Artefacts from the Pluriverse:
Designing for long-term futures and sustainability

PhD Proposal 2019

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Cover Image: Screen capture of Global average atmospheric CO^2 emissions of 415ppm. Darker regions represent below 399ppm and lighter regions 430+ppm. See more at "Earth: A Global Map of Wind, Weather, and Ocean Conditions." n.d. Accessed May 20, 2019. https://earth.nullschool.net.)

I. Introduction

The age of Anthropocentric climate change brings with it an uncertain future for organised human life, while our economic and industrial systems continually plunder the life-sustaining biosphere in the pursuit of mass consumption, *enabled* by design. Yet, when it comes to *designing* for a truly sustainable future we are still bound by this wicked problem of ecology versus economy. While in the natural world, organisms are interconnected and communicating all the time, our 'Business as Usual' economic system seems to assume that every action and interaction within human society is solely based on a singular profit motive, regardless of the true costs to our biosphere, which is an *externality*. Given the urgency for immediate climate action there seems to be a crisis of imagination in seeing a future beyond 'Business and Usual', particularly when it comes to industrial design practise.

Seeing as our visions of the future are resigned to self-fulfilling death spirals of dystopias, it can be argued that the design discipline has a role to play in breaking these dystopian cycles by constructing new disciplinary paradigms towards better futures. Futures that point towards solution spaces, facilitating the transition and transformation to an ecology of desirable futures as opposed to an insular point of view of 'Business and Usual'. To evaluate the possibilities of a thriving, sustainable future world, we as designers need to be able to 'foresee' radically different futures. Designing for such a radical future depends on being able to visualise a future that doesn't yet exist, garnering valuable foresight that might help create a vision both desirable and feasible, through and by design.

The following research proposal looks at the ways in which industrial design might contribute to adapting, iterating and redefining the narratives of the future towards long-term sustainability. Such an enquiry calls for an exploration into the possible modes of futures engagement that might expand the possibilities of our collective future frame through a *designerly* solution-driven exploration for facilitating climate action. Actions that by the very act of *design doing,* articulate better, more hopeful visions of the future, by building a *solution finding* approach to Speculative and Critical Design towards positive social and ecological transformation through designed artefacts. Given such as outlook, the research leads with the following question:

"How can Industrial Design be an enabler for imagining better, more hopeful futures towards long-term sustainability in the age of climate change?"

Form and Outline of the Proposal

This proposal acknowledges that the design discipline, when it comes to the question of 'designing for sustainability', has yet to articulate a more substantial response to the ecological catastrophe unfolding in front of our eyes. This proposal positions the role of design within the highly complex wicked problems of the climate crisis and ecological breakdown by acknowledging the origins of the ecological crisis and comprehending the possibilities of our collective future within these frames (Slaughter 2012),. With that in mind, one might wonder why human beings are the *only* species[1] on the planet that deliberates so intensely on the problem of sustainability and climate

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[1] It might be trivial to note that there are no equivalent Climate Summits being held by any other species either on land or at sea— as far as we can observe.

change and yet, fundamentally struggles to rethink the basic premise for what all our civilizational systems are attempting to 'sustain'. Insofar as human beings are organisms of the natural world, it is perhaps an indictment on the way our modern, technological human society has been *designed* such that the human species is wilfully racing towards an evolutionary cliff—taking a whole host of other species with it (Díaz et al. 2019). This *wicked problem* (Morton 2016), which can be attributed to the pursuit of infinite growth on a finite planet, is made possible by the domination and exploitation of nature—by some disproportionately *more* than others (Althor et al., 2016).

If we as a species are serious about trying to survive at least till the end of the century and leave a habitable planet for future generations, it might be pertinent to understand why, despite the almost obsessive incremental pursuit of 'sustainability' over the past 30 years or so, the climate and ecological crisis has *accelerated*[2]. Tipping the scales ever closer towards the end of organised human life[3]—clearly whatever was tried has not worked or is not enough. Despite the overwhelming evidence and calls from prominent researchers saying that nothing but a drastic reduction in our ecological and carbon footprint will even come close to preventing the disaster our species seems to be wilfully rushing towards—we designers still find ourselves tweaking around the peripheries of our systems rather than confronting the root causes of the ecological crisis[4]. This crisis serves as a wakeup call for transforming and organising our global society on principles of long-term sustainability that at the very least ensure species survival and creates a *flourishing* human system designed for the long term, because there are not many choices left[5].

This proposal also acknowledges that the solutions to the wicked problem of climate breakdown go far beyond academia, seeing that it is no longer alarmist to state that the climate breakdown is by far the single greatest existential threat humanity has ever faced as a species and there is no prescribed manual for how an academic discourse should proceed when confronted by a proposition so pervasive in thought and action. However, this time our civilisation cannot afford another 30 years to act. Even the academic discourse on this issue has come to a crossroads which is far from cheerful, given how underplayed the urgency of the emergency actually is (Spratt and Dunlop 2018).

The proposal therefore attempts to outline a discourse on the role of design towards *long-term* sustainability *beyond* 'Business as Usual' that can help bring about designerly visions of better futures beyond despair and denial. As this proposal will explore, the future of organised human life in the face of climate breakdown is a picture of a world more dystopian than science fiction, and for some experts studying these relations, the future is *far* bleaker[6]. By global

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[2] "Media Release: Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating' | IPBES." n.d. Accessed May 6, 2019. *https://www.ipbes.net/news/Media-Release-Global-Assessment*.

[3] Watts, Jonathan. 2019. "Human Society under Urgent Threat from Loss of Earth's Natural Life." *The Guardian*, May 6, 2019, sec. Environment. *https://www.theguardian.com/environment/2019/may/06/human-society-under-urgent-threat-loss-earth-natural-life-un-report*.

[4] Monbiot, George. 2019. "Dare to Declare Capitalism Dead – before It Takes Us All down with It | George Monbiot." The Guardian, April 25, 2019, sec. Opinion. https://www.theguardian.com/commentisfree/2019/apr/25/capitalism-economic-system-survival-earth.

[5] "World's Food Supply under 'severe Threat' from Loss of Biodiversity | Global Development | The Guardian." n.d. Accessed February 24, 2019. *https://www.theguardian.com/global-development/2019/feb/21/worlds-food-supply-under-severe-threat-from-loss-of-biodiversity*.

[6] As noted by Jem Bendell in his unpublished paper titled "Deep Adaptation: A Map for Navigating Climate Tragedy" where the Sustainability Management expert calls for a re-evaluation of academia when it comes to the ecological catastrophe. *"The author believes this is one of the first papers in the sustainability*

inaction, human society is racing towards 'runaway' climate change, that will set off irreversible feedback loops. Feedback loops that will push the human species among many, towards an evolutionary precipice of 'near-term' extinction that might even happen within a single generation, as pointed out by climate change activists[7]. Therefore, this proposal sets out to bridge design research and action as a way to offer possibilities for addressing the growing concern of academics around the world[8] about the critical need for radical, transformative visions and actionable solutions. But in order to do so, it is important to understand some of the uncomfortable truths about the modern world which was birthed by modern industrial civilisation.

It is becoming clear now that nothing short of radical transformation to our economic and industrial systems will prevent the triggering of *irreversible* feedback loops—our civilizational systems that have so far depended on the continual extraction of the natural world. Failing to do so is expected to lead to a long-term "Hothouse Earth" in the foreseeable future (Steffen et al. 2018). Therefore, the design research proposal outlined here works from this premise by attempting to glimpse at the wicked complexity of the climate change within the historical, political, economic and social context of the modern world as they emerged from the legacy of Colonialism—*cheapening* both human and non-human lives, even our collective futures and our worldview (Patel and Moore 2017).

While our economic systems and industrial modes of production depend upon these extractive systems to design and sustain our modern 'standard of living', these arrangements have in turn decimated the biosphere. These systems however, do not live in isolation from their historical context, and seems to have embedded within it a *tacit* logic that sustains to this day. With this in mind, the question of 'sustainability' broadens beyond the traditional confines of "green-washing", symbolised by surface level discourses that seek to "sustain" the very systems that dedicated to the destruction of life on Earth. Assuming this crisis does not exist in a vacuum, and is part of a complex earth-system, the literature presented here navigates the historical, socio-political and economic narratives in an attempt to get a broader picture on how these things came to pass—and it is not a pretty picture.

There is a case to be made for what our species is facing is in part a legacy of 'modernity as a colonial practise' (Mignolo 2011) wherein the first tenets of our present economic systems were *designed* in order to subjugate nature and each other (Patel and Moore 2017). As a consequence, our economic systems of extraction and domination are now cannibalising and negating the very futures that were promised as '*progress*', what can be called a *defuturing* (Fry 1999; Escobar 2017) of our collective futures on a planetary scale. It turns out that any notion of 'progress' when it comes to mitigating the effects of climate change, cannot be based on economic growth of these extractive systems anymore (Hickel and Kallis 2019).

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management field to conclude that climate-induced societal collapse is now inevitable in the near term and therefore to invite scholars to explore the implications. " Read the unpublished paper at: http://lifeworth.com/deepadaptation.pdf

[7] Movements like Extinction Rebellion and Youth Strike for Climate have started to raise alarm bells and hold mass civil disobedience in order for swift and radical climate action and climate justice."

[8] Over 15000 scientists across the world have issued "World Scientists' Warning to Humanity: A Second Notice" which according to many academics should have been called "final notice"

While design unfortunately has readily performed the intellectual function *for* these extractive systems, any serious conversation on sustainability for the long term would need to comprehend what lies within *and* outside the extremely narrow frames of 'Business as Usual'. By following a narrative arc, the sheer magnitude of the wicked problem of climate breakdown can be understood as a mere *symptom* of our violent "split with nature" that is now a serious threat to organised human life[9]. Some of the connections made here comprehend the complexity of the context this research will tackle and the insights drawn from various disciplinary fields, with their long traditions of analysis to create new insights into the nature of the task at hand.

