than-human perspective on design. As in other areas, we must develop “sympoietic”²⁹ practices for living on a damaged planet” (Haraway, 2017, p. 67) within the field of design. This urgent rethinking is necessary to understand design’s complicity in the global climate crisis and its role as a driver of extractivism, mass industrialisation, and waste production.

Design thinking has historically viewed animals, plants, and the organic and inorganic environment as infinitely replenishable resources, devoid of *agency* and value beyond utilitarian ends. Given this, how can we reformulate the ontology of design to begin to recognise the interconnectedness of the Earth as a network of non-human and human beings? This question is crucial for developing sustainable and ethical design practices that can effectively address the urgent challenges facing our world today.

28.

Anthropologist Tobias Rees has described the problem behind the idea of “the human” in the following words: “‘The human’ – just as well as the category of ‘humanity’ – is not a universal, a timeless ontological category that has always existed. Instead it is a recently invented concept that emerged in Europe about 250 years ago and that became subsequently universalized”. (Rees, 2018, p. 40)

29.

The term *sympoiesis* derives from the Greek words “syn”, which means “together”, and “poiesis”, which means “creation or production” («Sympoietic», 2019, p. 1). It is used by Donna Haraway (2017) to mean making with. The author argues that nothing makes itself, but rather is created and defined by the interactions and relationships between its parts (Haraway, 2017). A *sympoietic* system is continually formed and transformed by its relationships with its environment (Beth & Dempster, 1998).

In his widely cited book *Ecology without Nature* (2009), Timothy Morton challenges the idea of a division between humanity and nature, proposing a new way of ecological thinking (Morton, 2009). He argues that humans are not the ultimate measure of all things, which contradicts the classical humanist view. Morton builds on Harman's idea that the world is not solely what is manifest to humans, and that it is not nonsensical, but rather necessary, to consider a reality beyond our thinking (Bryant et al., 2011). Both Morton and Harman advocate for the importance of non-human entities and beings, emphasising an urgent need to change our relationship with all other beings, be they animals, plants or minerals (Morton, 2017). By recognizing and embracing the interconnectedness of all living beings, we can begin to develop a more comprehensive ecological understanding that transcends traditional divisions and hierarchies.

They propose another relationship with the world, with objects and with hierarchies called Object-Oriented Ontology (OOO). The human being is no longer the centre of the universe and does not place himself above other beings (Harman, 2018). Starting from the same assumption as Arturo Escobar, all entities are interdependent, from objects to animals, plants to minerals (Escobar, 2018). This consideration requires us to realise that human beings are no longer seen as ontologically unique regarding *agency*³⁰. In part, this reflects the fact that defining non-human *agency* depends on the resolution of a broader question:

What does agency look like beyond the human context?

This question continues to engage discussion but, in the last two decades, many studies have increasingly recognised that humans are not the only agents capable of influencing and transforming other entities (Knappett & Malafouris, 2008). As Latour (2018) highlights, sustainability transformations are rooted in the physicality of our world: water, air and soil. By extension, humans are “no longer the only actors” but are part of hybrid assemblages of humans and non-humans (p. 43).

30.

The ability to take action or to choose what action to take («Agency», 2023).

The philosophy known as Object-Oriented Ontology (OOO) rejects the *cartesian dualism* that distinguishes between thinking human beings (*res cogitans*) and non-human animals, inanimate objects, and the human body itself (*res extensa*). Instead, OOO offers a new perspective that recognises objects possessing unique properties and qualities that cannot be reduced to their relationships with other objects. OOO is similar to Bruno Latour's (2007) version of actor-network theory (ANT) by emphasising the constant formation of hybrid entities in which humans merge with non-humans. Fox and Alldred (2015) stress the importance of studying assemblages of human and non-human, animate and inanimate, material and abstract entities, as well as the affective flow within these assemblages, rather than focusing solely on individual bodies, subjects, experiences, or sensations.

OOO is primarily concerned with exploring objects' fundamental nature and hidden or withdrawn qualities. ANT approach considers that actors are associating and constructing networks of heterogeneous agents through translations, or relationships. Thus, the focus is not on the actors but their relationships with other actors (Law & Hassard, 1999).

Latour (1993) notes that this predisposition to classify and dichotomize, is a fundamental characteristic of the modern critical position, which creates "two entirely distinct ontological zones: that of human beings, on the one hand, and that of nonhumans, on the other" (p. 10) and establishes "a division between a natural world and society" (p. 11).

The actor-network approach assumes that no actor is passive, all have some degree of *agency*, but all vary in the extent to which they influence or resist the influence of other entities (Somerville, 1999). At this stage, not only should humans and non-humans be viewed within the same framework, but *macro-actors*³¹ and *micro-actors*³² should also be viewed in this way. According to Wise (1997), this notion of *agency* means that macro-actors cannot be more powerful than a priori micro-actors³³ (Wise, 1997). Thus, ANT focuses on an actor not because he is or is not human or because of his size, but because he has the most significant role in a network. These could be action points for design to focus on the relationship between actors rather than on the actors.

31.

Macro-actors in ANT refer to large-scale entities or actors that have significant power and influence within a network (institutions, organisations or etc).

32.

Micro-actors refer to smaller-scale entities or actors within a network (individuals, objects or even non-human entities).

33.

For example, a big company like *IKEA* (as a macro-actor) cannot act on its own, but only through its agents (be they human representatives or its computers).

In this investigation, the central aim is to study OOO's particular interest in the qualities and interrelationships of objects rather than in hierarchies. Thus, Harman (2018) presents the concept of flat ontology, which opposes reductionism and open hierarchization. For *flat ontology*, the main enemy is *taxonomical prejudice* (Harman, 2018). This prejudice assumes from the beginning that the world must be divided into a small number of types of entities - *cartesian dualism* is an excellent example of this prejudiced hierarchization. To better understand the concept of *flat ontology*, we turn to the most straightforward explanation found in the words of Garcia (2014) when summarizing the work of Manuel DeLanda: "In Manuel DeLanda's rereading of Gilles Deleuze's philosophy, the idea of a flat ontology was used to describe theories that do not order worldly entities hierarchically -either in accordance with the substantiality of entities, or based on transcendental principle- but that attribute an equal autological dignity to each individuated thing" (pag.4).

As is clear from Garcia's words, a *flat ontology* does not mean a reduction in the importance of the human being. Instead, it is a restructuring that aims to look at "all objects equally" (Harman, 2018, p. 402) and a rejection of the "ontological delusion that humans are radically different in kind from all other entities" (ibid., p.404). We start from the premise that "humans, animals, inanimate matter and fictional characters all equally exist" (ibid., p. 55). This way, we go against preconceived hierarchies and obtain an initial egalitarian approach to objects. As Ian Bogost (2012) says, "all beings equally exist, yet they do not exist equally" (p. 11). In doing so, he admits that not all things are equal in qualities, but they are equally important. Thus, all objects deserve the same attention; one object is not a priori more important, critical or sacred than another, and human beings are no exception to this rule.

To reinforce his position that everything is interconnected, Harman (2018) defines OOO as a philosophy against "physicalism, smallism, anti-fictionalism, and literalism" and that "... among other things, OOO holds that the external world exists independently of human consciousness" (p. 38). Against *smallism*, object-oriented thinking argues that objects are constantly related in different dimensions and scales, physical, psychological or temporal, and being understood actively or

passively (Harman, 2018). All of this happens in ways that escape human comprehension. According to Harman (2018), there is no direct access to the world that can permanently establish the existence of objects because there is no permanent knowledge. In other words, something is always unknown or inaccessible, no matter how much we observe, measure or interact with it. This leads us to consider that the complexity and greatness of an object cannot make it less or more real than its parts (ibid, 2018).

In the same way, we should not be in a hurry to eliminate fictional objects from existence. By fictional, we do not just mean fictional characters but also everyday objects that we apparently consider real but which we will never be able to access the truth of their existence (ibid, 2018). After all, without interaction, there is no tangible division between reality and fiction. Moreover, this leads us to an *anti-literalist* approach. This approach is because any literal description or perception of something does not give us its essence but only a tiny translation (ibid, 2018). Therefore, accessing reality through interaction - such as the in-person perception of a problem - is a more sensible way of accessing reality than any literal information.

In conclusion, Object-Oriented Ontology (OOO) underlines the equal importance of all objects and their complex relationships, challenging traditional hierarchies and human-centred perspectives. This approach transposed to design can help define a posture that seeks to counteract prejudices and make all actors equal parts of the process. By doing so, we constantly question the vastness of independent objects beyond human consciousness.

5.5

Hyperobject

34.

We can better understand the concept of hyperobject through an example. Let us look at the city of Porto as a hyperobject. Porto is viscous. When we are in Porto, we are absorbed and immersed in it. What puts us in Porto is not our location; instead, we are inside its reality, in the air, in the water, in people, in all kinds of animate and inanimate beings surrounding us. Porto is non-local because its boundaries could be ambiguous and sometimes even non-existent. For example, the Douro River becomes part of Oporto when it crosses the city. Let us say where the Porto ends horizontally, but where are the city limits vertically? Non-locality means that the particular compromises the general itself. Porto is not just a geographical formation or an urban construction. It relates to all the other objects it incorporates and the objects containing it. Being a river bank, a riverside house or the Clérigos tower. Porto is geologically millenarian but was baptized by the Portuguese hundreds of years ago. Moreover, the objects that make it up have various ages and are in different stages of their life. These temporal and local undulations make it almost impossible to understand and define Porto. Finally, Porto is interobjective. It is a mesh of interrelated objects of various dimensions, shapes, types and physicalities. Like any hyperobject, it is beyond the total comprehension of human beings (Morton, 2013).

35.

The German philosopher Martin Heidegger explored the nature of being and “being in the world,” and proposed that they could vary for humans, nonhuman life, or inert objects (Dasein - Definition, 2023, para. 2).

Timothy Morton (2013) coined the notion of “independently of human consciousness” with the term hyperobject in his book *Hyperobjects: Philosophy and Ecology after the End of the World* as “things that are massively distributed in time and space relative to humans” (p. 1). For him, hyperobjects carry a distinct significance for philosophy and ecology. So, he defines five main characteristics of a hyperobject: viscosity, nonlocality, temporal undulation, phasing and interobjectivity ³⁴.

Morton (2013) summarises the core of his proposal as follows:

“Hyperobjects have numerous properties in common. They are viscous, which means that they ‘stick’ to beings that are involved with them. They are nonlocal; in other words, any ‘local manifestation’ of a hyperobject is not directly the hyperobject. They involve profoundly different temporalities than the human-scale ones we are used to [temporal undulation] ... Hyperobjects occupy a high-dimensional phase space that results in their being invisible to humans for stretches of time [phasing]. And they exhibit their effects interobjectively; that is, they can be detected in a space that consists of interrelationships between aesthetic properties of objects.” (p. 1-2)

Morton proposes that global warming is a hyperobject that fundamentally alters humanity’s ontological and epistemological experience, or how human beings experience “being in the world” ³⁵ (Heidegger et al., 2008, p.104). Instead of perceiving themselves as being in control of their lives and activities, humanity is increasingly forced to adapt. Humans lose *agency*, because “Hyperobjects are not simply mental (or otherwise ideal) constructs, they are real entities whose premordial reality is withdrawn from humans” (Morton, 2013, p. 15). Human beings are just one more of the many forms of life and matter on Earth that have to coexist.

In recognising the profound implications of hyperobjects, Timothy Morton highlights the concept of global warming as a good example that challenges humanity’s perception of control, underlining the need to recognise the *agency* and the interdependence of all life forms on Earth.

Considering the challenges of the *Anthropocene*, we should seek to develop new ways of looking at and evaluating things. Incorporating OOO, ANT and Hyperobjects concepts into the design field is essential for many reasons. It provides the foundation for a flat ontology, an approach to design that is object-oriented rather than merely human-oriented. Then, it defines and characterises an external world independent of humans, which gives us insight into objects temporally, conceptually, and structurally (Morton, & Boyer, 2021). For this reason, it allows for a holistic approach and understanding of the conditions and state of the world we live in and for which designers are designing. So, a non-human-centred design evaluation would result in an emancipation from an individualistic approach based on a flat ontology, focus on relationships, and be more inclusive and comprehensive. A new design mindset could be guided by the following principles:

All objects must be given equal attention, whether human, non-human, natural, real or fictional. *The designer must look at everything as an equal object*³⁶.

36.

We orient each principle following the logic of looking at each act of design as an object. This is not about reducing the practice's amplitude but extending it to the whole spectrum that *object* can have.

Objects have the ability, through their actions, to influence the world around them. *Designers must consider how objects interact with each other and shape their environment*, not just how they can be used by humans.

Every designed object is an intervention in nature and the network of connections. To understand the complexity of objects is to recognise that they are in constant relationships and challenge the idea that objects can be viewed in isolation. *The designer must take into account the interconnectedness of everything.*

Although the definition of an object is elementary, objects themselves are complex. As we saw, every object could also be considered a hyperobject. *The design must consider complexity.*

The designer should be open to the possibility of new and unexpected relationships between objects. This approach requires a desire to experiment, take risks, and explore objects' potential beyond their current uses and meanings.

All design attempts must take into consideration understanding the context of objects. *The designer must be able to understand different scales of space, time and mind.*

Efforts to integrate this knowledge offer substantial potential for enhancing future designs. Furthermore, by empowering non-human entities with goal-setting and decision-making capabilities, designers can augment their influence on design outcomes. It is not a proposal to not determine hierarchies or priorities, but rather an initial posture that considers all entities as equal. By considering the impact of the subject matter, design practices can be more attentive and mindful of objects and their interconnections.

If we hope to achieve a more pluriversal world, it will require a fundamental ontological rethinking of design. This new conception of design must move beyond the current economic system and embrace diverse values, worlds, and ways of being. With this expansive redefinition of design in mind, a central question emerges: How can design practices support and enable just economic transitions that promote pluralism? Moving forward, the field of design must focus on redirecting economics away from relentless growth, extraction, and consolidation of power. Instead, ethical and equitable design approaches should empower local, small-scale solutions that meet community needs. This transition will be challenging, but a pluriversal future demands reimagining design's relationship with economics at a foundational level. By centering diversity, sustainability and human dignity, designers can help construct economic systems and practices that serve all people, communities and our shared world.

6. *Alternative economics as theories of change on which design depends*

6.1 Theories of change

Designers today encounter increasingly complex challenges that demand new approaches. To tackle these issues effectively, designers need diverse yet complementary theories of change to guide their work.