The design research laid out here is intentioned to the pursuit of *imagining better futures* to address and create new knowledge for what could be an alternative view on how industrial design might contribute in unpacking the complexity of climate action and to comprehend the task of long-term sustainability. In order to do so, this proposal combines various subjects and conceptual domains in a holistic *designerly* approach so as to create new connections and new insights into the 'sustainability' discourse. It can be argued that the future of sustainable design must reimagine the *intellectual* possibilities of design that is intent on designing better futures by intentionally *expanding* the possibilities of our narrowed horizons—by time-travelling and 'bringing back' the *designerly* artefacts from this future (Candy 2013).

In the wake of cataclysmic climate breakdown, these designerly visions *rehumanise* (Freire 2014) our collective futures as an *essential* responsibility of designers in the age of climate breakdown. The task of this design research then, is to contribute towards an envisioning of the radical transformations by generating the necessary design activities that *show* what pluriversal possibilities the future could hold (Escobar 2018) by *creating* the pluriversal visions and artefacts for the very *reclaiming and rehumanising* of our futures that we as a species hope to see[10].

To this end, I propose how it might be possible for designers to transform into what Buckminster Fuller called *"comprehensive anticipatory design scientist"*, for the great responsibility of stewardship for 'Spaceship Earth' (Fuller 1969). In alluding to this vision, my role as a design-researcher puts the design *doing* at the forefront as a *generative* activity in this PhD, towards creating new knowledge in industrial design and long-term sustainability where designers pose as *futures archaeologists* (Candy 2013)—*discovering* and *embedding* the better futures into the artefacts that they create today.

What follows the literature review section is the Research Design in section III which explores the methodological basis for exploring long-term sustainable futures within a Research through/by Design (Sevaldson 2010; Durrant et al. 2017) framework. Here I suggest exploring Speculative and Critical Design (SCD) (Dunne and Raby 2013) which despite its shortcomings (S. Bardzell et al. 2012; J. Bardzell and Bardzell 2013) might offer a window for new possibilities in the design *doing* within an ecological framework by pursuing a

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[9] Sixth Mass Extinction, Insect apocalypse, Ocean Acidification, Soil Depletion, Permafrost Melting, Coral Bleaching, Deforestation, weakening of Jet stream, rise in social unrest, inequality, poverty and mass starvation and hunger are all part of the "inevitable" dangers we are set to face.
[10] What this implies for the design discipline is that it undergoes an intellectual transformation that attempts at finding solutions to our man-made ecological breakdown, partly because design profession has been party to creating the civilizational crisis of climate breakdown—aiding and abetting new forms of production and consumption of resources for the past century and today with the weaponization our social hooks that genuinely threaten democratic movements worldwide.

solution finding approach that could break new ground in finding radically sustainable, technological artefacts from more desirable futures.

In section III, I expand on the methodological framework for how such a strategic *designerly* futuring can be made possible through SCD could be carried out in three "acts" that will be integral to this research. In section IV, the structure, form and outline of the PhD thesis by *compilation* is explored including the brief outlines of 5 articles that are expected to be published by the end of the research timeline. Section V explores the work plan for the 4 years of the PhD and how the proposal and research design will work together to address the primary research question.

Before that, in the literature review section that follows, I explore some of the relevant discourses on the question of sustainability and the ecological crisis through historical and economic frames of colonialist and neo-liberal legacy of capitalism. In this section, I explore the tendency of these systems to break its own promise of utopian futures by sacrificing *all* of our futures for the sake of short-term economic gains; and why the only way out might be to explore and expand our future possibilities through a rigorous imagining of pluriversal "worlds where many worlds exist". This section proposes why a *reclaiming*, *refuturing* and *rehumanising* of our collective futures is *essential* to how designers can envision radically sustainable alternative future worlds *embedded* within the artefacts they create today.

This proposal tries to make the case for pursuing a more transformative, ecological approach to design where beyond despair, other worlds are made possible by the design *doing*—a self-conscious political project (Graeber 2013). Speculative and Critical Design (SCD) becomes a critical, strategic tool for *reclaiming* the future where artefacts from alternative, pluriversal future worlds expand the *pluriversal* possibilities for an ecologically sustainable society to *emerge* from the present unsustainable one (Bookchin 1981),.

II. Literature Review

> "Can you look at the mountain and not just calculate its mineral worth? Can you understand that a mountain has much more than just the value of the minerals in it? And there is—it's a civilizational issue, right? That for people who have lived there, have known that mountain, they know it sustains not just the people. It's not just a question of who is getting displaced. But how does, for example, that bauxite mountain—which stores water and waters the plains all around it, which grows the food, which sustains a whole population—but it's meant for a corporation that is given the mining contract. It's just, how much does that bauxite cost? Can we store it and trade it on the futures market?"
>
> — Arundhati Roy

Civilisation at stake

With the onset of cataclysmic climate breakdown and the sixth mass extinction, organised human life is presented with a bleak future, one that is approaching faster than expected (Xu et al., 2018). Our economic and industrial systems continually threaten the life sustaining biosphere (Díaz et al. 2019)—threating the very foundations of human civilisation[11]. As the Earth climate system heads into a new phase called "Hothouse Earth" (Steffen et al. 2018), it has been observed that *never* has the human species come face to face with an existential threat so profound in scale or intensity. There is compelling evidence that as much as this crisis is caused by extractive human activity, the responsibility for it has been disproportionately distributed in *favour* of the already wealthy sections of human society (Althor et al., 2016). Climate breakdown comes across as a symptomatic ailment of a much deeper issue that concerns the very foundations on which our modern civilisation rests, and when understood as such, could provide unique insights into how we can shape better futures beyond dystopia (Slaughter 2012).

The latest scientific consensus paints a sobering picture of the future to even the most optimistic of those among us. According the Intergovernmental Panel on Climate Change (IPCC)[12], human civilisation to decisively act to limit the global average temperatures to 1.5°C before pre-industrial levels by the year 2030 in order to avoid triggering irreversible feedback loops. However, it seems like the global average temperatures are already "locked in" at 1.5°C above normal[13], with a 'best case' scenario of 2°C above normal. All of this is *assuming* that there is drastic reduction in carbon emissions from fossil fuels and an *overdependence* on geo-engineering along with "negative emissions" technology, yet unproven at the scales needed[14]. It is said that even despite the

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[11] Watts, Jonathan. 2019. "Human Society under Urgent Threat from Loss of Earth's Natural Life." *The Guardian*, May 6, 2019, sec. Environment. *https://www.theguardian.com/environment/2019/may/06/human-society-under-urgent-threat-loss-earth-natural-life-un-report*.

[12] Irfan, Umair. 2018. "Report: We Have Just 12 Years to Limit Devastating Global Warming." Vox. October 8, 2018. https://www.vox.com/2018/10/8/17948832/climate-change-global-warming-un-ipcc-report.

[13] "World Is Locked into About 1.5°C Warming & Risks Are Rising, New Climate Report Finds." Text/HTML. World Bank. Accessed January 9, 2018. http://www.worldbank.org/en/news/feature/2014/11/23/climate-report-finds-temperature-rise-locked-in-risks-rising.

[14] Koebler, Jason, and Nafeez Ahmed. 2018. "The UN's Devastating Climate Change Report Was Too Optimistic." *Vice* (blog). October 15, 2018. *https://www.vice.com/en_us/article/43e8yp/the-uns-devastating-climate-change-report-was-too-optimistic*.

global consensus, the Paris agreement will end up *failing* to meet its non-binding targets and is projected to lead to a 2.7ºC warmer planet instead[15]—an unmitigated catastrophe at a point when the sixth mass extinction is already underway[16] (Ceballos et al., 2017), along with biodiversity loss (Díaz et al. 2019) and the melting of the arctic ice cover[17] and the degradation of soil fertility[18] due to globalised industrial farming.

The Earth is so far the *only* known habitable planet that can afford human life the set of comfortable living arrangements essential for civilisation to flourish. When it comes to the future of civilisation, it becomes important to comprehend what it means *to nurture* a habitable "Spaceship" Earth that in turn *nurtures* civilisation itself. This might turn out to be the *essential precondition* for fulfilling the promise of a thriving, technologically advanced civilisation when face with climate change. Therefore, the climate and ecological crisis becomes a civilizational concern. A concern that seems to have carried over into the popular imagination as well, but one that arguably has hampered our collective abilities to envision better futures. Dystopian visions of the future fill up the spaces of the collective imagination in science fiction and popular culture as a comfortable warning of things to come (Slaughter 1998), which is making us fear the future[19]. Beyond these stunted imaginaries of the Anthropocene, other symptoms come to the fore as a pervasive state of apathy and despair can be observed permeating the cultural and political discourse. These cultural *symptoms* of our times might just be the proverbial 'canaries in the coal mine' and if so, we are up to our neck in dead canaries.

It is important to note that while the imperative to change these systems have existed for quite some time, the delay in creating a meaningful transition to a zero-emission economy was deliberately sabotaged by oil corporations and their beneficiaries for short term economic profits. Their strategy for over the past *forty* years[20] was to pursue dedicated campaigns of disinformation and propaganda to resist and dismantle any regulations or policies aimed towards decarbonisation—campaigns that continue to this very day[21]. It is clear now that our civilizational systems need to undergo a drastic reduction of the carbon emission in order to contain global average temperatures to 1.5ºC above pre-industrial levels. As a major contributor to climate change, global

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[15] Schwartz, John. 2018. "Paris Climate Deal Is Too Weak to Meet Goals, Report Finds." *The New York Times*, January 20, 2018, sec. Science. https://www.nytimes.com/2016/11/17/science/paris-accord-global-warming-iea.html.

[16] "Plummeting Insect Numbers 'threaten Collapse of Nature' | Environment | The Guardian." n.d. Accessed February 13, 2019. https://www.theguardian.com/environment/2019/feb/10/plummeting-insect-numbers-threaten-collapse-of-nature.

[17] Resnick, Brian. 2017. "We're Witnessing the Fastest Decline in Arctic Sea Ice in at Least 1,500 Years." Vox. December 12, 2017. https://www.vox.com/energy-and-environment/2017/12/12/16767152/arctic-sea-ice-extent-chart.

[18] Watts, Jonathan. 2017. "Third of Earth's Soil Is Acutely Degraded Due to Agriculture." *The Guardian*, September 12, 2017, sec. Environment. https://www.theguardian.com/environment/2017/sep/12/third-of-earths-soil-acutely-degraded-due-to-agriculture-study.