A theory of change is an explanation of the reasoning and tactics necessary to achieve desired goals and outcomes. It helps designers understand and influence complex systems like organizations, ecosystems, and economies (Irwin, 2015).

One approach is for designers to explore alternative economic models that can reshape current systems to be more sustainable, equitable, and resilient (Mander, 2012). Designers have a crucial role in enabling economic transitions. Their capacity to drive change on multifaceted problems depends on engaging deeply with emerging economic thinking.

Theorist David Orr (2018) contends design disciplines must grasp economic theories, because “all design exists within a larger framework of political economy that distributes costs and benefits across society” (p.4). These economic structures incentivize certain values, practices, design solutions and lifestyles with societal and environmental repercussions. So the prevailing economic model can either constrain or enable sustainable, socially-conscious design.

For designers to help develop systems in harmony with nature, they require design informed by both ecological knowledge and the economic priorities that shape what gets designed (Orr, 2018). This theory of change integrates ecology and heterodox economics (Raworth, 2017). At its core, designers who care about sustainability must also wrestle with economics: “Ecological design must be applied to broader systems of politics, law and economics” (Orr, 2018, p.8).

The next chapter explores a theory of change grounded in alternative economic paradigms. This frames design for sustainability by grappling with potential underlying economic regimes.

6.2 Degrowth

In the economic paradigm of *capitalism*, value is generally interpreted as any entity with the potential for profitable exchange for the market. According to Parrique (2021), we are “mixing value with profitability” (Parrique, 2021,13:01). This raises the question of whether the path of economic growth can coexist harmoniously with the principles of sustainability. At this stage of the investigation, the answer seems easier. We are currently dealing with economies based on denying the biophysical and ecological context that has become unstable and unsustainable (Boehnert, 2018). The conventional neoclassical economies view the environment as a mere source of resources based on a denial of reality. We urgently need to search for alternative economies that speak to the primary contradictions of our time: ecological overshoot, social shortfall, and capital accumulation. Currently, proposed solutions to addressing these issues are diverse but often remain framed within the dominant narrative of correcting market failures instead of dismantling systemic failures (Spash, 2020). This comes despite the evidence already presented here suggesting that a rapid, global and absolute decoupling of environmental impact from economic growth is highly unlikely, if possible (Wiedenhofer et al., 2020). However, many alternative theories, practices and worldviews have emerged that seek to challenge these constructions (Burkhart et al., 2020). The *degrowth* movement is one example of an alternative economic paradigm that has regained popularity.

The contemporary *degrowth* movement is based on the premise that:

- Growth is a structural imperative of the current economic system, to the detriment of the ecological context on which we depend;
- Growth is no longer desirable;
- Growth has always been based on exploitation (D’Alisa et al., 2015).

The concept of *degrowth* is intended to address the fact that economic growth intensifies the pace of life - competition, individualism, and anxiety - while increasing debt and not reducing poverty and inequality (Muraca, 2016). On the other hand, due to the extreme stress placed on the Earth’s systems by environmental factors such as climate change, economic *degrowth* will happen whether we like it or not. In other words,

it is intended as a call for the need to make the economy “slower by design, not disaster” (Victor, 2008, p. 11).

Degrowth is a multidimensional concept (D’Alisa et al., 2015). It combines critiques of capitalism, colonialism (Hickel, 2021), patriarchy, productivism, and utilitarianism (Kallis, 2019) while making proposals for more caring, just, convivial (Dengler & Lang, 2022), happy, and democratic societies (Brand et al., 2021).

Degrowth is indeed a proposal for voluntary, equitable, and democratically led reduction of the materials and energy that society extracts, processes, and disposes of as waste (Schneider et al., 2010), but it is more fundamentally a call to break with economic growth as the central goal of a society and to oppose the automatic association of growth with better outcomes (Latouche, 2005). To summarise, we can look at the principles proposed by Herman Daly of how a new economy should act:

- The economy must not use natural resources faster than they can be replenished by the planet;
- The economy must not deposit waste faster than it can be absorbed (Daly, 2008).

Finally, *degrowth* is not only a quantitative issue of doing less of the same but is also a qualitative issue of doing differently. It denotes a reorientation of economic relations toward a different structure along different principles to serve different functions (D’Alisa et al., 2015). It is a proposal to move toward a society in which the social metabolism—how societies organise their interaction with flows of materials and energy—is organised differently. The principles evoked in this context include care, sharing, autonomy, solidarity, justice, democracy, and *conviviality* (D’Alisa et al., 2015).

We can connect the emphasis on “different, not only less” (D’Alisa et al., 2015, p.4) with Arturo Escobar’s perspective of living in the *pluriverse*. *Degrowth* and *pluriverse* share the explicit effort to connect with multiple existing visions and cosmologies that challenge the hegemony of growth and development (Escobar, 2011). This effort represents a much-needed intervention that rather than posing *degrowth* as one view that dominates all others, it is seen as one among numerous worldviews and understandings of living well that express parallel ideas and different terms (Kothari et al., 2014). Seeing *degrowth* as not one but several closely interconnected social representations means recognising that what *degrowth* is varies according to different actors, uses and places - that *degrowth* is not singular but plural.

Due to its plurality, *degrowth* is a relevant approach to consider in design (Flipo, 2007). *Degrowth* is related to reducing production and consumption, which consequently reduces ecological impacts and improves human well-being (Schneider et al., 2010). Between production and consumption, products and services are created and, for each one, the way in which they are designed and used is considered (Spangenberg et al., 2010). Designers are key players in these actions and have a responsibility to prevent their decisions from perpetuating the current negative social and environmental impacts. In this way, rethinking design means talking about sustainability in terms of production and consumption (Spangenberg et al., 2010). Given these considerations, *what knowledge can design draw from the theories of degrowth and the degrowth movement?*

The answers to these questions are complex and far-reaching, necessitating analysis across many fields. However, we can highlight three key points that design should incorporate to enable a successful transition:

Design for conviviality

Through the appropriate choice and implementation of new technologies in products during the production process, design can largely influence consumers and users. Consequently, the approach of *conviviality* proposed by Illich is a promising way to rethink how designers design products, services and associated technologies. Illich (2009) used the term “conviviality” to “designate the opposite of industrial productivity” (p. 17). In particular, Illich’s alternative to the current state of design is a design that focuses on social solidarity based on friendship and mutual giving but also “creatively accepts” its limits (Mitcham, 2003, p. 29). In line with this perspective, Popplow and Dobler (2015) have discussed *Design for degrowth* as something that is less concerned with consumption and more concerned with reproduction, reduction and relationships (Popplow, 2015). In other words, this kind of design focuses on reducing material goods and increasing relationships between actors - we can connect here with posture and mindset previously defined.

37.

An example is IDDEAS, an initiative that contributes to the empowerment of small businesses in the food sector in Chile. The project proposes a new food development model based on four axes: the political proposal of food sovereignty, the solidarity economy circuits, the technological proposal of digital manufacturing, and the contribution of distributed design to transformation and social autonomy. Aimed at designers, small-scale producers and other relevant actors in the food value chain, IDDEAS offers a system to strengthen skills and generate local networks to develop and implement the designed products (This is distributed design, 2021).

38.

Some criteria can be interpreted differently, but the transcript has been made because it is an essential complement to the research.

Design to distribute

Design for *degrowth* is also about designing according to a system that satisfies human needs through the contributions of autonomous individuals, rather than merely industrial and profitable principles³⁷ (Illich, 2009).

“Don’t wait for economic growth to reduce inequality – because it won’t. Instead, create an economy that is distributive by design” (Raworth, 2017, p. 205).

This may require creating some design approaches that integrate the notion of distribution as a new strategy that proposes new decentralised patterns of production and consumption (Kohtala, 2015). Here, the concept of distributed economies promotes small-scale production with a local supply chain of socio-economic actors, and uses local resources according to local needs (Johansson et al., 2005). At the local scale, feedback is faster and ecological boundaries are more readily identifiable. Furthermore, we can better tailor solutions to the specific conditions of a particular place and community (Wahl, 2016). A design approach that promotes distribution also increases the percentage of added value retained in the territories (Johansson et al., 2005). Gavin Melles (2011) proposed socially responsible design to design solutions using existing or new skills and labour (Melles et al., 2011). To this end, he suggests that the design process should integrate a number of criteria, namely:

“Need: does the user or community need this product/ solution?

Suitability: is the design culturally appropriate?

Relative affordability: is the outcome locally and regionally affordable?

Advancement: does it create local or regional jobs and develop new skills?

Local control: can the solution be understood, controlled and maintained locally?

Usability: is it flexible and adaptive to changing circumstances?

Empowerment: does it empower the community to develop and own the solution?

Dependency: does it add to third world dependency? ³⁸”
(p. 149)

Fundamentally the design should promote local skills, environmental humanisation, appropriate

technologies, participation and inclusion of local resources (Lockton et al., 2008).

Durable and repairable design

As we have already analysed, some unsustainable strategies prevent self-repair through simple assembly or specialised tools to accelerate the renewal of physical products, even if they are repairable (Tyl et al., 2014). The prevention of obsolescence is a central concept in design, especially the durability and reparability of products (Diehl et al., 2009). Durability means the optimisation of lifespan, while reparability is the property of a product to be restored (Tecchio et al., 2016). Some design tools and approaches focus on managing different end-of-life options of a product to overcome this threat. These approaches include reuse, remanufacturing and upgradeability of products. Pialot et al. (2012) defined these three approaches as follows:

Reuse - the process of collecting used products or components and distributing or selling them as used;

Remanufacturing - consists of collecting a used product or component, assessing its condition and replacing broken or obsolete parts with new or refurbished parts;

Upgradeability - consists of improving a product, step by step, with the integration of upgrades (Pialot et al., 2012).

Design commons

There are some obvious but non-trivial opportunities for designers to work according to a degrowth mindset, for example, by reducing the material needs of their work to a minimum. However, we intend to focus on innovation targeting collaborative *commons*, which “have the potential to transform the control of knowledge” (Raworth, 2017, p. 229). *Degrowth* and commoning are emergent movements that contribute to the deconstruction of individualism. Working toward a “commons-creating economy” (Helfrich, 2013, p. 15) means bringing the economy back into society and nature and calling working to bring the economy back into society and nature and calls for the reintegration of persons within the community, the human within the nonhuman, and knowledge within the knowing, being, and doing. So, commoning is a form of social labour that manages a common’s resources³⁹ through participatory, nonhierarchical methods. These concepts expand notions of *commons* beyond biophysical (material) or intangible resources or goods. Indeed, as De Angelis argues, in an interdependent world, everything is *commons*⁴⁰ (De Angelis, 2017). Rather than *commons* as a thing, or a set of rules, we could see *commons* as networks of coevolving

39.

Historically, some designers have contributed to the *commons* in various ways. Enzo Mari’s manual Autoprogettazione shared design drawings and construction instructions for a series of domestic furniture that amateurs could build with off-the-shelf materials and easy carpentry skills (Mari, 2002).

Another example is the Global Village Construction Set, a modular, DIY, low-cost, high-performance platform that easily manufactures 50 different industrial machines needed to build a small, sustainable civilisation with modern comforts. The platform develops open-source industrial machines that can be manufactured for a fraction of commercial costs and shared projects online for free («Machines: Global Village Construction Set», 2018).

40.

De Angelis, everything is a common, such as the social fabric or the principle of the Earth as a shared living space on which we all depend (De Angelis, 2017).

structures that connect social and ecological processes (D'alisa , 2013); and that are co-design, co-produced, made, and reclaimed through everyday practices, relations and imaginaries of acting and being in common. In this sense, communing can be defined as the process of collectively making the *commons*, and by doing so, we become common subjects or commoners, shifting towards more equitable and ecological forms of relating to our environment (Villamayor-Tomas et al., 2023).

After highlighting the relevance of having a common, distributive, durable and convivial design, it is important to revisit the notion that *degrowth* is a diverse academic field comprised of diverse concepts. To illustrate this diversity, it is useful to examine the conceptual framework created by Timothée Parrique (2019) to synthesize some key concepts in *degrowth*. From the results of his research we can highlight 3 values and 15 principles. Here we aim to summarise the extent of *degrowth* and highlight the conclusions that could be useful for design. We can also see that some of this data coincides with some of the research presented in the actual and previous chapters. *Degrowth* advocates three universal values, which should underpin all economic practices in a *degrowth* society:

Autonomy: A principle of freedom both at the individual level and at the collective level.

Sufficiency: A rule of distributive justice that states that everyone should have enough to meet their basic needs and no one should have too much when it comes to the limits of the planet

Care: A principle that rejects exploitation and violence, and promotes solidarity towards humans and non-humans.

Applying these values to the different acts of provision - extraction, production, allocation, consumption, and disposal - Parrique developed a list of 15 universal principles:

Resource sovereignty: The people who make decisions about resource extraction should be the local communities. Be a steward of nature.

Sustainability: The output of the economy should remain within the *regenerative* capacities of renewable natural resources, within the stocks of non-renewable resources, and within the assimilative capacities of nature.

Circularity: The flow of energy and materials in the economy should be as circular as possible, with the aim

of minimising the extraction of virgin resources and the disposal of non-recyclable and non-assimilable waste.

Socially useful production: What is not needed should not be made. Production should satisfy needs and contribute to well-being.

Small, not-for-profit cooperatives: All businesses should be centred around pursuing a social benefit, be small enough to allow direct democratic governance, and take the form of a cooperative.

Proximity: Produce local, consume local.

Convivial tools: Technology should be fit for a purpose outside itself. Technology should be democratically manageable, controllable, reversible and easily understandable.

Postwork: The ultimate goal of economic organisation is to liberate time for non-economic purposes. The time and effort devoted to provision activities should be determined autonomously and constitute only a small part of life.

Value sovereignty: economic valuation process should always be informed by social and moral values. What is considered valuable may vary from one context to another, and different core values are incommensurable from one another.

Commons: Strategic resources should be decided and managed as *commons*.

Gratuity: The supply of goods, services and amenities determinant for the satisfaction of needs should remain outside the domain of the market and be organised politically.

Sharing: Any surplus must be treated with caution as it carries the possibility of inequality.

Voluntary simplicity: People must regain autonomy over their needs and wants and reflect on the consequences of their consumption.

Relational goods: People should consume with, not against, others. Consumption should focus on the ends (feelings, friendship, love, etc.) and not the means (products).

Joy of living: Economic organisation should be a vehicle to ensure the joy of living and life should be lived enjoying the abundance of nature and culture. (Parrique, 2019)

Most of the notions contained in these elements are not fundamentally new but are considerably important to keep in mind throughout the design process. However, for the design process, it is also essential to visually understand its space of action. As quoted by Kate Raworth (2017) in her acclaimed *Doughnut economics: Seven Ways to Think Like a 21st-Century Economist*, “the most powerful stories throughout history have been the ones told with pictures” (Raworth, 2017, p. 19). We will explore how Raworth takes economics to a wider audience and calls for an economy that respects both social needs and the planet’s ecological limits with his *Doughnut Economics* model.

6.4 Doughnut Economics

The *Doughnut Economics*, while not assumed to be an alternative that explores degrowth, is an economic model that favours a balance between social and environmental objectives (Raworth, 2017) and is a relevant complement to the theories explored above.

Modern economy has often been associated with extractive and exploitative behaviour, where the focus has been on growing profits. However, according to Kate Raworth (2017), the art of the economy is rooted in a human organisation around the household and hearth, remarking that:

“The word economics was coined by the philosopher Xenophon in Ancient Greece. Combining oikos meaning household with nomos meaning rules or norms, he invented the art of household management, and it could not be more relevant today” (p. 4)

41.
The *social foundation* comprises 12 social dimensions that are derived from the social priorities specified in the United Nation’s 2015 Sustainable Development Goals. These 12 social dimensions are food, health, education, income and work, water and sanitation, energy, networks, housing, gender equality, social equity, political voice, peace and justice (The 17 goals | sustainable development, 2015).

42.
The *ecological ceiling* is based on the nine *planetary boundaries* that we have already described.

Raworth (2017) created the *Doughnut* (see Figure 17), an economic system designed to prioritise values that work “with, not against, the cycles of life” (Raworth, 2017, p. 62) because “balance is the shape of the future progress” (Greens, 2023, 31:40). This economic picture is a simple visualisation of the social and ecological conditions underpinning human well-being. The *social foundation*⁴¹ demarcates the inner limit of the Doughnut and establishes the basic principles of life in which no one should fall short. The *ecological ceiling*⁴² marks the outer limit of the Doughnut, beyond which humanity’s pressure on the Earth’s vital systems is dangerously overstepping the

boundary. So if we go beyond the dark wedges below the social base we will have people all over the world lacking in the basics of life. And similarly, if we go beyond the dark wedges radiating beyond the *ecological ceiling*, we will be pushing the *planetary boundaries* (Raworth, 2017). Together, these two interconnected boundaries create the limits of the Doughnut. Between the “two lies a safe and just space for all” where humanity can thrive (Raworth, 2017, p.17).

The economy, according to Raworth (2017), “is not a matter of discovering laws: it is essentially a question of design” (p.170). Although Raworth is using the concept of design in a general sense, designers can be useful allies for bringing about economic transitions with specific design practices, skills, capacities, thinking and approaches that lead us to achieve a *distributive* and *regenerative economy*. As previously explained, a design conceived to distribute is “one whose dynamics tend to disperse and circulate value as it is created, rather than concentrating it in everfewer hands” (p.185). However, for Kate Raworth (2017), an alternative economy only becomes complete when we build a society that is *regenerative by design* in which people become participants in regeneration and enable prosperity within *planetary boundaries*.

A number of strategies are outlined, some of which will be addressed later, for redesigning processes to promote regeneration. However, first it’s essential to focus on the well-known concept of the circular economy. The circular economy is seen as a promising idea and ideal that has much to contribute to addressing the challenges of the *Anthropocene* (Murray et al., 2017).

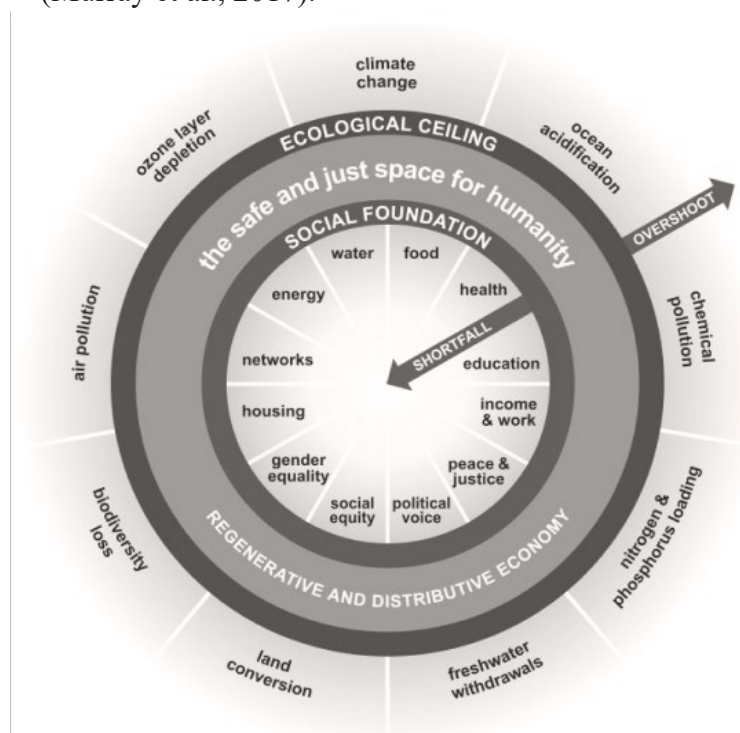


Figure 17. The Doughnut of social and planetary boundaries (Doughnut , 2023).

The concept of circular economy (CE) has elicited an optimistic reaction from industries and governments since it was seen as a promising solution to the challenges faced in the *Anthropocene* (Murray et al., 2017). Circular economy and sustainability are often used interchangeably (Simeone et al., 2019). Still, misinterpretations of the concept can lead to conventional circular economy projects producing only incremental improvements rather than fundamental changes (Kirchherr et al., 2017), which may not necessarily result in the desired sustainability gains. Robèrt et al. (2013) argue that economic prosperity relies on natural ecosystems' ability to recycle waste into new resources. Resource use should not surpass ecosystem regeneration rates (Robèrt et al., 2013). There should be no conflict between economic and environmental goals. As we will see in the analysis of the CE proposed by the *Ellen MacArthur Foundation*, organisations and individuals should recognise the interdependence between human life and the biological/chemical cycles of natural systems⁴³ (Ellen MacArthur Foundation, 2015). Therefore, sustainable and effective CE projects should alleviate the unsustainable strain on the planet's ecosystems by industrial activity. This can be achieved by incorporating clear environmental boundaries into the economy (Jackson, 2011) - The *doughnut economy* framework is a good example - recognising spatial boundaries to avoid shifting problems along the product life cycle (Korhonen et al., 2018).

43.

Robèrt et al. (2013) use the metaphor of a tree to explain this fundamental principle, where the trunk and branches represent the basic principles that give trees shape and strength, while the leaves represent the details that catch the eye with their green colour. According to Robèrt et al. (2013), neglecting the trunk and branches, which signify that human life depends on the biochemical cycles of natural ecosystems, can cause organisations to remain average in their sustainability efforts. For example, suppose organisations focus only on recycling - i.e. the leaves - without considering the types of materials disposed of in natural ecosystems. In that case, they may be unable to break out of the status quo (Robèrt et al., 2013).

44.

Acting with precaution can mean using the safest materials and technologies available, avoiding persistent and bioaccumulative substances, or being prepared to respond quickly if unexpected consequences arise.

A precautionary mindset should also be adopted. This means recognizing that the complex material and energy flows of today's industries may have unknown ecological impacts on future ecosystems (Korhonen et al., 2018). We cannot fully predict how current production systems will affect the environment over decades and centuries. So a precautionary approach⁴⁴ involves being cautious and minimizing potential risks. In line with this long-term vision, a *non-anthropocentric* and respectful environmental ethic should underpin healthy circular economies. This means valuing nature beyond just human utility. Minerals, plants, animals and ecosystems should be respected as non-human entities that contribute to healthy human relationships (Mathews, 2006).

A *non-anthropocentric* view moves away from seeing nature as existing solely for human use. Instead, it intrinsically values all living and non-living aspects of nature. It sees humans as part of, not above, the intricate web of ecological interactions.

A respectful environmental ethic further recognizes that humans depend on thriving ecosystems for clean air, water, food, materials and wellbeing. It urges gratitude, compassion and care towards the non-human world.

Accordingly, as noted previously, designers must acknowledge the inseparable, interdependent nature of the relationships between nature and human societies. Sustainability requires realizing humans are embedded within, not separate from, the natural world. Design informed by *non-anthropocentric* ethics can help ensure circular systems nurture rather than exploit natural systems. It is therefore imperative that the CE also becomes a regenerative economy (Raworth, 2017).

In 2012, the *Ellen MacArthur Foundation* introduced the concept of CE as “an industrial economy that is restorative or regenerative by intention and design” (*Ellen MacArthur Foundation*, 2013, p. 7) and later as “restorative and regenerative by design and aims” (*Ellen MacArthur Foundation*, 2015, p. 5). The *Butterfly Diagram* (Figure 18) is an alternative model to industrial economics. It represents the need to address a product’s entire life cycle. The spine of the diagram symbolizes the linear economic model. The rest of the diagram illustrates continuous material flows in closed loops of value. Specifically, it shows the circular flow of technical materials (metals, plastics, etc.) and biological materials (food, fibers, etc.) at different stages from production to consumption to recycling. This butterfly model demonstrates how effective circular economies keep resources in use through multiple lifecycles rather than the take-make-waste linear model ⁴⁵. In the *biological wing*, all nutrients are eventually consumed and regenerated. On the other hand, in the *technical wing*, products made with technical materials, such as metals and synthetic fibres, do not break down naturally, so they have to be designed to be restored - through repair, reuse, refurbishment and, as a last resort, recycling. The smaller the circle, the greater the value of the remaining product (Piscicelli & Ludden, 2016).

45.

Many critics of this diagram claim that it does not show that in the circular process, waste is a constant problem for products that are manufactured, distributed, consumed and come to the end of their life cycle. In general, the primary sector, which covers the extraction of raw materials, is, at least visually, excluded from the diagram. For example, in its initial process, aluminium alone involves three stages: mining bauxite ore, refining bauxite to alumina and then smelting alumina to produce aluminium. In order to produce 1 tonne of aluminium, the extraction process generates 10 tonnes of waste rock and 3 tonnes of toxic red mud. We conclude that the path to circularity is complex. Therefore, each phase must always consider the generation of residues and the possible impacts in the short, medium and long term («Waste Statistics», 2017).

Bakker and his colleagues (2015) carried out extensive research to extend the life of the product to keep it in a closed CE loop (Bakker et al., 2015). In their published book *Products that last*, they proposed a methodology for applying circular business models and six design strategies for a long product lifespan to products at different stages of their lifecycle. These design strategies include:

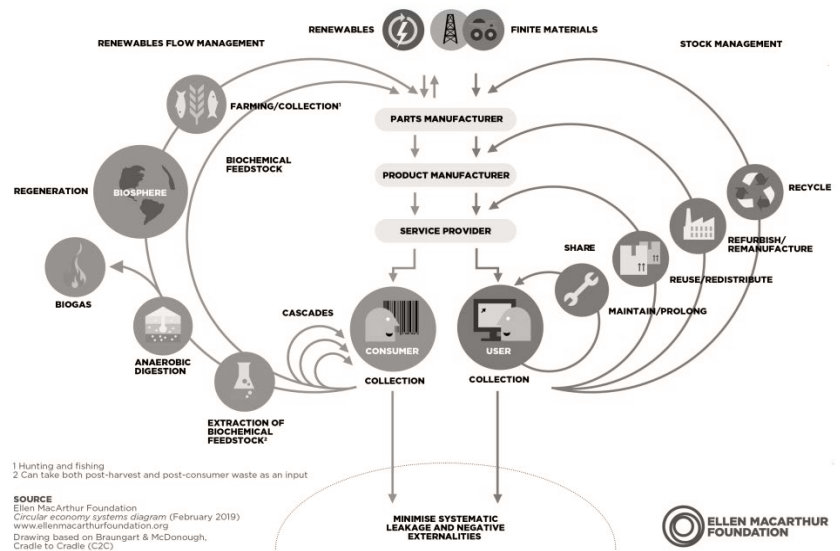


Figure 18. The butterfly diagram (*The butterfly diagram*, 2023)

- “ - Design for attachment and trust;
- Design for durability;
- Design for standardisation and compatibility;
- Design for ease of maintenance and repair;
- Design for adaptability and upgradability;
- Design for dis- and reassembly (Bakker et al., 2015, p.7).”

In the context of exploring alternative economic systems, one key question remains.

Why should degrowth and circular economy approaches be allied?

Degrowth advocates argue that simply making overdeveloped economies circular is insufficient, as recycling and reuse require energy and resources. Rammelt (2014) put the matter in a humorous way: “Capitalism operates on the assumption that the output of production is a function of capital, labour and natural resources; scarcity of the third factor leads to the development of substitutes and greater efficiency of the first two factors. The suggestion in economics textbooks is generally that natural resources are not a limiting factor. If we follow the logic of the production function, we can bake a cake with only the cook and his kitchen; we do not need flour, eggs and sugar. We could also make our cake a thousand times bigger without extra ingredients, if we stirred faster and used bigger bowls and ovens” (p. 63). Basically, there are biophysical limits that must be recognised. To address this, we can look at the fallacy that

46.

Note that some foods can be made circular through composting and nutrient recovery.

recycling will save *capitalism*. Despite the widespread belief, recycling cannot be the cure-all solution for our environmental problems. This is because a significant portion of our material consumption cannot be recycled. For instance, food and energy inputs constitute 44% of our material use, which cannot be regenerated once degraded ⁴⁶. Additionally, 27% of it is used for constructing buildings and infrastructure, while a considerable amount of waste is generated through mining activities (Haas et al., 2015). Consequently, only a tiny fraction of our total material consumption has the potential to be reused. Even if we recycle all of it, the continued economic growth would drive total resource consumption upwards. In 2018, the global recycling rate reached 9.1%, which dropped to 8.6% two years later. This decline is not due to the deterioration of recycling systems, but rather, the growth in total material demand - as demonstrated in fig 7 in chapter 2 - that is outstripping our gains in recycling (*The circularity gap report*, 2022). This analysis shows that the energy transition to renewables will directly reduce resource extraction and the emissions and waste associated with fossil fuel use. In addition, the importance of anthropogenic reserves requires a reduction in net additions and an increase in waste recycling. If these assumptions are met, one third of materials could be incorporated into circular loops, resulting in substantial environmental benefits. This is a realistic measure of what can be achieved by adopting the circular economy globally and will obviously create substantial environmental benefits. However, Haas (2015) also concluded that all of the above is far from realistic if we continue to have an annual increase in resource consumption of 2-3% per year: “Achieving a reversal of the global growth trend in resource consumption into a no-growth or even shrinking dynamic remains the greatest challenge” (p.774). The problem lies not with our technology but with growth itself.