[19] Solana, Michael. 2014. "Stop Writing Dystopian Sci-Fi—It's Making Us All Fear Technology." *Wired*, August 14, 2014. https://www.wired.com/2014/08/stop-writing-dystopian-sci-fiits-making-us-all-fear-technology/. This as opposed to the mainstream sci-fi pop culture of from the 1800s through to the 1960s and the 70s where the utopian visions showed an almost religious faith in western science to help man transcend into techno-utopia.

[20] Hall, Shannon. n.d. "Exxon Knew about Climate Change Almost 40 Years Ago." Scientific American. Accessed February 13, 2019. https://www.scientificamerican.com/article/exxon-knew-about-climate-change-almost-40-years-ago/.

[21] Lerner, Sharon. 2019. "How the Media Launders Fossil Fuel Industry Propaganda Through Branded Content." *The Intercept* (blog). April 3, 2019. *https://theintercept.com/2019/04/03/branded-content-fossil-fuel-companies/*.

dependency on global fossil fuel infrastructure [22] needs to be reduced drastically rolled back and dismantled.

However, it has become quite clear that even a *complete* transition to clean energy and the green technology *alone* will not alone solve the climate crisis. Even when technological alternatives are introduced, it has been observed that they actually *increase* consumption by increasing the *capacities* for extraction and consumption (York 2017). This 'double-bind' of 'technology as saviour' offers a cautionary tale on the assumption that merely replacing fossil fuels with renewable energy *alone* will achieve the ecological goals. Despite the fact that a large push towards the transition to renewable energy might lead to a period of steady growth, it inherently depends on depleting global reserves of several crucial minerals such as copper, lithium and other rare-earth metals that are unsustainable at present rates of consumption (García-Olivares and Solé 2015).

In the frame of endless extractive growth, even *green* growth cannot lead to a sustainable future (Hickel and Kallis 2019). So even the 'race' to completely transform the energy infrastructure to renewable energy brings about a 'race to the bottom' where instead of violently extracting fossil fuels we strip the land bare for lithium. Transformations in the energy infrastructure are arguably important, but these are just another strand of the wicked problems plaguing civilisation today. Rethinking the *underlying* premise of infinite, extractive consumption and growth on a finite planet implies understanding the *intrinsic* value of a mountain ecosystem larger than the sum of its lithium deposits. This *fundamental* shift in perspective questions our assumptions of *growth, progress* and *development* when it comes to the notion that ecology is an external entity, a mere 'resource' *waiting* to be exploited for economic growth[23].

The binary distinction between "man and nature" has been a staple notion for *modern* life, and can be observed in the way we make and maintain things—an outcome of the violence of our social structures (Patel and Moore 2017, 37). This can be traced back to the roots of the ecological crisis, beyond the roots of civilisation, to the binary split between "Man and Nature" (Bookchin 1988). If human society is to be serious about finding solutions we might as well try to understand the very schism. Insofar as human beings are organisms of the natural world, the notion that nature needs to be exploited and dominated as a resource could have only stemmed from a *society* that was intent on dominating and exploiting itself (Bookchin 1988). This *social* premise for the ecological crisis comes evident when we comprehend that 'nature' does not *know* it is being dominated[24] and for such a notion must first exist in the human mind first—as a *projection* of the social (Bookchin 1988). Within these frames, the *conquest* and *commodification* of nature and the ecological crisis reveals itself to be closely linked to the hierarchical relations of power and domination in

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[22] Riley, Tess. 2017. "Just 100 Companies Responsible for 71% of Global Emissions, Study Says." *The Guardian*, July 10, 2017, sec. Guardian Sustainable Business. *https://www.theguardian.com/sustainable-business/2017/jul/10/100-fossil-fuel-companies-investors-responsible-71-global-emissions-cdp-study-climate-change.*

[23] It is worth noting here that many of the indigenous communities around the world today understand this as a practise. The way they design their lives around an ecological understanding of their culture. For many of these cultures, nature and humanity are one and the same and their social systems reflect that understanding. The challenge is to renew this understanding and transform our global industrial society that is still technologically advanced yet ecologically conscious.

[24] For Bookchin, the concept of domination needs to occur in both the dominator and the dominated, that is, there needs to be an inter-subjectivity in the relation of power. In reality, we cannot truly dominate a chair, a rock or even a deer, such a notion of domination can only occur in our minds. Once we see this non-relationality manifest itself in human society, we can understand how the split between man and nature can occur, and as we are "social animals" this split has a social character.

human society which include patriarchy, classism, ageism, states, feudalism, casteism etc.,—that *stunts* the growth of the human organism as it shuns the "self" and prevents it from discovering "its own capacities and uniqueness" (Bookchin 1988).

We find littered across modern history the tell-tale signs of this schism in the early moorings of Colonialism and slavery with its subsequent impact on global history (Patel and Moore 2017, 50). This time however, it is being practised on a planetary scale—cheapening lives and nature as commodity (Patel and Moore 2017). Thus, the very notion of "endless growth" has been carried forward to the ways in which we consume resources today—finding ever new frontiers for expansion in order to make things cheap to be consumed and discarded just as quickly as they can be produced (Patel and Moore 2017, 19).

In that light, strategies for climate action are intimately tied to the struggle for climate justice that can be understood as the legacy of conquest carrying over to the ingrained logic of violent extraction and subjugation in global industrial economic systems—the very systems that impoverished the colonised people[25] (Hickel 2018). The nature of modern civilisation can be argued to be an extension of such violence—that cheapens the lives of the marginalised(Patel and Moore 2017) and *dehumanises* them as "belonging to the past", forever catching up to "a future that never seems to arrive"(de O. Martins and de Oliveira 2016). We might do well to ask if what masquerades as "progress" today is even worth pursuing when the human future itself is being negated by "defuturing" (Fry 1999; Escobar 2017). The ecological crisis by virtue of its planetary scale has created prospects for a future that *cheapen* and *dehumanise* the entire human species as it does the natural world, as it was done to the Global South for centuries before.

It has been argued that despite the baggage of history it is "the best time to be alive" because "progress is a demonstrable fact" since "the data doesn't lie"[26]. One might look at some of the genuine progress that have taken place in the world and see a world safer, less poor and more *civilised* than ever before and assume that our current 'free market, neo-liberal' economic system has finally helped the world shed the dark horrors of Colonialism and Slavery. Anthropologist Jason Hickel analyses that these 'feel good' narratives of progress actually hide the dark side of modern life—close to 60% of the world's population lives in poverty. The majority of which live in the previously colonised part of the world—alluding to the historical impoverishment of Colonialism and Slavery that continues to this day (Hickel 2018).

What these narratives hide is a horrific revelation that global poverty and hunger might have actually gotten *worse* in the past few decades (Hickel 2016)—a claim that delegitimises the present economic order which seems to be aiding and abetting the impoverishment of the human species. Impoverishment in this case is carried out through 'structural adjustment programs' and other systematic manoeuvres through the institutional mechanisms of the World Bank and the International Monetary Fund (IMF). These programs in fact promote the privatization and deregulation of public

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[25] Hickel, Jason. n.d. "How Britain Stole $45 Trillion from India." Accessed January 20, 2019. *https://www.aljazeera.com/indepth/opinion/britain-stole-45-trillion-india-181206124830851.html.*
[26] Weintraub, Karen. 2018. "Steven Pinker Thinks the Future Is Looking Bright." *The New York Times*, November 21, 2018, sec. Science. https://www.nytimes.com/2018/11/19/science/steven-pinker-future-science.html.

infrastructure and services that essentially *continue* to keep the Global South impoverished and "under-developed"—while at the *same* time siphoning that wealth from the Global South to the Global North nations (Hickel 2016).

Furthermore, for measuring global poverty reduction based on the Millennium Development Goals (MDGs)[27], the base year of measurements was set to 2000 which was showing a *rise* in poverty. Subsequently statistics were manipulated enough to imply that poverty had *reduced* by accounting for China's growth from the 1990s instead of 2000s. Incidentally, during this period China's economy was growing at a phenomenal rate by doing the exact *opposite* of what the World Bank and IMF's structural adjustment programs proposed, and created a protectionist national economy (Hickel 2016). Even with the inclusion of Chinese data, as Hickel points out, the average poverty line of $1.92 today[28] is an *abhorrent* metric[29] to justify the present economic order whereas lived reality is stark for many even at the *dignified* poverty line of $10 a day—that means 4.3 billion humans (and rising) live in abject poverty today[30] (Hickel 2017).

When understood together with the mismatch between responsibility of emissions[31] and the burden of climate change (Althor et al., 2016)—life for most of the human population is *already* more dystopian than any imagined science-fiction dystopia. These "feel good narratives" of poverty and hunger reduction[32] create a hazy myth of "progress" disconnected from lived reality—people are hungrier and poorer now than ever in the past 30 years[33].

To turn the overwhelming economic disparity between the Global North and Global South, "rich countries started giving aid to poor countries. These efforts to 'level the playing fields' means that the Global North sends up to $120 billion dollars per year to the Global South as aid. Yet, for every dollar given for aid $24 is *extracted back* to the Global North through various policy mechanisms (Hickel 2018)—not the least of which are the aforementioned

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[27] These aims can be found in the UN's Sustainable Development Goals (SDGs).

[28] This too is a questionable figure since the $1.92 limit is for "extreme poverty" and does not account for the fact that inflation is much more extremely felt by those in extreme poverty. The figure, does not reflect lived reality, as someone living below this figure in a pristine ecologically sound village in say rural China may have a *better* quality of life that say someone living in $2 per day in a polluted, urban environment of a city like New Delhi, with no food sovereignty and dignity of work.

[29] There is serious concern over the legitimacy of using proportion of population versus the absolute number of people who are poor and malnourished. The ethical and moral implications are profound if we consider the absolute numbers of those suffering from poverty and hunger—which has actually gone up in the past 30 years.