As discussed in *chapter 2*, high-income countries consume more materials on average. This higher level of consumption contributes to the continuous growth of the global material footprint.. Reducing material use means reducing pressure on ecosystems. It means less deforestation, less habitat destruction, less biodiversity collapse. And it means our economy will use less energy, allowing us to transition faster to renewable energy. In other words, *degrowth* applied to design - reducing material and energy use - is an ecologically coherent solution to a multi-layered crisis. And ideally, we should be doing *degrowth* while improving people's lives. How can design make this possible? Recalling again what we wrote previously, *capitalism* is a system that is organised around exchange value rather than use value. Most production is oriented towards the accumulation of profits rather than the fulfilment of human needs. When we understand this, it becomes clear that a *need-oriented design* that corresponds to a *social foundation* and does not go beyond the *planetary boundaries* that sustain us, is the paradigm shift that is required.

In this chapter we can also observe that *degrowth* is an academic field, full of diverse and evolving concepts. In the end, we chose to interpret the three complementary concepts of alternative economies - *degrowth*, doughnut economy and circular economy - as a present part of a design process. Thus, we summarise this structuring in three key strategies - corresponding to each of the economic proposals addressed - and each of them deconstructed into different relevant principles to keep in mind. Each of the principles will have actions and questions that may be relevant to (re)orientate the whole process. They can act as a checklist to encourage designers to start questioning and strategising from the beginning and throughout the design process.

Encourage degrowth

Designing for *degrowth* represents a substantial shift in understanding the role of design in society. It challenges the dominant paradigms of consumption, production, and economic growth, favouring instead a more holistic, sustainable, and equitable approach. At its core, designing for *degrowth* involves reorienting design practice towards the principles of: autonomy; proximity and distribution; conviviality and relationality; communality; care.

autonomy

- Promote individual and collective freedom - empower individuals and communities to make free choices;
- Make decisions democratically and with the participation of all stakeholders;
- Combat inequalities and oppression.

How can your product or service empower individual users and communities to make their own choices and exercise their freedom? How can your design process ensure that collective decisions made for the product or service are made democratically, with input from all stakeholders? How can we involve local communities? How can your design process ensure that the product or service does not reinforce existing power imbalances or oppress certain groups?

proximity and distribution

- Incorporate distributed patterns of production - local skills, appropriate technologies, participation and inclusion of local labour;
- Incorporate distributed patterns of consumption - local supply chains and resource utilization based on local needs - and retain value in the territory;
- Build local feedback loops and clear ecological boundaries.

How can we promote production with a local supply chain and local actors, utilise local resources, and design according to local needs? How can we ensure that the design approach seeks to promote the retention of a higher percentage of added value in local territories? How can we ensure that the design approach promotes cultural suitability and local accessibility? What design considerations should we take into account to ensure that the outcome creates local or regional jobs and develops new skills?

conviviality and relationality

- Analyze the relationships between actors (human and non-human) instead of encouraging consumption;
- Reduce unnecessary material goods;
- Promote social solidarity;
- See consumption as a social and collaborative activity.

How can we creatively accept the limits of our designs to fulfil users' needs? How can we design products that promote relationships between actors - human and non-human - rather than just encouraging consumption? What

strategies can we implement to reduce material goods while still providing a high quality user experience? How can we ensure that our design process promotes social solidarity? How can the design process ensure that consumption is centred on ends (feelings, friendship, relationships, etc.) and not only on means (products)? How can the design process ensure that consumption is a collaborative and social activity that brings people together? How can the design process ensure that consumption does not contribute to the exacerbation of social problems (e.g. social isolation or inequality)?

Communality

- Focus on the innovation of collaborative common goods:
- Knowledge is democratically manageable, controllable, reversible and easily understood by communities;
- Involve social work and manage resources collectively;
- Co-design and co-produce - use participatory methods;
- Make the knowledge created common knowledge;

How can we transform the knowledge created into common knowledge? How can the design process ensure that strategic resources are decided and managed as common goods? How can the design process ensure that local communities benefit from the management of strategic resources as common goods? How can the design process ensure that knowledge is democratically manageable, controllable, reversible and easily understandable?

Care

- Reject exploitation and violence;
- Promote solidarity with human and non-human beings;
- Design for inclusion and accessibility;
- Promote and improve well-being.

How can your product be designed to prevent exploitation and violence against human and non-human beings involved? How can your design process ensure that the product is accessible and inclusive for all users, human and non-human? How can your product contribute positively to the well-being of all stakeholders involved, and promote social and environmental sustainability?

Create within limits

Designing within the limits will lead us to the representation of the Doughnut Economy. Throughout the design process we will be questioned if we are respecting all the *social foundations* and *ecological ceilings*. Therefore, we should be informed and do extensive research. To encourage the use of this strategy, at the beginning of the process, we should be faced with the following questions:

attending to the social foundations

- Look at the 12 social dimensions and ask:

What social dimensions are we responding to? And which ones are we not?

not exceed the ecological ceiling

- Look at the nine planetary boundaries and ask:

Which planetary boundaries should we pay more attention to? Which ones have already been crossed?

build and maintain circular

Designing for the circular economy involves adopting principles and strategies that promote sustainable practices and reduce negative impact on the environment. The following principles are suitable for the ‘technical wing’ of the circular economy. They are not fixed and may vary depending on the nature of the project. Above all, they seek to guide designers towards creating products that are environmentally responsible and promote circularity.

(re)thinking design

- Assess the real need for a product;
- Ensure durability and usability;
- Ensure transparency and responsibility;
- Ensure that production is aligned with the regenerative capacities.

Is this product totally necessary? What is needed and what is not needed? How can we create a product that is durable, usable and meaningful? How can the design process ensure that processes are transparent and accountable? How can the design process ensure that production stays within the regeneration capacities of renewable natural resources?

responsible extraction

- Minimize resources and promote sustainable use throughout the product's life cycle;
- Implement strategies to minimize the adverse environmental effects of extracting raw materials;
- Avoid virgin resources;
- Integrate renewable resources.

How can the design process minimise the use of resources and ensure that they are used sustainably? How can your design minimise the environmental impact of raw material extraction? How can the design process minimise or avoid the extraction of virgin resources? How can your design promote the use of renewable materials and reduce the consumption of non-renewable resources?

shared consumption

- Design products that encourage sharing and participation in collaborative consumption models;
- Ensure that shared products are used efficiently.

How can your design promote sharing and collaborative consumption models? How can your design ensure that shared products are used efficiently and effectively to minimise waste?

easy repair and maintain

- Making products easy to repair;
- Provide repair services accessible to all.

How can your design promote the easy reparability of products and reduce the need for replacement? How can your design ensure that repair services are accessible and affordable for all?

reuse potential

- Design products with characteristics that encourage and facilitate reuse;
- Apply design standards to ensure that products are safe to reuse;

How can your design promote the reuse of products and reduce the need for new production? How can your design ensure that reused products are safe and meet quality standards?

refurbish that extends

- Design products with refurbishment in mind to extend their functional lifespan;
- Ensure that refurbishment is affordable, safe and easy to implement.

How can your design promote the renewal of products and extend their lifetime? How can your design ensure that refurbished products are safe, meet quality standards and are affordable for all?

recycling as a last option

- Develop strategies aimed at avoiding the production of waste from the outset;
- Encourage the recovery of materials;
- Incorporate principles that facilitate recycling processes.

How can we prevent recycling? How can your design promote the recycling of materials and reduce waste? How can your design ensure that recycling processes are efficient, effective and environmentally sustainable?

In conclusion, designing for alternative economies is not merely a theory of change in design practices, but a fundamental shift in the values that guide our design decisions. This chapter calls for a comprehensive rethink of the role of design in society - one that rejects the growth mentality and embraces a more sustainable, equitable and resilient future. By shifting our attention from profit and consumption to wellbeing and sustainability, this new way of thinking design offers a promising path to a more sustainable and equitable world for all.

7.

Design for Regeneration as a New Way of Designing

The last and fourth dimension of *transition design* involves new ways of designing. Here, all the other dimensions provide a set of rich and stimulating contributions. In this research, several questions have emerged, such as: How can designers become aware that design careers often contribute to ecosystem destruction and pose risks to humans? This is a critical question for the design field. Many traditional design practices are embedded within extractive linear economics and unknowingly perpetuate unsustainable systems. Designers must become aware of how current modes of production damage ecological systems and human health through pollution, waste, resource depletion, climate change, and more. This involves honest self-reflection and assessment of how one's work impacts the environment and society. Design schools and professional institutions can provide education on sustainability. Peer discussions challenging existing norms can also raise awareness. With a deeper understanding, designers can adopt more regenerative, circular approaches across specialisations that heal rather than harm our world. Tonkinwise shares these concerns by stating that “designers do a lot of material destroying on their way to being creative” (Tonkinwise, 2013, p. 5).

There is this sense of urgency to create new design habits that involve: ecological literacy and a renewed attention to materiality; rethinking innovation beyond conventional business, commercial and service towards transformative kinds of social innovation; creating new pathways for design and expanding it into explicitly change-oriented domains; relocalising sustainable innovations; and foregrounding the role of visioning in design (Escobar, 2018).

It is also not surprising that having reached this stage, the *transition design* framework is seen as fostering “a paradigm shift and an entirely new way of understanding households and understanding societies” (Yee, 2013, p. 8). In addition to changes in mindset, the creation of transition skill sets can be expected. New ways of designing is an area that draws on a myriad of approaches to formulate design interventions and solutions, which asks: “Are there other relevant design approaches or methodologies that can contribute to the transition solutions? How can existing solutions be recast within the context of *Transition Design* to become steps within a longer-term transition toward a sustainable future/outcome?” (Tonkinwise et al., 2015, p. 7).

Ultimately, *transition design* is conceived as a new area of design methodology, practice and research, and as such, seeks to integrate new forms of design that will help realise the vision but also change and evolve it (Irwin, 2015). This is why this chapter, given this dissertation's central aim, will explore how design can be a vehicle for regeneration objectively. Incorporating a *regenerative approach* to design will require a commitment to continuous learning and evolution and the tenacity to change a system through multiple and iterative interventions over time. It is intended that this new way of designing is not closed in itself but is constantly questioning and changing according to the different social, environmental and economic dynamics.

7.2 Moving beyond conventional sustainability

The *Brundtland Report*, commissioned by the UN in 1978, was a milestone in the beginning of the debate on sustainability, which later evolved into a more political approach and resulted in the concept of sustainable development. The report describes sustainable development as: "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN, 1978, p. 41). Although the idea was to bring nations together to build a sustainable future, this proposal for sustainable development has evolved into a questionable approach to control, intensive use and greater efficiency of natural resources (Walker & Salt, 2006). Once again, this approach to sustainability is entrenched within the confines of the reductionist paradigm previously subjected to critique.

Scholars have criticised current models of sustainable development for focusing narrowly on minimising the negative impacts of energy and resource use rather than taking a more regenerative, systems-oriented approach (Mang & Haggard, 2016). The continued emphasis by policymakers on productivity and quantitative economic measures such as GDP indicates that the predominant paradigm of sustainability remains constrained by economic thinking (Mang & Reed, 2012).

According to several theorists, the root issue lies in the *mechanistic* worldview that has emerged from Cartesian philosophy and now permeates modern institutions. This perspective views nature as “finite, linear, and subject to the same laws as mechanical systems” (Mang & Haggard, 2016, p.22) and thereby treats the natural world as a resource to be exploited rather than a living system to be regenerated (Cole, 2012). Consequently, it promotes human managerial control and dominance over nature rather than human integration and participation within nature’s cycles (Mang & Haggard, 2016).

This *anthropocentric* paradigm shapes both international policy and private sector approaches to sustainability. The development policies negotiated by the *United Nations* seek to establish standard criteria, indicators, and strategies to maintain the status quo (Du Plessis, 2012). Corporate initiatives capitalise on sustainability’s business opportunities while emphasising economic returns over social and ecological factors (Cole, 2012). Both public and private sector approaches prioritise reducing negative impacts such as emissions rather than nurturing the health of natural systems (Cole, 2012).

We can now clarify that the prevailing models of sustainable development remain constrained by *mechanistic*, *anthropocentric* worldviews rooted in *Cartesian dualism*, which privileges economic considerations over ecological and human well-being. Further research into holistic, *regenerative design* principles and their potential institutionalisation appears warranted. However, realising such systemic shifts will likely require profound changes to deeply embedded modern paradigms.

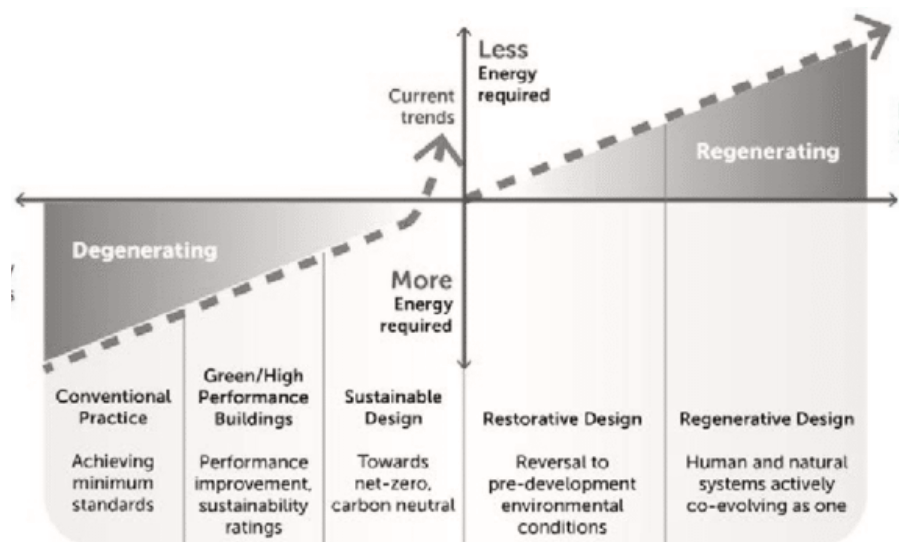


Figure 19. Range of sustainability approaches from Bill Reed (2007), adaptation by Craft et al. (Craft et al., 2017).