[30] What this implies is that people are one pay check away from dropping into miserable poverty. Hunger is also a huge factor as the UN measures calorific requirement to keep the body alive, not healthy. Meaning that a daily wage earner will end up chasing nutritional requirements because while the statistics might say they are receiving adequate calories, their *nutritional* intake is profoundly lacking—since most of the poor earn a living doing hard labour like construction work, rickshaw pulling etc, they actually need far more calories than they can afford, always at the edge of poverty. For example, the average rickshaw driver in India, requires around 3000–4000 calories per day. None of this even is mentioning the cost of healthcare emergencies in case of sickness that are far too likely to crop up when doing intense manual labour, since in most of these countries the healthcare systems are stressed.

[31] "EXTREME CARBON INEQUALITY Why the Paris Climate Deal Must Put the Poorest, Lowest Emitting and Most Vulnerable People First." n.d. Koninklijke Brill NV. Accessed April 27, 2019. *https://doi.org/10.1163/2210-7975_HRD-9824-2015053*.

[32] As Hickel points out, the measurement of hunger depends on questionable framing—a person is considered hungry for a period long enough for health to show detrimental effects, for FAO that period is usually a year, this implies that for the statistics, 11 months of hunger is not detrimental to health or even 3 months.

[33] Hickel argues that it may as well be that the world is far poorer and hungrier now than in the past 30 years. Hickel's analysis leads to the conclusion that four billion people remain in poverty today, and around two billion remain hungry – more than ever before in history, implying clearly that a system that keeps more than half the population in abject poverty is a system that clearly doesn't work.

structural adjustment programs of the World Bank and IMF riding on the euphoria of the "feel-good" narratives of progress. These mechanisms are in fact *designed* to cleave open the economic and ecological resources of the Global South for extraction and destruction in the name of 'development', not the least of which plays into the 'statistical reduction' of poverty and hunger. Perhaps this was to be expected from an economic system that since the dawn of colonial practise has considered the colonised Global South as a 'resource bin' for cheap nature and cheap labour (Patel and Moore 2017) and as of today even serves as a *dumping ground* for waste from the Global North[34].

Today, that logic manifests itself in the net *outflow* of wealth from the Global South to the Global North which is far greater than what the Global South receives in terms of foreign investment and aid. It turns out that the Global South is in fact *developing* the Global North and not the other way round (Hickel 2018, 29). Therefore, it can be argued that the major frameworks of global trade and economics today, *still* rely on the legacy of Colonialism and propagate it (Hickel 2018), because like Colonialism, it is designed to be a net wealth accumulator for the Global North and *impoverishing* the Global South[35]. It is safe to say that the very legitimacy of our globalised economic and industrial systems, in the face of the ecological and climate crisis, is very loosely held together with the "good news" narratives of aid, poverty and hunger reduction.

The Utopian Future: A Broken promise

One would assume that extracting such wealth from the Global South might have been invested in developing the magical interstellar future of flying cars, teleportation, antigravity sleds, holidays on the moon or expeditions to Mars—visions of the future that could only be comprehended by a better, more sophisticated civilisation while the rest were always 'catching up' (de O. Martins and de Oliveira 2016). At that time, this 'cultural promise of the future', was expressed in science fiction literature and assumed that the heady pace of technological progress would automatically *correct* the ills of human society by pursuing utopian, technological frontiers. Yet, a very uncomfortable question lingers on—where are these 'magical innovations' of the future (Graeber 2018)?

Instead, we are faced with horrifying visions of dystopias in the popular culture, warning us of things to come, of our futures stripped of all possibilities and meaning (Slaughter 1998). The once juggernaut of technological imagination of 'interstellar travel' has been *reduced* to screens and images in what can be attributed to "dead zones of the imagination"(Graeber 2018)—a "stultifying effect" of neo-liberal capitalism which has failed to transform

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[34] This sort of dissonance in the two missions is a jarring tale of how "development" narrative is played in order for the Global South to be a dumping ground for the waste from Global North countries.
"India Imposes Complete Ban on Solid Plastic Waste Imports." n.d. The Wire. Accessed April 27, 2019. *https://thewire.in/environment/india-solid-plastic-import-banned*.
Lee, Yen Nee. 2018. "The World Is Scrambling Now That China Is Refusing to Be a Trash Dumping Ground." CNBC. April 16, 2018. *https://www.cnbc.com/2018/04/16/climate-change-china-bans-import-of-foreign-waste-to-stop-pollution.html*.
[35] As Hickel points out, if the Global North is serious about reducing poverty and hunger beyond the rhetoric of sustainable development, social justice and charity within the systems of foreign aid—it must first *stop impoverishing* the Global South. This pattern is almost exactly what the colonial project espoused. The *development* in a similar vein, aggravates this condition because most of the *development* is never meant for real progressive changes but for cleaving open the "new markets" for more extraction through the marketization and commodification of the resources of the global South countries.

utopian science fiction into reality [36]. This *cultural disappointment* with the future comes from finding out that the 'inevitability of technological progress' that was rampant under capitalist expansion up until the 1960s and 1970s never materialised at the same pace in later years (Graeber 2018). Similar to the "good news" narrative of poverty and hunger reduction, technological visions of utopian futures served as a justification for exploiting the natural world and human society. As Graeber observes, this wasn't "naïve utopianism", the state of techno-social change at that time were such that it wouldn't have been impossible for someone from a century ago to dream of interstellar travel in the year 2001. At the turn of the 21st Century, even the promise of a 15-hour work week remains a dream[37], while people work longer and harder for lesser pay[38].

Those grand interstellar visions with their "poetic technologies" were replaced by more sophisticated ways to *simulate* them. The digital, Cyberpunk utopia of was eventually co-opted by intrusive, surveillance based "bureaucratic technologies" (Graeber 2018), demonstrating the inherent contradictions within our economic system as they distort the technological frontiers. The *monopolisation* of internet technologies that once aimed to 'liberate humanity' with the digital age has further *stunted* the possibilities of any great technological leaps in digital realm[39]. The immediate response one gets when pointing out this inherent contradiction is that there is 'no alternative'[40]. With the onset of the climate and ecological crisis, the existing economic paradigm yet again reveals itself to falter on its own promises, bringing about a crisis of imagination— "it is far easier to imagine the end of the world than to imagine the end of capitalism"[41].

In this Anthropocene epoch, a *defuturing* (Fry 1999; Escobar 2018) is negating possibilities of the future of both the colonised *and* coloniser, of the civilised *and* the savage, of the *developed*, *developing* and *underdeveloped* countries, of the Global

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[36] In Chapter2: *On Flying Cars and the declining rate of profit,* Graeber challenges the existing hegemony of neo-liberal capitalism by taking on its supposed strengths: that it could conjure up visions of utopian futures that could only be made possible if nature and human society could be conceived of as machines. Capitalism doesn't get known as a utopian system but it's promises of efficiency and these techno-utopian fantasies are ingrained within a mechanistic view of the world, i.e. an idealism that has no basis in reality as the field of Quantum Mechanics is starting to show us.

[37] "Whatever Happened to the 15-Hour Workweek?" n.d. Accessed February 14, 2019. https://phys.org/news/2017-10-hour-workweek.html.

[38] Elliott, Larry, and economics editor. 2008. "Economics: Whatever Happened to Keynes' 15-Hour Working Week? Asks Larry Elliott." The Guardian, August 31, 2008, sec. Business. https://www.theguardian.com/business/2008/sep/01/economics.

[39] The big four: Facebook, Google, Microsoft, Amazon are actually monopolist enterprises based on bureaucratic technologies. All of the technologies these four companies are developing are actually in order to further monopolise their own businesses. This Graeber claims, changes the basic assumptions about capitalism; that "capitalism is identical with the market". But in a market riddled with "bureaucratic technologies" he observes that the market starts to resemble like a state in its functioning, in this case—a giant advertising/surveillance system—challenging the notion that market competition is essential to its nature.

[40] As Graeber observes astutely, this is the paradox of the system that masquerades as capitalism today. Its proponents say they know to how best to organise human society and yet when it fails to live up to that promise, jump on to the question of there is no alternative. There is an almost supernatural capture of our society by bureaucratic regulations not despite capitalism but *because* of it. Capitalism's great victory was the promise of organising society as a well-oiled efficient machine as compared to the heavy bureaucratic behemoth of Soviet-style Communism. Graeber goes to explore the shift in Capitalism to a more globalised *financial* capital has lead to a form of managerial explosion where private enterprise has transformed into bureaucracies. He likens this managerial shift was needed by a system bereft of ideas for the future, but seasoned more towards keeping the system running so as to create the notion that the system works for common good when in fact it only functions to funnel profits to the top 1%. This pretence he claims is a form of "Sovietisation of Capitalism" —something that capitalism wants to hide.

[41] As Observed by Fredric Jameson. It is not clear who said it first but certain variations of this quote exist and as such has been attributed to both Slavoj Žižek and Fredric Jameson. Žižek notes that the idea came from Jameson but regardless of origin, the quote in essence is about the pervasiveness of dystopia as the only catharsis under capitalism's narrowing of all possible future frames.

North and the Global South. This narrowing and negation of our future possibilities in the face of climate breakdown distorts and disrupts the task of "becoming fully human" and thus *dehumanises* the entirety of the human species. Thus it can be said that the challenge for our time is to *renew* this lost humanity (Freire 2014). In the face of an uncertain, *dehumanised* future that fears technology, a possible window of opportunity opens up that might help transform the economic, social and political systems towards a more *rehumanised*, radically ecological, 'symbiotic' system (García-Olivares and Solé 2015).

At the very least there are opportunities to renew these efforts in order to avoid the self-fulfilling, "mythical path dependencies of dystopias" (O'Brien 2018). Creating 'rigorous', radical imaginations of the future might open up alternatives to the dystopian frames of 'Business as Usual', setting up visions of more *human futures*. Seeing the planetary systems coming at the crossroad of an uncertain future suggests that a renewal of different kinds of futuring is in order—a *refuturing* towards the long-term survival of a more ecological, more *human* civilisation.