The diagram drawn up by Bill Reed (see Figure 19), a pioneer of *regenerative design*, provides a good summary of the difference between *sustainable* and *regenerative* designs. It describes an evolutionary pathway based on a whole system approach that aims to develop the evolutionary potential of the whole system and its capacity to regenerate and co-evolve through healthy and mutually beneficial relationships (Reed, 2007).

At the lowest level is compliance-based design. Above this level is the domain of relative improvement or ecological design. Bill Reed argues that, as currently framed, sustainability can, at best, achieve a form of neutrality in which all negative impacts have been mitigated (Mang & Reed, 2018). Thus, sustainability adopts a neutral position as a reference point of what needs to be achieved to maintain the health of the planet's living systems and their ability to continue to support human life. The balance point divides a degenerating system from a regenerating one. So, when sustainability is seen as a transition point rather than a goal to be achieved, it allows us to construct a narrative that we can use to orchestrate systemic positive change (Wahl, 2016).

47. Operate involves enhancing the efficacy of energy and material utilisation, mitigating factors such as toxicity, and achieving higher standards through capable and disciplined practice; Maintain entails the preservation of desired operational outcomes and efficiency despite disruptions and environmental unpredictability; Improve refers to increasing the capacity of both human and natural systems to generate value; Regenerate involves unlocking the untapped potential inherent in the interrelationship between a given system and the more extensive system in which it is nested. It facilitates the evolution of living systems by manifesting their latent potential as new values in the world (Mang & Haggard, 2016).

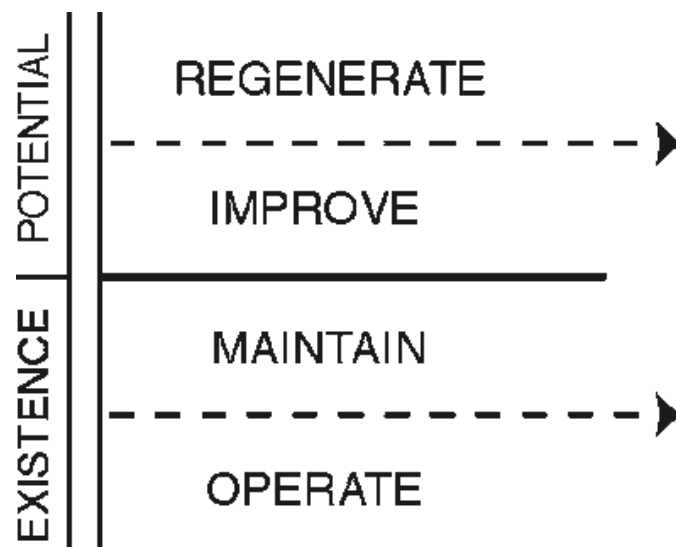


Figure 20. Levels of work by Regenes Group (Mang & Reed, 2018).

Charles Krone (1992) took this narrative and created a straightforward framework (see Figure 20) based on *living systems theory*: four levels of work ⁴⁷ that each system or living entity has to continuously engage in to be sustainable, divided by a boundary line (Krone, 1992). Below the line, we find the status quo of a degenerating global socio-ecological system. The approach at these two levels focuses on the efficiency and optimisation of one aspect of the system to absorb specific short-term disturbances, such as an environmental or social catastrophe, and return to its initial state. Sustainability

48.

"The inherent capacity for coming into being, for growth and development" (Mang & Reed, 2012, p. 10) that is defined by the unique essence of the system. Regenerative development looks at the potential of the project in relation to the essence of the system, which is nested, asking how the project can contribute to the integrity, life and viability of this larger system.

49.

Place is defined as the unique, multi-layered network of living systems within a geographic region. It results from the interactions, through time, of the natural ecology (climate, mineral, soil, vegetation, water or wildlife) and culture (distinctive customs, expressions of values, economic activities, forms of association, ideas for education or traditions) (Mang & Reed, 2012). Considering that this is a product design dissertation, when we talk about place, let us look at the term from a broad point of view. For example, place can mean the implementation context of the product to be designed.

emphasises increasing efficiency and effectiveness, reducing negative impacts and balancing competing demands. However, the goal can no longer be to live within our means but to ensure that we develop the capacity to adapt to all our systems, even if this means transforming those systems or replacing them with entirely new ones (Du Plessis, 2017). This is the first step to moving beyond the line and creating a *regenerative system*. Above the line, and while the previous two levels remain essential, the questions are no longer how to reduce the negative impact or adapt to the inevitable radical changes ahead (Mang & Reed, 2012). Integrating the following levels begins with understanding the unique potential ⁴⁸ or essence of a *place* ⁴⁹. From this understanding of potential, the development and design of the project proceed, and it remains a touchpoint of the entire project (Hes & Du Plessis, 2014). Thus, the crucial question is how we can regenerate our social-ecological systems so they can flourish and contribute to having a positive impact - not just by doing less harm but by doing more good (Brown, 2018).

Regenerative development discourse concerns healing fractured systems, bringing new life and new ways of being. Rather than trying to slow down or bow to the inevitable, it aims to repair the current problem and replace it with a healthy, abundant world in which all living things can thrive. So, quoting the words of Paul Hawken (2021):

"regeneration is not only about bringing the world back to life; it is about bringing each of us back to life. It has meaning and scope; it expresses faith and kindness; it involves imagination and creativity. It is inclusive, engaging, and generous. And everyone can do it. It restores forests, lands, farms, and oceans. It transforms cities, builds green affordable housing, reverses soil erosion, rejuvenates degraded lands, and powers rural communities. Planetary regeneration creates livelihoods occupations that bring life to people and people to life, work that links us to one another's well-being. It offers path out of poverty that provides people with meaning, worthy involvement with their community, a living wage, and a future of dignity and respect" (p. 9).

Finally, for design to contribute to social and planetary regeneration, it must seek life and heal some of the divisions already highlighted here. To do so, we must apply *regenerative philosophy* to design and ask:

How can we put life - human life, the planet, and everything it sustains - at the centre of everything we design?

7.3

Principles for Design for Regeneration

50.

Note that it is in the relationships between all eight - and perhaps those that will eventually emerge - that the power and potential of change can be found, operating coherently within a system at all scales, from local to global.

To facilitate the implementation of a new way of designing, it is essential first to understand and define a series of principles to achieve a design for regeneration. Kimberly Camrass (2023) suggests eight fundamental interconnected principles⁵⁰ designed to provide conceptual and practical guidance so that, throughout the process, regenerative outcomes can be envisioned and worked towards (Camrass, 2023). They are also expected to remain sufficiently open and flexible to allow for the uniqueness of each community and *place*. The eight principles can be summarised as follows:

Story of the place

The concept of regenerative practice originates from a narrative rooted in a specific geographical location, which considers interconnected human and natural systems and incorporates a multi-dimensional comprehension of reality and time (Camrass, 2023). Firstly, historical facts show that communities cannot maintain the determination to make and maintain essential changes without invoking a sense of deep relationship with a particular location (Ford et al., 2020). Secondly, delving into the *Story of the Place* enables us to grasp how living systems operate within that particular context, thereby offering valuable insights into how humans can align themselves with those operational patterns to the advantage of all. Lastly, the *Story of the Place* establishes a framework for an ongoing learning process, facilitating the *co-evolution* of humans with their environment (Mang & Reed, 2012).

Underlying worldviews and metaphors

A *Story of the Place* can be deepened by examining the systems, worldviews, myths, and metaphors that are part of it (Camrass, 2023). Incorporating these worldviews and metaphors helps to create a collective identity, meaning and purpose to overcome divisions and promote collaboration (Mang & Reed, 2012). In this way, a collaborative process from which the aspirations of a given community are identified and pursued is fundamental to a project that meets the essential needs of a given location (Reed, 2007).

51.

A *regenerative design* approach is oriented towards a vision of the future co-produced by the design team, the community and other stakeholders. This means that the provision of benefits from the ecological systems on-site is assessed against the socio-ecological objectives defined by everyone for the project. Figure 21 presents a selection of metrics for a future-oriented socio-ecological assessment of the benefits of a given project. Since this project is situated in a broader socio-ecological system, these indicators are considered at different scales. For example, a garden that produces food contributes to meeting the basic need for food in the community and is a local service. Trees and vegetation can sequester and store carbon as they grow, an ecosystem service with global benefits. Similarly, measuring how the project improves water quantity and quality depends on its location in the watershed (Pedersen Zari et al., 2020).

Goals and success measures:

The prevailing *mechanistic* approaches to sustainability often try to impose solutions on communities without an appreciation of the uniqueness of that *place* (Camrass, 2020). This idea that the answer to systemic problems is generalisable is highly detrimental to identifying and implementing actions that genuinely support the *co-evolution* of communities and the natural systems of which they are a part. Considering a more comprehensive range of contextual factors will naturally impact the range and nature of success measures. This is why definitions of regeneration are locally specific - a parallel manifestation to the concept of *cosmopolitan localism* - and objectives and measures of success must be developed collaboratively (Camrass, 2023). In this way, the involvement of all stakeholders can further facilitate the development of rich and layered metrics (Kramar, 2022). *Regenerative design* metrics⁵¹ measure the ability to increase an environment's vitality, viability and adaptability and understand that the project is part of a larger whole (Pedersen Zari et al., 2020).

Shared Future Metaphor:

Creating metaphors can shape a new perception of reality (Lakoff & Johnson, 2003). Creating a shared image for a community's desired future is an essential early step (Camrass, 2023). Any image of a regenerative future is also beneficial, allowing communities to identify its underlying

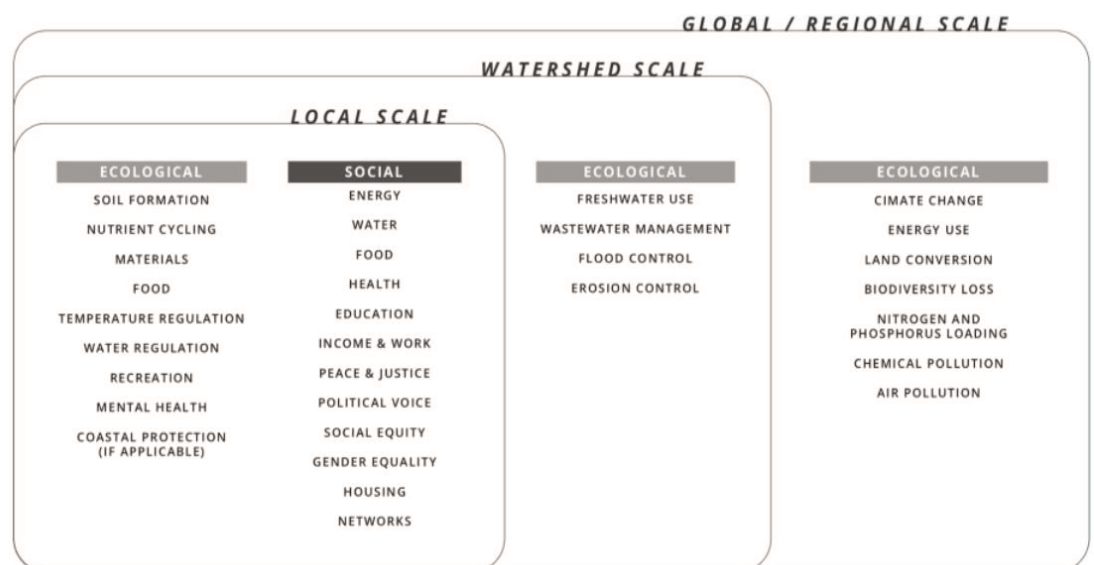


Figure 21. Example of Social-Ecological Metrics for Development (Pedersen Zari et al., 2020)

metaphor. By being expressed metaphorically, ideas around the future can be more easily communicated and understood, helping people understand complex topics, communicate efficiently, and influence others (Thibodeau et al., 2019).

Deconstruction:

Creating or identifying new design methods is essential for examining and deconstructing undesirable images and identifying hypothesised futures (Wahl, 2016). Developing a *Story of the place* to develop an image of the desired future represents an opportunity. Future thinking and practice can inform actors by providing the means to identify what is desired, facilitating the process by which communities can identify and consider possible, probable and preferred futures (Inayatullah, 2012). Incorporating future concepts into regenerative imagery is vital, helping individuals and communities identify alternative futures and achieve alignment for social change (Inayatullah, 2008).

Backward mapping:

Vanessa Machado de Oliveira (2021) writes about four denials that societies face: the denial of systemic complicity in harm; the denial of *planetary boundaries*; the denial of entanglement; the denial of the magnitude and complexity of the problems (Machado de Oliveira, 2021).

In light of the imminent possibility of denials, it is critical to maintain a coherent understanding of our own involvement in the complex and systemic issues we face. Communities need to remain aware of these issues. Backward mapping from a desired regenerative future is important, but his map should be dynamic, responsive and evolve with the systems in which a community is situated (Camrass, 2023). Mapping should be seen as a guide, a set of coordinates, rather than a rigid action plan. In a sense, it is a theory of change, but a theory that needs to be dynamic and adapt to the vast systems in which it develops (Inayatullah, 2008). Therefore, this process must ensure that the principles of dynamism and responsiveness remain centre stage.

Co-evolution:

As already analysed, most prevailing approaches are categorised by an *anthropocentric* perspective. *Regenerative* approaches, by contrast, aim to shift this paradigm to prioritise a sense of interactive adaptability and *co-evolution* between human and natural systems. The *co-evolution* of human and natural systems is the fundamental pillar of regenerative thinking and practice (Cole et al., 2013). Damage mitigation and resource efficiency should not be seen as aspirational goals but as building blocks for achieving a future characterised by systemic co-evolution (Camrass, 2023). Recalling that natural and human systems are interconnected, interdependent and reinforcing relationships is helpful. An action in the system can have system-wide effects.

Internal Regeneration:

As Bussey (2014) explains, it is important that when undertaking work we examine the concepts that shape us and the values that inform us (Bussey, 2014). Inayatullah (2008) discusses the concept of internal alignment and the need for our internal maps to reflect external ones (Inayatullah, 2008). Like the idea of the *co-evolution* of human and natural systems, which is a cornerstone of regenerative thinking and practice, our own internal regeneration is ongoing, iterative and permanent. Daniel Wahl writes that if there were a more conscious and healthy intention behind all acts of design, humanity could considerably improve societies and the planet (Wahl, 2006). Thus, a continuous re-examination of our thoughts and internal narratives is fundamental and requires an acceptance of constant change and an abandonment of certainty and control (Wahl, 2016). Here we consider the shift to a *post-anthropocentric* mindset as an important step towards internal regeneration.

Revisiting some of these principles is an essential and constructive step in designing regeneration. If we understand and adopt these principles, we can enable a more sustainable and harmonious relationship between human and natural systems. A relationship based on sustainability, resilience and the *co-evolution* of communities and their environments, ultimately leading to a more regenerative future.

The concept of regeneration implies a fundamental process of generating healing in living systems and fostering an innovative spirit that expands the healing effect. While the pursuit of sustainability has brought significant progress to society, it is time for us to adopt a RD approach (Hes & Du Plessis, 2014). This requires a change of mindset - based in part on the previous chapters - that allows us to build a reflexive, reactive and flexible process that tries to anticipate scenarios and admits that there are no preconceived formulas (Mang & Reed, 2012). Transformative innovations - identified as H3 in *chapter 4* - can emerge by challenging assumptions, questioning new possibilities and asking questions such as *why* and *what if* when we try to implement improvement strategies (Wahl, 2016).

RD requires participants to recognise the totality of the system in which they operate, allowing for a conscious experience of the interrelationships that generate the system. To facilitate this participatory approach, the methodology (see Figure 21) can be guided by three distinct and complementary approaches:

- *Living system theory*;
 - *Permaculture*; ⁵²
 - *Developmental change process* ⁵³
- (Mang & Reed, 2012).

These three approaches - along with others already discussed here, such as the circular economy - are the basis for developing and evolving a *regenerative methodology* (fig. 22). The design methodology aims to achieve project implementation and create emerging paths of systemic resilience that meet social needs, improving the health of all living systems. The process is iterative and has five aspects: place, needs and goals, scenario design, assessment and implementation (Graves et al., 2019).

We can use various tools and approaches to facilitate the work within each phase. We explore three development processes that can help guide activities in these phases and choose the best tools and the best way forward:

52.

Permaculture is a design system that assesses and articulates the distinctive character or essence of a place and then reflects it in a wide range of optimised design solutions and management techniques that have the effect of beneficially linking elements of natural and human systems (for example, a road system that serves as a water collection and erosion control structures) (Mang & Reed, 2012).

53.

The *developmental change process* is a process that allows design teams to engage communities and enter into a co-creative dialogue with stakeholder communities through storytelling, creating a story field that shifts the focus from problem-solving and conflict to seeing the potential of the whole system and how that potential can be engaged and understood (Mang & Reed, 2012).

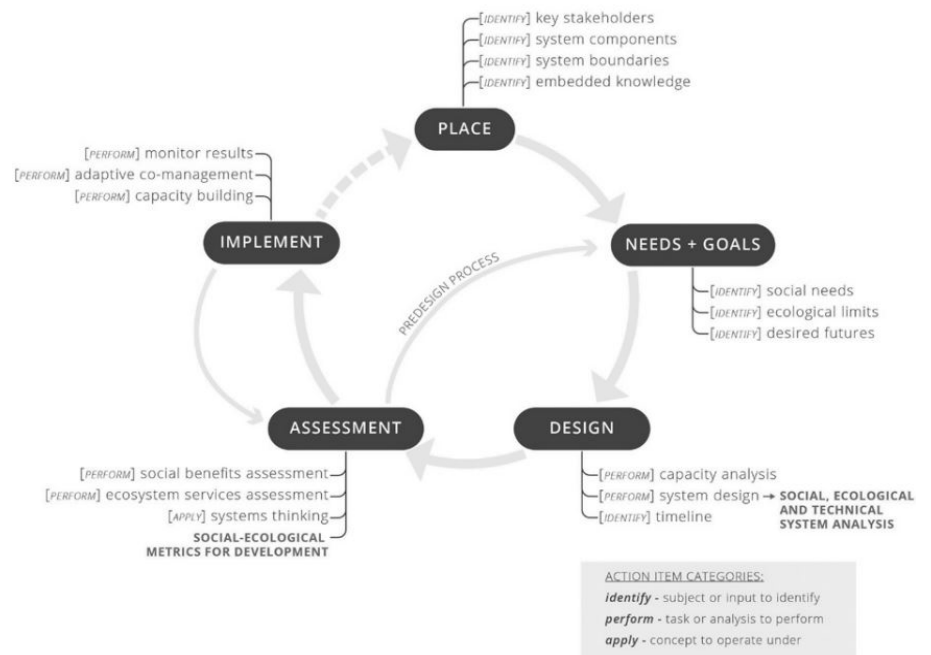


Figure 22. A process for regenerative social-ecological design (Graves et al., 2019).

Growing partnerships with stakeholders:

Projects should act as a source of inspiration for all the stakeholders affected by them (Haggard, 2002). One of the most potent effects of the *regenerative development process* is that people rediscover what interests them and what they share in common by rediscovering their *place* through the *Story of Place* process. By starting a joint project, we lay the foundations for awakening the connection people feel between themselves and the *place* they inhabit. Thus, designers must move from mere *builder* to *partner*⁵⁴ (Mang & Reed, 2012).

Living systems thinking:

Regenerative processes are evolutionary and go beyond improving current systemic performance, embedding in the system the ability to continue improving its performance over time and through changing environmental conditions (Mang & Reed, 2012). Implementing these processes, therefore, involves a greater degree of complexity and systemic dynamism, spanning several scales or levels of systems, and requires an ecosystemic and local perspective, multidisciplinary teams and broad stakeholder participation (Pickett & Grove, 2009). *Living Systems Thinking* is a means of applying systemic thinking based on *Living Systems Theory* in a way that responds to the uniqueness of a given location.

54.

The metaphor of a gardener is used to explore the role of design and designers as a partner in a regenerative practice (Ramo, 2009). Benne and Mang (2015) explained that "A gardener does not 'make' a garden. Instead, a skilled gardener is one who has developed an understanding of the key processes operating in the garden. Through careful observations of the conditions of the garden's ecosystem at any given time, a savvy gardener identifies core processes that are impaired and makes judicious decisions on how and where to intervene to reestablish the flows of energy that are vital to the health of the garden" (Benne & Mang, 2015, p. 10).

Integrative development processes:

Regenerative development involves creating and pursuing creativity based on the deep commitment of all stakeholders involved. This implies that a successful *regenerative process* integrates various disciplines, phases, team members and local stakeholders. Thus, the whole process has to be designed in such a way as to integrate the different actors in the development of the day-to-day work of the project (Mang & Reed, 2012). A development change process will support the transformation of thinking needed to effect real and lasting change.

The three factors of the process work together iteratively to create, maintain and realise the potential of all project phases (Mang & Reed, 2012). Below is an explanation of the five phases of *regenerative development*:

Place

The main objective of this phase is to *understand the place* and its community, reflect on the dynamics, patterns, relationships and potential inherent in that specific place and conceptualise how the project can be a regenerative force (Mang, 2006).

This design phase begins with identifying the main stakeholders in the socio-ecological system where the project will be realised. Social components - such as values, customs, institutions, local knowledge or infrastructure - are identified along with ecological components - wildlife habitat, vegetation, climate, soil conditions, geology, water or energy flows. In this way, the system's boundaries are identified, which can vary in scale - for example, from the building to the region (Graves et al., 2019). In general, this is the initial phase of the project, in which the design instructions and guidelines are developed. So, there are two crucial tasks to fulfil right at the project's start: creating a codesign team and creating a design space with which the collaborative design team can evolve (Escobar, 2018).

We then proceed to three collaborative steps:

Define the place:

The first step is to define the study area or the *place*, asking: *How big is this place?* (Mang & Reed, 2012). Here, it is necessary to recognise that any place, however small, is deeply interconnected with a larger one. As Kelly (2005) states: "At the ultimate level, your home is a cell in an organism called a planet. All these levels interconnect" (para. 1).

Integral Assessment:

The next essential step in *regenerative development* is finding the core of a particular *place* (Du Plessis, 2017). Creating a story starts with an *Integral Assessment* to help project and community stakeholders understand the *place* as a whole to make sense of the enormous diversity. The assessment incorporates information from a wide range of sources and disciplines - including site visits, existing data, reports, maps and interviews - and looks for patterns that are present both historically and in the natural, social and economic sectors (Du Plessis, 2017). These patterns form the structure of the *Story of the Place* and provide a reference point to anchor the project (Hes & Du Plessis, 2014).

Story of the Place:

The third step is the *Story of the Place*, which transforms these patterns and weaves a narrative that allows people to connect and see themselves in the *place* (Camrass, 2023b). The story describes what we previously called the potential or essence of a *place*. However, to capture the essence of the *place*, it is crucial to involve the community by asking them:

What kind of place is this? How do they describe it? How do local people express the place? What do local people like about their place? (Mang & Haggard, 2016) *Finally, what solutions already exist in this place?* (Mang & Reed, 2018).

Thus, we have reached the end of this phase with the system boundaries, key stakeholders, key components and embedded knowledge of the project defined.

Needs and Goals

One of the main objectives of a regenerative project should be to ensure the social base of the community living in the area affected by the development and, if possible, in the surrounding areas (Graves et al., 2019). Here, it is relevant to look at the social dimensions defined by Kate Raworth and remember that these *social needs* must be met within *planetary boundaries*.

The challenge for the design team is to work with a community of people to understand constantly changing and evolving relationships and develop the ability to adapt and create goals for the future. The design team must facilitate the creation of a vision of a sustainable future by all stakeholders at a site in order to be successful (ibid., 2019).

Create guidelines

Dialogue continues to develop during and after the process by sharing stories that reflect the experiences of stakeholders and communities and the perspectives of different experts. These stories are the result of a shared understanding of a desired future. As we move towards a deeper understanding, we create a shared meaning of what we want and what it could become (Hes & Du Plessis, 2014). This shared vision represents the full potential of the project, its goals and aspirations (Hoxie et al., 2012). As a result, a first set of guidelines, principles and concepts is developed for the design process that helps meet social needs and ecological limits. Once again, as Du Plessis (2017) reminds us, “There are no universal guidelines and indicators for *regenerative design* and *development* – these have to emerge from contextual dynamics and respond to ecological worldview values” (p. 53). However, Paul Hawken (2021) suggests guidelines, based on *yes/no* questions, that can guide our action and help build the right indicators for a given location:

“Does the action create more life or reduce it?

Does it heal the future or steal the future?

Does it enhance human well-being or diminish it?

Does it prevent disease or profit from it?

Does it create livelihoods or eliminate them?

Does it restore land or degrade it?

Does it increase global warming or decrease it?

Does it serve human needs or manufacture human wants?

Does it reduce poverty or expand it?

Does it promote fundamental human rights or deny them?

Does it provide workers with dignity or demean them?

In short, is the activity extractive or regenerative?”

(p. 249)

scenario design

At this stage, defining or discovering the project's true regeneration potential is essential. The first step is to revisit the project's aspirations, analysing synergies and conflicts (Reed, 2007). Then, involving all the players in the project, three stages are followed to develop the regenerative concept:

Immersion to understand the project's potential by addressing two questions:

What could this *place*/product be like if it lived up to its full potential and vocation? And what is its contribution? (Hes & Du Plessis, 2014).

Recognise and celebrate the aims and aspirations of the project:

Understanding the latent capacities of the *place*/product forms the basis for a deeper contemplation of the project, guided by the following questions: Who and what does the project serve and how? What is the significance of its realisation? Why is it important? (Mang & Reed, 2012).

Transform the project's aspirations and understanding into a tangible concept by asking:

What does this *place*/product require of us? What can the people involved do to help the project realise its potential? Can the project be linked to the systems around it? Can we imagine the project in such a way that its success is directly related to the success of our efforts to regenerate the surrounding natural systems and communities (the better these systems are, the more successful we will be)? (Mang & Reed, 2012).

After these steps, possible scenarios are created for the *place* or product. These scenarios reflect the needs and objectives identified. At this point, a more concrete potential for the *place*/product and the project's objective is created until a concept emerges that can serve and elevate both (Mang & Reed, 2012). In other words, a concept development dynamic is built for the project based on three elements (Figure 23) - the potential of the *place*/product, the objectives and aspirations of the project, and the regenerative concept (Hes & Du Plessis, 2014).

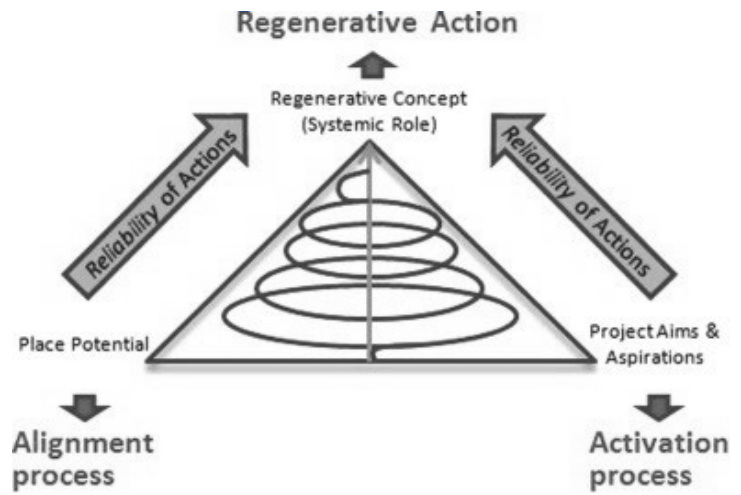


Figure 23. Regenerative Action (Mang & Reed, 2012).

Assessment

The implementation will focus on a specific *place*, considering its unique properties and processes. Wahl (2016) notes that biodiversity, cultural diversity and local wisdom are more likely to be productively sustained at regional and local scales. He also emphasises that focusing on the local and regional context does not mean that global knowledge sharing and peer-to-peer networking should be excluded, suggesting that different strategies apply at different levels (Wahl, 2016). In other words, a product that prioritises local production and implementation will enhance the locality, consequently contributing to global health and well-being.

On the other hand - going back to the concept of design *commons* - focusing on the local can promote learning and creativity, giving power and knowledge back to the community (Graves et al., 2019). Mang and Haggard (2016) also suggest that by celebrating local culture, the harmony between nature and community increases (Mang & Haggard, 2016). Designing a harmony of patterns means that the project values the *place* and ecosystems and that the unique attributes of the *place* enhance the built environment and those who inhabit it (Mang & Reed, 2020). In other words, appreciating a *place*'s diversity and uniqueness can transform how we live and value our environment while supporting resilience and *regenerative development*.