Long-term Sustainability and the Ecological Imagination

The question of long-term sustainability becomes all the more essential now that is clear that 'Business as Usual' is leading us to dystopian nightmares, even *willing* to cannibalise its own future profits for economic growth (García-Olivares and Solé 2015). Externalising the costs of the climate and ecological crisis, is predicted to lead to loss of productivity and well-being for both labour and enterprises that are the foundation for a healthy society and economy. The economic systems today seem to be *unprepared* for the coming social unrest, which could further raise spiralling costs to the economy (García-Olivares and Solé 2015). The wicked problem of the climate and ecological crisis need to be addressed beyond the technical frames of 'Business as Usual' that focus on short-term, peripheral tweaks to the system in some form of 'managerial incrementalism'. Enmeshed within the *wickedness* is a core question for the human species itself—whether or not an "ecologically oriented society can be created out of the present un-ecological one (Bookchin 1988).

When it comes to the challenge of social transformations and its future in the age of climate breakdown, this critical question might offer an important insight so as to formulate a "critical analysis of our relationship to the natural world" within the "ecological" dimension that realigns humanity's relationship with nature so as to heal the "split" and transcend it (Bookchin 1988). There is also caution to be maintained when trying to formulate new ecological thought *for* nature and ecology. These sorts of ecological frames must not assume that the ecological movement must go *against* human 'arrogance' and give equal rights to all creatures, as has been the case with the Deep Ecology movement. While this may be a noble thought at first, upon deeper analysis we find that such a notion dangerously veers into a misanthropic turn by describes humanity as an amorphous thing, as though the third world was equitable with the first, "women with men, poor with the rich, and the exploited with their exploiters" (Bookchin 1988). Insofar as human beings are natural organisms, the notion of stripping away any role of humanity in nature can be as much misanthropic as the Anthropocene.

Furthermore, de-humanising the Anthropocene in the name of fighting for the rights of nature strips away the rights *to* nature of the very indigenous people and the poorest in the Global South who have been at the forefront of

ecological struggles for centuries—ignoring the historical context of centuries of oppression and struggle. Taken further, this line of reasoning eventually reaches the conclusion that it would be better to have *mass genocide* in order to curb the "growing population that devours resources" (Bookchin 1988)—which sounds eerily similar to the colonial discourse that has for centuries subjugated the colonised people on similar grounds[42]. This response to the 'human centeredness' of the Anthropocene would be understandable if it weren't so destructive to the very idea of humanity itself and might prove to be a very slippery slope to a form of *ecological* totalitarianism.

This caution is to help formulate an ecological approach to environmentalism that considers the *human* aspects of climate action "rooted in an ecological philosophy, ethics and sensibility" that will help our "market society" transform into a "non-hierarchical cooperative in harmony with nature" (Bookchin 1988). Essentially the question boils down to the kind of civilizational culture we as a global human society want to create going forward. It has become increasingly clear what a *dehumanised*, *defutured* socio-economic system of 'Business as Usual' looks like. A totalitarian system which has managed to threatened most life on Earth by triggering a mass extinction event *and* stunted humanity's possibilities as a species, within a mere couple of centuries—a colossal acceleration in evolutionary terms.

Therefore, it becomes imperative that the design discipline within these frames comprehends this new "ecological philosophy", to build a new culture of our collective future—comprehending the brutal legacy of the one before it. But none of these moves come easy and the ever narrowing frame of the climate crisis, which is at once both a "hyperobject" *and* a wicked problem (Morton 2016), makes it a daunting task to attempt any solution without comprehending the *indeterminacy* and the unravelling of complexity on planetary scales. This means unpacking the notion of power and domination in society, which has spiralled into the ecological crisis and stunted the human species (Bookchin 1988), but one that is essential to "bend the curves in an equitable, ethical and sustainable way" (O'Brien 2018).

It is therefore important to be cautious about the presumed primacy of technocratic solutions being put forth to push for *behavioural changes* reserved exclusively for the marginalised and poor who are the least responsible for the emissions to begin with (Althor et al., 2016). Lasting and transformative change would need a profound shift in our understanding of long-term sustainability which does not expect that human beings become objects to be changed—reduced to their carbon footprints—but as the very agents of transformation (O'Brien 2018). This implies that emissions reduction is indeed the work tracking back a lot of the devastation already underway (Díaz et al. 2019) well beyond just technical solutions and behavioural change approaches. The form these transformation take, would need to consider and

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[42] Leo Amery, then Secretary of State for India, speaking of Winston Churchill: "During my talk with Winston he burst out with: 'I hate Indians. They are a beastly people with a beastly religion'." Churchill was famous for his racist views on the supremacy of the white race. In 1937, he told the Palestine Royal Commission: "I do not admit for instance, that a great wrong has been done to the Red Indians of America or the black people of Australia. I do not admit that a wrong has been done to these people by the fact that a stronger race, a higher-grade race, a more worldly wise race to put it that way, has come in and taken their place".
Heyden, Tom. 2015. "The 10 Greatest Controversies of Winston Churchill's Career," January 26, 2015, sec. Magazine. https://www.bbc.com/news/magazine-29701767.
"Winston Churchill Is No Better than Hitler, Says Indian MP." 2017. The Independent. March 21, 2017. http://www.independent.co.uk/news/world/world-history/winston-churchill-adolf-hitler-no-better-shashi-tharoor-indian-politician-post-colonialist-author-a7641681.html.

occur within the practical, political, and the personal spheres of human society (O'Brien 2018) not to 'beat the people with the climate change stick' so to speak but to engage with the human dimension as an *ally* in this endeavour, informed by climate justice for those most vulnerable. This understanding is *absolutely critical* to a just transition for staying within the 1.5°C target (O'Brien 2018).

Future Dreaming: A counter-imaginary of Cultural Change

The dogmatic cultural frames of *infinite* economic growth of 'Business as Usual' and the all-encompassing culture of our extractive, globalised, neoliberal economic culture has accelerated the climate crisis to a point that it might easy to assume that there is no alternative either. Yet, no human culture has ever been a monolith—it is always changing by those who refuse to be subjected to it (Graeber 2013). This might be why in our modern industrial culture, ecological activism and indigenous movements in the Global South have been at the forefront of resistance struggles to preserve their natural ecosystems—a form of "mutual self-definition against the values" (Graeber 2013) of the current economic paradigm. In anthropology, this form of cultural comparison, known as "schizmogenesis", has been an active force in history whereby a culture becomes a "self-conscious political project" (Graeber 2013).

Global climate breakdown presents an opportunity where a new ecological culture could emerge from within the old, knowing fully well what it will be defined against and what it stands up *for* and on that promise, it may form the foundations for other, *new* forms of ecological thought to emerge. These new ecological traditions might even be distinct from conventional environmentalism which does not look at the basic premise of the present society—that humanity *must* dominate nature—splitting it from the natural world (Bookchin 1981).

The understanding of this "new consciousness" as a synergy between the sciences, as understood in terms of systems theory, inspired in turn from the ecological systems themselves. These go beyond mere reductionist views but into a more holistic, "symbiotic mutualism"(Bookchin 1981). For this kind of profound transformative change to occur in the time frame of 12 years set up by the IPCC report, nothing short of a *radical* shift in the worldview and action will suffice. However, this does not mean that we designers fawn over the "good old days" but learn what we must from them, because for the most part, humanity has evolved "beyond an innocence" of the primordial (Bookchin 1981) and in doing so has changed the biosphere in ways which might turn out to be irreversible (Steffen et al. 2018).

Contrasting this with how things are, it turns out that such a profound leap in perspective where design at the very least, must first *begin* to imagine futures beyond dystopia (Slaughter 1998)—those that articulate human and ecological *prosperity* beyond the narrow frames of 'Business as Usual'. The encouraging news is that some of these strategies already exist. Whether we focus on a "symbiotic economy" (García-Olivares and Solé 2015) or Ecological Economics (Jakobsen 2015) or Participatory Economics (Albert 1991), it has become increasingly clear that there have always been alternatives available. These alternatives try to build a vision in which economics is built on the common understanding that human civilisation has to move beyond the destructive, mechanistic systems towards more ecological, long-term perspectives of sustainment of human society.

Demystifying Futures beyond Ecological Dystopia

Beyond the commodification of the natural world by 'Business as Usual' a holistic perspective opens up—a metaphorical "spaceship earth" where humanity is the steward for the planetary life systems (Fuller 1969). The natural world thus regains its *intrinsic value*—a pristine forest is valuable for its own sake, without it being reduced to its "resource potential" or mineral wealth. Being part of natural world, this *intrinsic value* extends to all human beings— not as objects to be controlled and dominated for extracting "human capital". These values might be the *preconditions* for this new ecological perspective as a 'self-conscious political project', creating the material conditions for social and ecological prosperity where production and consumption align towards long-term sustainability, constituting a form of "radical holism" (Kossoff 2015).

To pursue this precondition means that the focus is on *quality of life*, nurturing an *emergence* of social and ecological transformations towards a more thriving human future where 'development' and fair redistribution of 'resources' and wealth are a means to that end(Kossoff 2015). "Radical Holism" here forms the basis for an 'emancipatory' politics, further rooted in observations from the natural world, predicated on the *wholeness* of natural systems and also practiced by various traditional indigenous, grassroot social movements (Kossoff 2015). This wholeness is predicated upon the *intrinsic* property of an organism itself, only to be experienced by an encounter with its parts. The *mutual* participation of the parts expresses a single unity—*diversity* is therefore intrinsic to this holism.

This "radical holism" in turn accounts for the sustainability of everyday life— a framework in which "communities control the satisfaction of their needs at all levels of scale". In essence a society that builds *itself* (Kossoff 2015). This is equally visible in the realization of the *communal* as a fundamental goal of Autonomous Design (Escobar 2017). Both these notions suggest that *sustainability* of human civilization is a long-term endeavour that might occurs within a self-directed, autonomous framework focused on a *dignified* articulation of everyday life. Taken forwards, this framework essentially aims to *rehumanize* and *refuture* human society in the age of climate breakdown. The *refuturing* here implies a profound switch towards an ecological society where the pursuit of better, more *human* futures is pursued as the very emancipatory platform towards a *just* transformation, directed towards a truly sustainable human civilisation for a long-term. One might even claim that in the face of an existential threat, to *refuture* is to *rehumanise*[43] and to *rehumanise* is to *refuture*[44].