At this stage, the design scenarios are evaluated according to the social needs, environmental limits and socio-ecological objectives identified for the development site - ideally in close

55.

There are many ways to assess the social and ecological benefits of a product or development place. Communities can develop their list of relevant well-being indicators specific to their context. Alternatively, they can build on existing standards and measures for well-being, such as the Sustainable Development Goals or life satisfaction metrics (Graham et al., 2018).

collaboration with the community⁵⁵ (Graves et al., 2019). The metrics are just a suggested starting point. The RD must accept that design and development occur amidst complex systems in space and time. Therefore, things are constantly changing, and development needs, limits and objectives must be reassessed. RD is an iterative and adaptive process that allows adjustments to be made to increase the development's resilience. In other words, whenever necessary, we must redefine the needs and goals at this stage (ibid., 2019).

Given the complexity of the development and the need for broad stakeholder involvement in the processes, forming a core team is essential. The team maintains and promotes the project's core objective and aspirations (Reed & 7group, 2009). Another requirement is maintaining harmonisation with nature, particularly to the *place*'s uniqueness (Mang & Reed, 2012). It is essential to use its particularities as parameters to determine the appropriate and possible design solutions (Haggard, 2002). Objectively, at the end of this phase, we must arrive at a detailed design and documentation of the project and its construction.

Implementation

As development moves into the implementation phase it is essential to realise that there is no end to the process. When construction is complete, this is just the beginning. As Pamela Mang and Bill Reed (2012) point out, "design does not end with the delivery of the final drawings and approvals, or even with construction of a project" (p. 17). An RD process aims to create conditions that ensure continuous *co-evolution* and *mutually beneficial* integration of human and natural systems, which means that a site-influenced design will continue to flourish long after the project is complete (Mang & Reed, 2012).

One project alone cannot provide the resources and energy needed to realise the full potential of this ongoing regenerative effect (Goodwin, 2018). Instead, it must create a system of mutually beneficial stakeholder relationships (Bellato et al., 2023). Herein lies the power to extend the project's contribution to wider spheres of influence and time. *Co-evolution* is a process that cannot be predicted but can be planned and managed continuously⁵⁶ (Reed, 2007).

56.

e.g., restoration of riparian areas in urban settings can re-establish wildlife corridors, leading to interactions between city dwellers and wildlife) (Gregory et al., 2021).

In order to catalyse systems of *co-evolutionary mutualism*, it is necessary to see people and nature as "co-creators of the enormous web of emerging complexity that is the evolving biosphere and human economics and culture" (Kauffman, 2007, p. 905). Once again, as instruments of *co-evolution*, regenerative projects bring stakeholders together.

Updating stakeholders

It is therefore necessary to seek to update and grow stakeholder systems to reinforce continuous learning (Mang & Reed, 2012). To this end, it is essential to adopt a three-pronged approach to stakeholder growth:

Discovering shared identity: By rediscovering their *place* through sharing the *Story of Place*, people discover what matters to them and what they share. Shared identity is essential in creating the connection needed to make the changes required for a sustainable future - both for the project and the *place* (Mang & Reed, 2012).

Redefining what is at stake:

Stakeholders are generally defined as those who will be positively or negatively affected by a project (Olander, 2007). In this process, stakeholders are defined as those interested in the expanded potential that a regenerative project brings to a community and its biosphere (Mang & Reed, 2012). This shift in emphasis allows for a dialogue with key groups centred on shared vision and opportunity rather than on what is wrong (Du Plessis, 2017). According to Hoxie et al. (2012), the designer promotes a *regenerative mindset* in the community and acts as a dialogue facilitator between all parties involved (Hoxie et al., 2012).

Everyone involved:

As mentioned above, the success of *regenerative development* depends on the involvement of all stakeholders in a *place*, not just the design team, and on them moving from the role of *builder* to *partner*⁵⁷ (Hes & Du Plessis, 2014).

57.

It is important to remember that all phases are interrelated. In this case, the activities in phase 1 prepare stakeholders by making them aware of their role.

Finally, we summarize the implementation phase as the post-implementation maintenance, ongoing feedback and monitoring phase. It is again important to remember that the five phases, when taken together, can create an iterative cycle (Pavez et al., 2022) that opens up potentially endless opportunities. This is through the development of structure, capacity and community engagement, which support the continued operation and evolution of the project and its *place* and enable continued flourishing (Conte & Monno, 2016). Because design is “not so much about making things as about how to make things that fit gracefully over long periods of time in a particular ecological, social, and cultural context”⁵⁹ (Orr, 2002, p. 27).

59.

There are already some practical examples of companies applying regenerative development. Here, we make an overview of four companies that have proven to be relevant to validate some of the methods and principles presented:

1 - *Interface* is a carpet tile company contributing positively to environmental outcomes. To date, *Interface* has integrated circularity concepts into its product lines, invested in an internal training program on eco-awareness, piloted new business models, and ensured that its supply chain throughout the production and distribution process adheres to the same regenerative principles (*Interface*, 2020).

2 - *Traceless* uses natural biopolymers from agricultural and industrial to create sustainable alternatives to plastics and bioplastics. The highly technical product fully integrates into natural material cycles, mimicking nature's ability to create usable, purpose-built products that leave no trace. It differs from other bioplastics in these respects: It is natural, based on plant waste; it is compostable under natural conditions (*Traceless*, 2023).

3 - *Ecosia*, a non-profit search engine, uses ad revenue to plant trees worldwide. *Ecosia's* concept is to use the power of the Internet to restore forests. *Ecosia* switched to a trustee ownership structure that resulted in it operating as a non-profit company, thus safeguarding its promise to plant trees and ensuring it could stay true to its goal: channelling all profits into projects that benefit the environment and society. The company's transparency is vital to maintaining regenerative goals and the company culture: *Ecosia* publishes an annual financial report on its investments - from reforestation to renewable energy projects (*Ecosia*, 2023).

4 - *Patagonia* understood early on that the impact of the brand expands far beyond its partners and spans the entire value chain. Recognizing this, *Patagonia* takes a vetting approach before engaging with new manufacturers or logistics partners. Its internal Social and Environmental Responsibility team can veto a new partnership where a factory does not share *Patagonia's* values and beliefs. With this approach, *Patagonia* ensures that its purchasing practices minimize its impact on the environment and expand its influence on working conditions and community development (*Patagonia*, 2023).



Figure 24. Cutlery made from bio-circular plastic by Traceless (*Traceless*, 2023).

Regenerative thinking does not give us an objective plan for the future, but it can help us ask better questions about where we want to go and how to get there. RD is composed of several sub-concepts. RD's overarching idea is to understand nature's cycles, processes and purposes. This knowledge is combined with ideas of whole systems approach, the creation of places, the mutual health of people and planet, and *co-evolution*. The designer is encouraged to constantly seek to enrich himself with new knowledge and ideas (Conca & Dabelko, 2019). As such, it is essential to emphasize that the proposals presented here are open-ended and can be revised over time due to new and better proposals.

Based on the current proposals and the knowledge gained in this research, we conclude with an outline of the theoretical framework of *Design for Regeneration* that can help us put this knowledge into practice. Therefore, for each phase, we have given an example of the type of questions we could ask:

Working both inside and outside

Remember that our inner conditions - how we think, reflect, and communicate - affect our actions. Designing regeneratively involves a developmental perspective and requires us all to work on ourselves and our mindsets and behaviours as much as on the infrastructure, institutions, services and products of our outside world.

Seek continuous re-examination of internal thoughts and narratives, remain open to accepting constant change and abandon the search for certainty and control.

Which parts of the products/ services/ system are still degenerative? How can we design interventions that encourage individuals to improve their thinking, reflection and communication skills to impact their external actions positively? What strategies can be implemented to promote a culture of continuous self-improvement? How are perspectives changing, and how are we reflecting on these changes?

Empower participation and hope

Regenerative thinking recognizes that complex problems have different causes and perspectives and that diverse viewpoints are needed to solve them. We should involve different stakeholders with different specialties and characteristics.

Starting with a hopeful vision of where we want to go can help overcome short-term barriers - working from *what if?* can create the momentum and commitment needed for the work that needs to be done. Enable participation and ensure that everyone can make their voice heard. Actively engage and create spaces for exchanging ideas, encouraging plurality and diversity.

What might be the blind spots of the work, and how / by whom can they be illuminated? What can the people involved do to help the project realize its potential? How important is it to make it happen? What strategies can be used to ensure that all stakeholders' voices are heard? And how do we ensure plurality and diversity of stakeholders?

Start with place

Delineate the study area and recognize its connection to a broader context. Carry out an *integral assessment* to discover the project's potential based on data collection from various sources such as site visits, reports, maps and interviews. Also, look for historical, natural, social and economic patterns.

Interweave the patterns identified, creating a narrative (*Story of Place*) that allows people to connect emotionally and conceptually with the project. Involve the community in this process, exploring how local people describe, what they like about it and what solutions exist.

Through ongoing dialog, develop a common understanding of the project goal. This evolving understanding leads to formulating design guidelines, principles and concepts. These provide a framework for the design process.

Develop the regenerative concept by envisioning the project potential, appreciating the objectives and translating aspirations into concrete measures. Consider how the project can align with and contribute to surrounding systems and communities. The concept of the project should establish limits.

What kind of place/community/context is this? How do local people describe it? What solutions already exist in this location? Why is this solution necessary? Or Who are we here to serve and why? What qualities and limitations does this project have? What cultural, economic, geographic, climatic and ecological aspects should be considered? How can we use these characteristics as a guide and inspiration to develop solutions? How can we ensure that the guidelines, principles and design concepts contribute to staying within the limits of the place/community/context? And How do we contribute to a better life in this place/community/context?

Design and build in a harmonious and systemic way

Look again at the potential of the project, the project objectives and the regenerative concepts. Combine with defined guidelines and limits, and work with people to create shared ownership of challenges and find shared solutions. Look beyond financial value and narrow measures of success. Always think about our work's impacts, consequences and contribution to a broader whole, both intended and unintended. Testing and iterating ideas and activities is essential rather than launching and acting urgently. Build a core team to maintain project purpose and align with the unique characteristics of the place/community/context. Promote detailed project documentation and construction that reflects harmony with nature and a commitment to regenerative development.

How can the design process be structured to ensure a harmonious and systemic approach that considers both users needs and the wider context? What strategies can be used to promote a sense of shared ownership among users and stakeholders throughout the design journey? What strategies can be used to proactively identify and address any potential negative impacts the product may have on users, society or the environment? Does this design create more life or reduce life? Is this design extractive or regenerative?

Growing co-evolution, capacity and reciprocity

Work to create the conditions for others to continue to shape the project in the future. Support others in building capacity and developing relationships, mutuality and reciprocity. The aim is to ensure sustained flourishing beyond the immediate lifetime of the project. Establish a network of relationships between stakeholders. These relationships amplify the influence of the project over time and in wider contexts. Update these stakeholder systems to maintain continuous learning and encourage *co-evolutionary mutualism*. To enable this process, act as a catalyst for a regenerative mindset in the community and as a dialogue facilitator between all parties involved.

How can the design process be structured to promote continuous reflection and evaluation of how the product contributes to the wider user experience, societal well-being and environmental regeneration? Can this open work help others to engage and influence? How does capacity building contribute to overall community development? What strategies can be used to promote co-evolution?

Having reached this phase, we have built a new context for design action after the study has been based on constructing future dimensions. Based on new economic perspectives, inclusive axes of action and relational ontologies, this context will be the desirable scenario we want to achieve. Furthermore, to get there, we must use a new way of designing so that we can make this journey in a regenerative way.

IV Futures for design

“I don’t like to talk about happiness, but about harmony:
living in harmony with your own conscience, with your
surroundings, with your loved ones, with your friends.”

(Saramago, 1998)

The environmental, ecological, economic, and political crises unfolding today can be characterized as hyperobjects - realities that are omnipresent, inseparable from ourselves, and ultimately caused by human action despite also victimizing humanity (Arora & Stirling, 2023). In other words, the *Anthropocene* crisis arose through the accumulation of modern society's unsustainable technological and industrial design paradigms. However, this same crisis now subsumes and imperils human civilization. As designers and scholars have realized, the sheer scale and complexity of climate change, biodiversity loss, and resource depletion urgently demand mitigation and adaptation (Arora & Stirling, 2023). However, adequately responding to these existential threats requires acknowledging modernity's complicity in bringing them about through previous design norms. This presents a reflexive dilemma, as the *Anthropocene* was precipitated by the unintended consequences of established problem-solving logic, which cannot be relied upon to chart an alternate path. Thus, designers today face a profound epistemological challenge in conceptualizing design principles and practices that can create sustainability transitions rather than perpetuate escalating unsustainability. This will necessitate questioning underlying assumptions, values, and worldviews inherited from conventional design thinking.

Part of this integral reflection and understanding is based on the relationships between human and natural systems. Questioning human dominance - dominance of human over human, human over nature - is the first step in demanding an examination of our collective views and behaviours. In the first phase of this research (*Chapter 2*), we identified design as a practice deeply linked to the rise of *capitalism*, mass industrial culture and the exploitation of natural resources and human labour. Moreover, as a consequence, it has contributed to the oppressive, productive and extractive logic of so-called *Western modernity* (Monfrinotti Lescura, 2021).

Table 1 presents the conclusions of this chapter and the corresponding fundamental changes we propose throughout the dissertation - from the current mindset to the future *post-anthropocentric mindset*.

This study aims to inform new approaches and research agendas that may pave the way for positive systemic transformation.

<i>present</i>	<i>future</i>
one man as measure of all the things	appreciation of the diversity and uniqueness
uniqueness of human agency	all objects have some degree of agency
humans as separate from nature	interconnectedness of humans, the earth and non-human beings
accumulation of profits	fulfilment of needs
organised around the exchange value	organised around the use value
endless growth as the ultimate purpose for economy	planetary and human health as the ultimate purpose for economy
linear resources use	circular resources use
mechanistic and short-term thinking	systemic and long-term thinking
competition and individualism	cooperation, mutualism and co-evolution
globalised and centralised	localised and distributed
individual benefits and knowledge	common benefits and knowledge
degenerative	regenerative

Table 1 | key changes for a post-anthropocentric mindset

However, a question emerges:

Does advocating for theoretical transitions imply cessation of practical sustainability initiatives?