To do so calls for a "broader frame" of the "speculative imagination" that can "situate our intellectual and imaginative journeys"(Slaughter 1998), forming the *seeds* for more desirable futures towards more pluralistic vision of futures (Escobar 2018), beyond simple binaries of utopia/dystopia (Slaughter 1998). These *rehumanised*, *refutured* pluriversal visions would fundamentally see humanity as *stewards* of nature that both nurtures and is nurtured by it, not in

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[43] Using Paulo Freire's definition of the term. If the schism between coloniser and colonised, oppressor and the oppressed, dehumanises both then doesn't that mean the bigger challenge here then is to *regain* the humanity of both the oppressed and the oppressor? To *refuture* our defutured frames and *rehumanize* it as well.

[44] This alludes Arturo Escobar's concept of "ontological autonomy" Or what Escobar implies when he says every community practices the design of itself(Escobar 2017), where autonomy is the most fundamental feature of living and takes the form of "autopoiesis"—of self-creation of living systems. For Escobar, "Ontological Design" — design that designs itself—persists within a "double movement" that creates a long term sustainable way of reimagining and reconstructing local worlds(Escobar 2018).

the sense that we surrender all our agency to some "mythical nature" that is beyond comprehension and intervention but more like steering a boat (Bookchin 1981)—knowing full well where we came from but with a vision of a better future to strive towards. These visions ask of us as a civilisation to consider the potentiality of people themselves for spontaneous, radical social change (O'Brien 2018).

Cultural movements with a "critical futures awareness" (Slaughter 1998) as forms of self-conscious political projects (Graeber 2013) are not new. What Escobar calls "societies in movement" have long found refuge in Decolonial studies (Tuck and Yang 2012), Feminist "critical fabulations" (Rosner 2018), "Afrofuturism" (Yaszek 2006) and Indigenous futures (Lewis 2016) by creating their own cultural movements with visions for human liberation. These movements have created pluralistic, "multi-directional" futures possible (de O. Martins and de Oliveira 2016).

With their commitment to becoming more *fully* human (Freire 2014), these movements challenge the *defuturing* and *dehumanisation* of the 'Western worldview' and *still* find space for a critical futuring that doesn't discard it completely (Slaughter 1998), but instead takes forward some of its desirable values forward into the futures. This kind of emancipatory, *pluralistic* futuring could form the amalgam for a new critical futuring as "societies in movement" rather than 'social movements', leading to "new forms of life" founded on principles of decision-making by women, people's dignity, inter-existence and inter-being (Escobar 2017).

Science Fiction and the Future

The concept of 'refuturing' is not new to modern culture. The cultural prospects of refuturing have always been around us, continually being made right in front of our eyes. From science fiction films to corporatized interstellar visions of futures on Mars[45], to the comics and sci-fi literature that promised robot factories and the end of work, 'science fiction as utopia' has always been a cultural project for creating pathways to the modern world we know today (Graeber 2018). Even impractical utopian fictions have been cultivated in the collective imagination as 'plausible' visions of technological possibilities to the general public. For the most part these have been used to generate and manufacture public opinion towards forming public opinion by cajoling the audiences into accepting the technological frames through "diegetic prototypes"—artefacts that make tangible the narrative logic of cinematic fiction to support desirable technological possibilities[46] (Kirby 2010).

This might explain why it was plausible for people in the 1900s to think of travelling to the moon and other solar systems, or fly in jetpacks and have robot maids. The promise of technological inevitability created a frame to experience and reinforce the cultural imaginaries of capitalism and its techno-utopian ideals as a force for social change (Graeber 2018). These forms of *cultural futuring* through emerging technologies, bound within their cinematic worlds formed an essential narrative for modern industrial culture, a powerful

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[45] "Elon Musk Says He Is 'confident' People Could Afford to 'Sell Their Home on Earth' and Move to Mars on a SpaceX Rocket - Business Insider Nordic." n.d. Accessed February 15, 2019. *https://nordic.businessinsider.com/elon-musk-starship-super-heavy-cost-ticket-mars-2019-2?r=US&IR=T.*
[46] Taken from film theory, a diegetic artefact embeds within it the narrative diegesis/narrative logic. So, a lightsaber in Star Wars may not real in the real world but it is real in the narrative world. A lot of this depends on suspension of disbelief and narrative strengths of the world-building that the cinema auteurs play with.

phenomenon across human societies. Design as a discipline is quite embedded within this form of cultural futuring which uses the speculative imagination of designing for fictional worlds that are yet to be—world's that are designed *simultaneously* along with the narrative arc (Wille 2015).

Design as future making

Despite all the *wickedness* confronting us, the future is yet undetermined and is constantly being made. In these *wicked* times, better visions of the future are not just required, they are *essential*. It has been argued that how we humans envision futures might be very much in the discipline of design (Margolin 2007). Design in its formal disposition is always tasked with the role of future making, something that doesn't yet exist. What Schön calls a "voyage of discovery" enables a designer to construct "design worlds" that do not *yet* exist by engaging with the *indeterminacy* of wicked problems through the very materials and prototypes they produce (Schön 1992). This participatory conversation with the design activity transforms the design with the emergence of certain *unintended* consequences led by a form of intention that transforms the understanding of the given situation. 'Designing' thus, takes a "material" situation through the "active, sensory" participation and "appreciation of actual or virtual worlds"(Schön 1992).

These "designerly ways of knowing" might contribute to new ways of understanding within design research, building upon design knowledge that is mostly *tacit* and one that is mainly expressed by *engaging* in the act of designing than in any other form or language(Cross 1999). Thus design as a self-sustained field of research might be argued to be a distinct entity in the age of design-thinking separate from the binary philosophical distinctions of science and art (Buchanan 1992; Cross 1999). Designers do so since they are trained to conceive a subject matter on a general *and* particular level that when developed and presented, are philosophies and "proto-philosophies" of design existing within alternative views (Buchanan 1992).

It might be conceivable to think that a designer could look at the indeterminate wicked problems of climate change as a "quasi-subject matter" and in the process of attempting a *concreteness*, take the wickedness out of the problem and perhaps eventually solve it (Buchanan 1992). It is reasonable to conclude that in the context of a complex order of the larger ecological systems, designers might be charged with the critical role of creating the future we wish to see (Margolin 2007).

This form of "designerly way of knowing"(Cross 1999) the future, opens up a transformative approach to design as form of self-conscious act of speculation towards constructing future, *pluriversal* "worlds where many worlds exist"(Escobar 2018) in the here and now—a form of "designerly ways of futuring". These "designerly ways of futuring" could comprehend the possibilities of how things *could be* rather than how they are by posing "what if" questions (Dunne and Raby 2013). It could be argued that this is what design has always been—as a core human activity (Cross 1999; Schön 1992; Papanek 1985), engaged with the possibilities of the future and as such could be considered as a "study of mankind" (Buchanan 1992). These "intellectual" capabilities of design as a discipline provide new possibilities of design-research that allow for design professionals to be engaged with the *designerly thinking*, *knowing* and *doing* within these new diverse alternative future frames.

Design and the Future: An Intellectual Responsibility

As an intellectual discipline, design performs its role in the pursuit of new design knowledge through the design *doing*. Paraphrasing Gramsci, designers can be considered the "organic intellectuals" of modern society—constantly creating *new* modes of thought into being (Gramsci 1971, 6). While no human activity that can be separated from the intellect, not everyone has "in society the function of intellectuals" and while *everyone* has an intellect to intellectualize, philosophize and design, not everybody who does so is considered part of an intellectual *discipline* and not all of them have the *function* of intellectuals (Gramsci 1971, 3). However, one must be careful of this dichotomy, since the person who *creates* cannot be separate from the one who *thinks*. Similarly, while it can be claimed that 'to be human is to design and to design is to be human' (Papanek 1985, 3), not everyone who designs can be called a designer and not every *intentioned* human activity can be called design.

This social *function* of designers as "organic intellectuals" is one that a "dominant social group" nurtures and grants patronage to. As an "intellectual" class, designers articulate and shape society as their pursuit is informed by the values of the dominant social order—by participating in practical life as practitioner, as constructor, as organizer and as creator[47]. Within complex social structures, such "organic intellectuals" are the "functionaries" as their relationship is "mediated" by the whole fabric of society (Gramsci 1971, 12). Design, it can be argued, emerged to be one of these "functionaries" for industrial capital and the modern industrial world through "technical education and closely bound to industrial labor"[48]. Insofar as the design discipline has been embedded within the dominant modern industrial culture, it has contributed to the degradation of the ecological systems by propagating a consumerist and commodified view of nature for short term economic gains (Papanek 1985).

The *notion* of an intellectual however, is predominantly associated with allegiances to a "dominant social group", implying that only an *elite group* of functionaries deal with the responsibility of intellectualising that directs and transforms society while other more marginalised groups are bereft of any say in the matter. In reality, the *intellectualising* functions in society are spread across all strata of society. These highly complex and critical social and intellectual functions are performed by the marginalised classes, without which society would crumble and cease to exist[49] (Graeber 2018, 71). In essence it could be

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[47] These roles are created, even though Gramsci doesn't state it explicitly, towards a form of *designing* the social order that the dominant order wants to see and for which the intellectual classes are responsible. They set the terms of the socially acceptable debate. Things that can and cannot be said (or designed), which represent the frames of the dominant order. These intellectual groups are formed in connection of intellectuals with all social groups but these connections are more elaborate and extensive with the dominant social group. They have their own high culture and complex rituals.

[48] In order to dominate and exploit nature, one must first learn its secrets and as such the dominant order of industrial capitalism and by extension, neo-liberal capitalism would in effect create the class of organic intellectuals that can perpetuate the dominant social order of yet more violent extraction and expansion. It might be not be a stretch to claim that a large population of society in this system—slaves, women, children, elderly, LGBTQ, differently abled people were violently denied participation unless they could prove useful (read profitable) to the industrial capitalist order (a system that depends on slavery, women's oppression, and the often-forgotten exploited child labour in the factories during the Industrial Revolution).