This study argues not necessarily. Theoretically, re-examining unsustainability's root causes does not preclude concurrent applied work. However, orienting around conceptually clarified purposes and revised principles may benefit practical efforts. With recurrent critical reflection, existing initiatives can avoid perpetuating the same paradigms implicated in generating today's crises. Therefore, this research suggests complementary domains of conceptual transitions and operational transformations are needed. Each domain should inform the other in an *iterative, reflective and co-evolutionary process*. Concrete sustainability projects provide experiential learning to help refine guiding premises and models. Meanwhile, theoretical transitions can imbue practice with renewed purpose and parameters.

Exploring conceptual foundations for systemic change is vital but should be dynamically linked to practical experimentation and action. This study seeks to catalyze sustainability transitions by providing reflective and applied contributions. Further research can clarify how to enact this integrative theory-practice relationship.

In *Table 2*, we summarise the dimensions of a design action towards preferable futures. Analysing this list as a whole represents a holistic transformation of the designer's mindset. This framework comes in response to the research question - *how can we reshape design practice to move beyond an anthropocentric mindset in order to restore the relationship between humanity and the natural world and promote a regenerative future?* - and summarizes the results of the conclusions made in the course of the dissertation.

In the course of this dissertation were presented alternatives for four central dimensions - based on the *Transition Design Framework* - that could guide the reformulation of design practice: Visions of transition rooted in axes of change; Exploring a new ontology of design as a driver of a new mindset and posture; Alternative economics as theories of change on which design depends; Design for Regeneration as a New Way of Designing.

To offer more convincing visions - enabling cultural, social and ecological reintegration - we have proposed axes (*chapter 4*)

that aim to inform and inspire projects in the present. These axes, modifiable according to the situation, are intended to act as a reminder throughout the process to make us question whether or not it makes sense to follow a particular path.

So, by using them, “we begin to see not just new ways of fighting for a more just and vibrant society, but whole new ideas about what that world might be like” (*The design studio for social intervention*, 2020, p. 11).

In the environment of inner questioning, incorporating new philosophies in the design domain (*Chapter 5*) is essential. Scholars increasingly argue that *anthropocentric* ontologies constrain design thinking, and more inclusive, relational paradigms are needed (Walsh et al., 2021). This suggests integrating non-human-centred, flat ontologies that recognize all human and non-human entities as holding inherent value and *agency* in broader systems. Through reflexive paradigmatic shifts, designers may transition towards relationship-oriented practices that collectivize rather than externalize diverse perspectives (Candy & Potter, 2019). However, questions remain regarding how specifically these alternative ontologies can be operationalized to improve sustainability outcomes.

What precise mechanisms, values, and relational configurations do more-than-human design paradigms imply? How would adopting such perspectives reshape current routines, priorities, and policies in the design process?

More conceptual development is still required regarding how *post-anthropocentric* premises can translate into practical, ethical transformations throughout the design lifecycle. Thus, while inclusive ontologies hold promise for expanding systemic awareness and responsibility, researchers must continue articulating how design practices should tangibly change if commitment to these alternative worldviews deepens. This suggests an important direction for further scholarship investigating the applied meanings and implications of transitioning to more-than-human, relationally-oriented design paradigms. By integrating this knowledge, we not only have substantial potential improvements in integrating new entities in design practice, but we also begin to redefine the notion of value in design.

The questioning of value, presented in *chapter 6*, introduces value in design as a variable that is not just about profitability. By shifting our attention from profit and consumption to wellbeing and sustainability, we build a promising path to a

world of common goals. We must recognise the importance of design being informed of current and future economic theory, because design is not independent of the political and economic picture (Orr, 2018, p. 4). This knowledge is crucial for designers to work at different scale levels and develop strategies, goals and limits appropriate to each level. This way, we will be seeding a practice oriented towards *human* and *planetary needs*, prioritising *proximity*, *sharing* and *autonomy*.

However, it has become clear that to make any kind of design truly transformative, it is necessary to search for and teach a new method. This may mean not only looking for new types of designers, but also new types of users, audiences, as well as new types of clients, collaborators or stakeholders - because “thinking isn’t done by individuals; it is done by communities” (Cook, 2017, para. 8). It was also shown that conventional approaches to sustainability - in the image of the current state of design - are not leading us to solve the emergencies faced. We can identify and diversify some common goals by converging all the research on regenerative practice and its collective knowledge - its methods, mindsets, positions and frameworks. As explored in *chapter 7, design for regeneration* considers the need for new approaches that go beyond current ways of designing. It suggests shifting towards design practices that harmoniously engage with, nurture, and *co-evolve* with natural and human systems. The ultimate goal of these *regenerative design* approaches is regeneration rather than just sustainability

But are we ready for this regenerative future?

As an emerging theory for change, regenerative design and development still need conceptualisation and application. The conceptualisations of RD in current academic debates still need to be understood, which makes the implementation of regenerative approaches challenging. The lack of factual knowledge and an accessible approach makes the concept of RD challenging to understand and put into practice. Currently, the debate is mainly centred on demonstrating the need for change by pointing out the shortcomings of the current paradigm.

Moreover, actions and solutions supporting regenerative development must be studied and tested. On the other hand, as emphasised in this research, change has to occur systemically. This makes the process even more demanding and complicated for today’s societies to change their mindsets, strategies, processes and practices. Still, although gaps can be identified, some concepts can support the transition from its current discourse. Looking outside the design discourse for

complementary solutions and ideas is essential. Using as a filter the condition and guidelines that result in a harmonious relationship between human and natural systems.

Finally, as the *Iceberg model* shows us, mindset change has the potential to catalyse systemic change. The mindset shifts presented in this dissertation can act as starting points for a broader paradigm shift. This requires us humans to rethink our role in the natural world. We need to be constantly critically analysing the usual stories. If the *mechanistic* worldview has taught us to think that we are above nature and that we dominate natural resources, in a *regenerative post-anthropocentric perspective* we need to start thinking that we are equal and dependent to our peers and non-human beings. In parallel - and perhaps even more urgently - we need to change how we view life and its support systems and discard degenerative patterns right from the design phase. At this point, it would be relevant to promote restructuring the practice and design education. It is precisely where continuity for future research is most relevant. A continuity based on the construction of a socially and politically active discipline, on the promotion of critical thinking and constant research, on the search for realistic proposals with local impact and implementation, and, above all, on a search that responds to the objectives of everyday well-being.

The time has come to transform our relationships. We must bring together a wide range of wisdom and entities to optimise our acting ability. It is imperative that we start acting in a way that improves the future, and collaborative efforts are essential. Ultimately, this is the essence of living as designers.

pillars for visions

community vision	Restore community and collective life
local vision	Reshape and promote local solutions and local life
autonomy oriented vision	Promote local autonomy
feminist vision	Challenge patriarchal assumptions and promote feminist and anti-racist policies
integrated earth life vision	Promote reintegration with the Earth
interrelational vision	Promote construction of relationships

*Exploring a new ontology of design
as a driver of a new mindset and posture*

principles for action

- 1 The designer must look at everything as an equal object.
- 2 Designers must consider how objects interact with each other and shape their environment
- 3 The designer must take into account the interconnectedness of everything
- 4 The design must consider complexity.
- 5 The designer should be open to the possibility of new and unexpected relationships between objects.
- 6 The designer must be able to understand different scales of space, time and mind.

Table 2 | dimensions of a design action towards preferable futures

Alternative economics as theories of change on which design depends

encourage degrowth

- | | |
|---------------------------------------|--|
| autonomy | 1 Promote individual and collective freedom - empower individuals and communities to make free choices; 2 Make decisions democratically and with the participation of all stakeholders; 3 Combat inequalities and oppression. |
| proximity and distribution | 1 Incorporate distributed patterns of production - local skills, appropriate technologies, participation and inclusion of local labour; 2 Incorporate distributed patterns of consumption - local supply chains and resource utilization based on local needs - and retain value in the territory; 3 Build local feedback loops and clear ecological boundaries. |
| conviviality and relationality | 1 Analyze the relationships between actors (human and non-human) instead of encouraging consumption; 2 Reduce unnecessary material goods; 3 Promote social solidarity; 4 See consumption as a social and collaborative activity. |
| communality | 1 Focus on the innovation of collaborative common goods; 2 Knowledge is democratically manageable, controllable, reversible and easily understood by communities; 3 Involve social work and manage resources collectively; 4 Co-design and co-produce - use participatory methods; 5 Make the knowledge created common knowledge; |
| care | 1 Reject exploitation and violence; 2 Promote solidarity with human and non-human beings; 3 Design for inclusion and accessibility; 4 Promote and improve well-being. |

create within limits

- | | |
|--|---|
| attending to the social foundations | Look at the 12 social dimensions and ask:
what social dimensions are we responding to? And which ones are we not? |
| not exceed the ecological ceiling | Look at the nine planetary boundaries and ask:
Which planetary boundaries should we pay more attention to? Which ones have already been crossed? |

***Alternative economics
as theories of change
on which design depends***

build and maintain circular

(re)thinking design	1 Assess the real need for a product; 2 Ensure durability and usability; 3 Ensure transparency and responsibility; 4 Ensure that production is aligned with the regenerative capacities.
responsible extraction	1 Minimize resources and promote sustainable use throughout the product's life cycle; 2 -Implement strategies to minimize the adverse environmental effects of extracting raw materials; 3 Avoid virgin resources; 4 Integrate renewable resources.
shared consumption	1 Design products that encourage sharing and participation in collaborative consumption models; 2 Ensure that shared products are used efficiently.
easy repair and maintain	1 Making products easy to repair; 2 Provide repair services accessible to all.
reuse potential	1 Design products with characteristics that encourage and facilitate reuse; 2 Apply design standards to ensure that products are safe to reuse;
refurbish that extends	1 Design products with refurbishment in mind to extend their functional lifespan; 2 Ensure that refurbishment is affordable, safe and easy to implement.
recycling as a last option	1 Develop strategies aimed at avoiding the production of waste from the outset; 2 Encourage the recovery of materials; 3 Incorporate principles that facilitate recycling processes.

Table 2 | dimensions of a design action towards preferable futures

Design for Regeneration as a New Way of Designing

design phase

working both inside and outside	1 Seek continuous re-examination of internal thoughts and narratives, remain open to accepting constant change and abandon the search for certainty and control.
empower participation and hope	1 Start with a hopeful vision, asking what if? 2 Enable participation and ensure that everyone can make their voice heard; 3 Actively engage and create spaces for exchanging ideas, encouraging plurality and diversity.
Start with place	1 Delineate the study area and recognize its connection to a broader context; 2 Carry out a integral assessment to discover the project's potential; 3 Look for historical, natural, social and economic patterns; 4 Interweave the patterns identified and create a narrative ("Story of the place"). Involve the community in this process and explore issues; 5 Develop a common understanding of the project goal and formulate design guidelines, principles and concepts; 6 Develop the regenerative concept; 7 Consider how the project can align with and contribute to surrounding systems and communities; 8 Establish limits.
Design and build in a harmonious and systemic way	1 Look again at the potential of the project, the project objectives and the regenerative concepts. Combine with defined guidelines and limits (work with people); 2 Create shared ownership of challenges and find shared solutions; 3 Test and iterate ideas and activities; 4 Build a core team to maintain project purpose and align with the place/community/context characteristics; 5 Promote detailed project documentation and construction.
Growing co-evolution, capacity and reciprocity	1 Create the conditions for others to continue to shape the project in the future. Support others in building capacity and developing relationships, mutuality and reciprocity; 2 Establish a network of relationships between stakeholders. Update these stakeholder systems to maintain continuous learning and encourage co-evolutionary mutualism; 3 Act as a catalyst for a regenerative mindset in the community and as a facilitator of dialog between all parties involved.

Table 2 | dimensions of a design action towards preferable futures

Figure 1. Illustration of the dissertation structure

Figure 2. Vitruvian Man, Leonardo da Vinci (1490) (Vitruvian Man, 2023)

Figure 3. Modulor, Le Corbusier (1948) (Le Corbusier et al., 1999)

Figure 4. Drawing of the “Unité d’Habitation” in Marseille, Le Corbusier (1952) (Frampton, 2007)

Figure 5. Circular Flow Diagram, Paul Samuelson (1948) (Giraud, 2010)

Figure 6. Time to care, Oxfam (Coffey et al., 2020)

Figure 7. Global Material Footprint 1980-2019, Material Flows (Material Footprint , 2023)

Figure 8. Material footprint per capita 2000 - 2017, United Nations (The Sustainable Development Goals Report, 2019)

Figure 9. BAU, BAU2, CT and SW scenarios of the 2004 The Limits to Growth book (Meadows et al., 2004)

Figure 10. Socio-economic and earth system trends after the ‘Great Acceleration’ (Steffen et al., 2015)

Figure 11. The state of the planetary boundaries (Richardson et al., 2023).

Figure 12. Iceberg model from Goodman (1997), adaptation by Unschool (Acaroglu , 2020)

Figure 13. Mushroom model by Unschool (Acaroglu , 2020)

Figure 14. Design for Interactions, Carnegie Mellon School of Design (Design for Interactions, 2023)

Figure 15. The Transition Design Framework, Carnegie Mellon School of Design (Transition Design Seminar CMU, 2023)

Figure 16. Three Horizons Thinking from Bill Sharpe (2016), adaptation by H3Uni (Seeing and Thinking in Three Horizons, 2023)

Figure 17. The Doughnut of social and planetary boundaries (Doughnut , 2023)

Figure 18. The butterfly diagram (The butterfly diagram, 2023)

Figure 19. Range of sustainability approaches from Bill Reed (2007), adaptation by Craft et al. (Craft et al., 2017)

Figure 20. Levels of work by Regenesi Group (Mang & Reed, 2018)

Figure 21. Social-Ecological Metrics for Development (Pedersen Zari et al., 2020)

Figure 22. A process for regenerative social-ecological design (Graves et al., 2019).

Figure 23. Regenerative Action (Mang & Reed, 2012)

Figure 24. Cutlery made from bio-circular plastic by Traceless (Traceless , 2023).

ANT: Actor-Network Theory
BAU: Business as Usual
BAU 2: Business as Usual
CE: Circular Economy
CMU: Carnegie Mellon School of Design
CT: Comprehensive Technology
GDP: Gross Domestic Product
H1: Horizon One
H2: Horizon Two
H3: Horizon Three
IPCC: Intergovernmental Panel on Climate Change
LtG: Limits to Growth
MIT: Massachusetts Institute of Technology
OOO: Object-Oriented Ontology
RD: Regenerative Design
SW: Stabilised World
TD: Transition Design

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