[49] These underclasses actually perform what Graeber calls "interpretive labour"– the intellectual work done by the subjugated in the relations dominations and hierarchy where the subjugated suffer "compassion fatigue". This is perhaps also an oversimplification of what the feminist movement has long argued and he observes this has been a staple understanding within Feminist Standpoint Theory but he points out that this is also true of *all* forms of social domination. As an example, he points out that the

argued that it is not the intellectual class but these very "caring classes" who keep society from disintegrating[50]. Yet, they are the ones assumed to be the ones constantly 'catching up', waiting for a future that never arrives[51] (de O. Martins and de Oliveira 2016). Going forward, the intellectual task of design discipline shouldn't just be to form eloquent opinions but to *practice* them, not as rhetoric but action (Gramsci 1971). Thus, design must formulate a self-reflection if it is to facilitate a *reclaiming* of the defutured frame in the Anthropocene by deliberately *expanding* possibilities of our collective future, enabled by an emancipatory, self-conscious political project making the future *more* human for both the so-called "dominant" *and* marginalized groups.

As an intellectual discipline of the future—design would be designated to intellectual pursuits of better, *pluriversal* futures within the culture it currently participates in and creates. Considering these 'new modes of thought' as a 'designerly way of futuring', designing for better futures implies creating visions of a better future that do not yet exist, with the "immediate social function" of addressing the issue of long-term sustainability. In so doing, designers are called upon to share in the responsibility of an intellectual pursuit when faced with an existential threat—to pursue a course that brings forth new modes of thought that can help *rehumanise* our collective possibilities of the future.

Designerly Ways of Futuring and The Pluriverse

Designing a rehumanised future requires a profound shift in the way design functions in society. The race towards "bottom line" economics has further entrenched the discipline into narrow, dystopian frames of 'Business as Usual' Design and design-research for an ecologically responsible future depends on being able to imagine radically different, pluriversal futures that intentionally *refuture*, *rehumanise* and *reclaim* our collective futures by articulating what these futures *could be*—perhaps full of pluriversal possibilities of "poetic technologies" led by the speculative imagination. This vision towards a "pluriversal" design could engage with the climate and ecological crisis by creating spaces and artefacts for transformative technologies and radical system transitions along pathways of long-term sustainable scenarios of possible futures (Angheloiu et al., 2017). These *designerly ways of futuring* might also offer new subjectivities which challenge the current hegemony while at the same time create new solutions and aesthetic strategies through a form of "agonism" as separate from antagonism, creating a more plural radical democracy (Mouffe 2013).

Such an *agonistic* approach where diversity of possibilities can be experienced would celebrate differences without any expectation for reconciliation (Mouffe 2013). For the purposes of challenging hegemony of 'Business as Usual',

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"poor are so consistently miserable that otherwise sympathetic observers blot out their existence completely".

[50] Graeber's use of the term "Care work" is for emotional labour which is highly intellectual as well as highly critical to society but not traditionally in the intellectual class. See: Graeber, David. 2014. "Caring Too Much. That's the Curse of the Working Classes | David Graeber | Opinion | The Guardian." March 26, 2014. https://www.theguardian.com/commentisfree/2014/mar/26/caring-curse-working-class-austerity-solidarity-scourge.

[51] This constitutes a form of "structural violence" that as a result, people at the "bottom of a social ladder spend a great deal of time imagining the perspectives of, and genuinely caring about, those on the top", which almost never happens the other way around. This can be understood in the forms of complete alienation of the perpetually deprived classes and castes today, some of which happen to be "working classes" in industrial society, but also those others who are constantly being subordinated—these "caring classes", which keep society alive, perform the critical role of maintaining and organizing society from the margins.

opening agnostic and cooperative possibilities could be the ideal principles to follow when thinking about the future (Mouffe 2013). Escobar takes a similar but crucial departure into how design and designing can play a role in creating change towards a concept of the "pluriverse", that is, "a world where many worlds fit" inspired by the Zapatista movement in South America[52]. The *situatedness* of design in the pluriverse focusses on the design for autonomy that is driven by a politics of radical interdependence (Escobar 2018). Escobar looks to Transition Design and Speculative and Critical design as new frontiers of design as pursuits pluralistic sustainability.

Speculative and Critical Design (SCD):

The "designerly ways of futuring" found in Speculative and Critical Design (SCD), particularly the works of Anthony Dunne and Fiona Raby, question the modernist visions of late capitalist society. By taking a critical look at alternative futures and future imaginaries, they engage in alternative futures not of how things are but how they *could be* (Dunne and Raby 2013). For a while, Speculative and Critical Design (SCD) seemed to have addressed the call for a 'critical design studies' bringing social theory to design studies (Escobar 2018). By dreaming up alternative futures and posing "what if" questions, they showed that design practise could move beyond just predicting and forecasting the future based on preconceived notions and trends of everyday modern life (Tharp and Tharp 2013).

Crucially, SCD offered an unbridled exploration of ideas in a free space towards alternative futures (Dunne and Raby 2013). Using critical theory, SCD articulates a form of 'constructive design research' where designing activities and design probes are the core research activity designed for "provocativeness" (S. Bardzell et al. 2012; Malpass 2017). It turns out that SCD is an "approach to provocation" and thus is staunchly against "design solutionism", which it considers the domain of commercial design (Dunne and Raby 2013). For the same reasons SCD does not prescribe a method for creating the "critical" artefacts, since essentially it is not about *solving* needs. How would one begin to *design* a critical project however, remains unanswered (S. Bardzell et al. 2012). It is difficult as of today to consider SCD as a serious research methodology when it refuses to prescribe a method that can be tested and improved upon.

Furthermore, SCD itself as a practise depends heavily on dystopian narratives aimed at provoking the bourgeois sensibilities of mostly white, western middle-class audience (de Oliveira 2016). There is also a severe aversion to articulate a more concrete politics that can move beyond the museum and also include the voices at the margins of global capital (Tonkinwise 2014). Without a real radical politics, the alternative futures that Dunne and Raby create are the kind of horrifying futures "we hope will never happen to anyone, anywhere" (Tonkinwise 2014). Ironically, in their attempt at creating alternatives to global market driven futures, Dunne and Raby propose creating the future "citizen-consumer", further entrenching the consumerist market ideology they claim

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[52] In *Designs for the Pluriverse*, Escobar looks at the politico-ontological implications of design freed from its fiduciary responsibilities of 'Business as Usual' that can help create new ways being and knowing as we create the path to a renewed future. Though not a designer himself, Escobar wants to show design it's responsibility and power through the lens of a cultural study of design. He explores the position of design with the struggles of the subalterns, such as the Zapatista in their vision to create 'a world where many worlds fit'.

to be trying to create alternatives to (Dunne and Raby 2013)—inadvertently implying that there is *no* alternative.

Critical design's obscurity might also be explained by the fact that Critical theory offers little to no insight on *how* to make things[53]. If the provocation achieves anything it remains in the realms of the aesthetic and the emotional confined to the senses and awareness as experienced in controlled museum environments (S. Bardzell et al. 2012). While these experiences are valuable in themselves, without an articulated vision for action the audience is left with a feeling of helplessness or amusement—becoming an accomplice to the hegemony it claims to be against. A fate that has been observed in bio-design when it tries to emulate bio-art—beyond the museum, the work quickly turns horrifying (Cogdell 2011).

Speculative Futures: Towards a 'solution finding' approach
Despite its glaring flaws, SCD is one of the few *designerly* practises that articulate visions of alternative futures through design practise—however dystopian and horrifying. There is every reason to believe that engaging in a *solution finding* framework for SCD might open up possibilities for creating alternative, *pluriversal* futures today. The premise for this approach would be based on "discovering" designerly artefacts *from* the pluriverse and be 'brought back' in the here and now, as a mode of designerly "time-travel"(Candy 2013). These "diegetic prototypes" (Kirby 2010) from these pluriversal, future imaginaries might be back-casted to present actions and technological frames.

The *pluriverse* here rejects the binary frame of utopia/dystopia, creating a broader spectrum of long-term sustainable future scenarios beyond 'Business as Usual' (Angheloiu et al., 2017). These alternative futuring methods would bring future studies, systems thinking and critical design to the forefront of dealing with long-term sustainability (Angheloiu et al., 2017). The critical question to ask of SCD is that if it seeks to create *real* change it might help to look at other disciplines and traditions that have already employed some of these tools create alternative futures. The climate research project Radical Ocean Futures (Merrie et al. 2018) from the Stockholm Resilience Centre, demonstrates a radical approach towards the communication of cutting edge ocean fisheries research by exploring four distinct alternative futures of the global future of ocean fisheries affected by climate change using design fiction (Bleecker 2009) and artist renditions of these futures[54].

On the question of creation of a more resilient, educated and democratic peer to peer (p2p) society (Wildschut 2017), Wildschut proposes forming an alliance between citizen science and academic science whereby citizen participation in science can further academic science's reach and create a new perspective on what science can achieve, contributing to the long-term interests of science and as another for people themselves to become agents of the transformation we want to see (Wildschut 2017). Here, SCD might also be productive towards citizen participation in science, by designing speculative tools and artefacts as

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[53] Bardzell et al. observe that Critical Theory has a general anti-method stance which emphasizes meanings and effects of the artefact and not that of its creation. It ignores the individual agent of creation that is the author, ignoring his/her intention, the authors find out that this is a limitation to its application to design. This perhaps could be why critical design becomes an 'elitist mystery' like art itself.
[54] For the Radical Ocean Futures scenarios and art, visit the project website:
"Radical Ocean Futures." n.d. Radical Ocean Futures. Accessed December 20, 2018.
https://radicaloceanfutures.earth/.

solutions but those that might also enable greater citizen engagement and participation in climate action.

Fictional research papers (Lindley and Coulton 2016) on the other hand, speculate on technologies that are yet to come into public life. The proposed 'framework' of SCD, might function as an 'disciplinary' glue where design fiction, industrial design and citizen science create the new speculative imaginations of "poetic" technologies for better futures, reaching out to the larger citizenry through open, scientific 'social networks'. These possibilities mean that speculative design and these "imaginary abstracts" might be able to create '*fictional* technological research' possible towards a socially and ecologically conscious futuring. Complete with diegetic landscapes and diegetic prototypes (Kirby 2010), this form of speculative *solution finding* might expand the possibilities of "what if" scenarios towards long-term futures and sustainability. The diegetic artefacts so *discovered*[55], might be the fragments from which better futures might be created today by transformations that leverage forms of 'socially useful production' towards long-term sustainable solutions that build on the agency of communities whose are already trained in the high quality technological skills that these futures might need (Cooley 1987).

Mediating and Facilitating Designerly Change

Exploring these designerly "*what if*", alternative scenarios opens up space for discussion and debate around possibilities beyond the narrow, defutured, dystopian frames of 'Business as Usual'. Designers as "organic intellectuals" (Gramsci 1971, 12) serve as "functionaries" that "mediate", through the whole fabric of society, the artefacts from these "pluriversal" futures as they spread out within complex social structures. It needs to be seen how mediations of these a *refutured* frames by a *solution finding* framework of SCD, could spread the *solutions* through society at large through realised artefacts that point towards the possibilities, modalities and agency of long-term sustainable visions of pluriversal futures.

The intellectual social function of design as a discipline within this frame would mean to mediate those possibilities as if it could be brought into existence today. With these diegetic artefacts as modes of time travel, the designers who build them might be considered 'inter-dimensional time travellers' (Candy 2013), whereby an future reality is embedded into the artefacts of "poetic technologies" created today. Within the 'diegetic logic' of these future visions, the world may be built around complex unknowns, with *speculations* aimed at triggering a *discursive* shift that could possibly "short-circuit" the dogmatic, defutured narratives of 'Business of Usual'. This design led framework for future dreaming might expand the intellectual horizons of design practise, helping shape these pluriversal futures through the design doing.

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[55] They are obviously not discovered but *designed* to be discovered. See the work plan for further info.

III. Research Design

Research Through/By Design

The approach to this design research is driven by Research through/by Design (Sevaldson 2010; Durrant et al. 2017) where I take up the role of the 'designer as reflective practitioner' (Schön 1992) and the 'designer as futures archaeologist' (Candy 2013) where the design *doing* leads the research activity. This would constitute what can be called a "designerly way of futuring", creating visions of the "pluriversal" future visions embedding the *tacit* knowledge of the design doing within the diegetic prototypes (Kirby 2010) of "poetic technologies"(Graeber 2018) of long-term, sustainable futures that don't yet exist. The strategic use of SCD allows for a *design led* framework of design research as a futures-oriented enquiry into climate action. In this frame, the intellectual responsibility of the design discipline is explored by opening up alternative *possibilities* for human society through the probing, sensing and resolving of these better futures with design as a means of mediation.

In this framework, the "design thinking" comes at the forefront of the research enquiry through the craft knowledge of the designer engaged with the design activity. The *tacit* knowledge of this thinking is embedded within the artefacts that will be produced from the enquiry. The proposition is that this design led framework could *lead* in all sorts of directions that other disciplines might build upon. As will be explored, one of these *new* directions could be towards a reimagining of future "poetic technologies" as a *point of departure* for 'sustainability' discourse that *shows* the rehumanising and refuturing potential of design. These new technological frames serve to focus on strategies of *exaptation*, *adaptation* and *transformation* where industrial design research and practise might be directed towards social and ecological transformations towards *long-term* sustainability as shown in Figure 1. This approach would consider this form of *pluriversal* futures enquiry as a "self-conscious political project" towards envisioning a 'transformation of all spheres' of human society (O'Brien 2018).
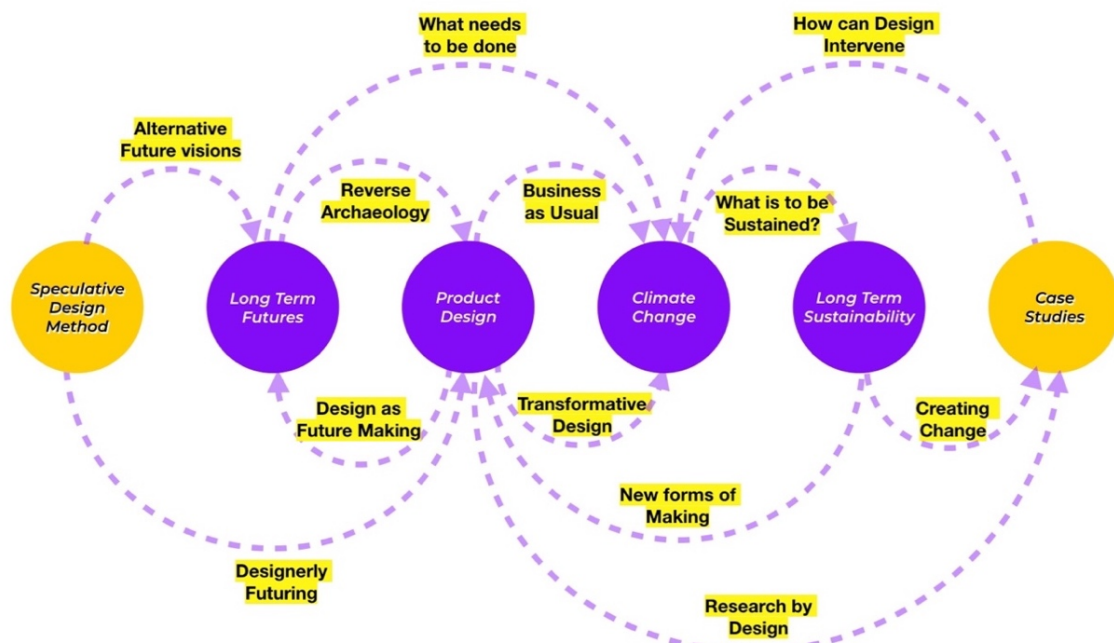

Figure 1 The transformative role of design led research as an intellectual discipline towards long-term sustainability. (Jomy Joseph, 2018)

Design as Future Making
In this research enquiry, foreseeing radically different futures beyond the utopian/dystopian binaries of 'Business as Usual', is assumed to be an *essential precondition* to achieve long-term sustainability. Therefore, the premise for this design research is built on being able to visualize and make a future that doesn't yet exist—starting with a critical analysis on how things are, and 'speculating' on how things *could be* as it *tangibly* articulates the *new* ecological thoughts through the design craft. This premise might open up the visions for futures that comprehend the *intrinsic value* of natural systems and the human organism where the intellectual capacities of design contribute to a social and ecological consciousness embedded in designed artefacts—transformations towards *better* futures today.

A "solution finding" approach to SCD, with its *pluriversal*, speculative futuring, breaks away from traditional prediction based, 'trend mapped' foresight methods in order to design for a future that is yet to be. Despite climate change trends pointing to the contrary, SCD could articulate future visions both desirable and feasible. This research enquiry will use SCD as a strategic tool and a means to explore and "make real" those pluriversal possibilities of radical, long-term sustainable futures with diegetic prototypes where the *tacit* knowledge of the designing serves as platform for "autopoiesis"—of self-creation of living systems (Escobar 2017). What Escobar terms "Ontological Design"—design that designs itself—persists within a "double movement" that creates a long term sustainable way of reimagining and reconstructing local worlds (Escobar 2018). It needs to be seen how the designer becomes a 'time traveller'(Candy 2013) and helps the realisation of the *communal* within a self-directed, autonomous framework focused on a *dignified* articulation of everyday life where a community practises the design of itself (Escobar 2017).

With the onset of ecological collapse further *accelerated* by 'Business as Usual' design practise, this particular approach to the design research stresses upon the *urgency* of climate action towards long-term sustainability. It needs be seen whether these new sensibilities can transform industrial design practise as a *comprehensive anticipatory design science* for 'Spaceship Earth' (Fuller 1969) within the frames of SCD framework that point to broader solutions when seeking an 'ecology of desirable futures'.

Tacit knowledge building and the Speculative Future
As discussed earlier, given the urgency of climate action, Industrial Design as a disciplinary practise is still within the narrow frames of 'Business as Usual'. Yet despite that, it is critically positioned to create the artefacts beyond 'Business as Usual'. When applied to a futures-oriented research by design, these new uncharted speculative imaginaries might be known within a designerly "knowing in action" as a reflective conversation (Schön 1992). Through creative, 'rigorous imagining' this proposal attempts to channel industrial design research that opens alternative trajectories of the future to emerge and be realised by 'bringing back' diegetic prototypes (Kirby 2010). The *craft* of industrial design enables the *intellectual* means of 'time travel' that construct the very *tangible* artefacts from *pluriversal* futures embedded with the long-term values of sustainability as future foresight.

This research enquiry positions 'design *as* future making' where the designer is a *futures archaeologist* (Candy 2013) within a Speculative and Critical Design (SCD) framework, making and unmaking pluriversal worlds while conversing with a "material situation" (Schön 1992) of constructed artefacts. This design

research is mediated through craft knowledge of design practise[56] which make *tangible,* the diegetic solutions needed to trigger new forms of discourse *as* climate action. This speculative approach to SCD, invites new forays into *solution finding* for climate action, distinct from "commercial design" while not rejecting it completely.

The diegetic prototypes thus designed from such an SCD framework would not attempt to *prove* the solutions themselves but to open up future *possibilities* of solutions as embodied, *tacit* knowledge within an artefact from a future yet to be—as a *point of departure*. What it implies for this research proposal is that even though the speculative imaginations of "poetic technologies" might seem "other-worldly", they would do so grounded on sound scientific claims[57]. This designerly *seeding* of futures research, expands the core motivation for industrial design research where the design activity comes at the *forefront* of research rather than being plugged in at the far end of the research question, making it distinct from design practise.

The Ecological Question

Insofar as these artefacts are to be realised for a *better* future, this design research would also address how they get produced. Since merely transitioning the global energy economy to renewable energy is not an option under current rates of consumption, resource extraction and economic growth (García-Olivares and Solé 2015), building an social and ecological consciousness *decoupled* from extractive industrial growth is required. This consciousness considers the *intrinsic* human *potential* that brings forth autonomy of those whose skills make technological civilisation possible. The notion of "socially useful production", raised by the Lucas Aerospace Combine Committee, also called the "Lucas Plan", proposed as a radical plan to transform military technology towards socially responsible, civilian needs (Cooley 1987).

In similar terms, the *intrinsic* value of natural systems might be considered as a repository of evolutionary knowledge, where nature nurtures the elements in conditions conducive to life and nothing is 'wasted' in a closed system (Benyus 2002)—nature *designs* itself. The challenge for this consciousness to be pursued in this proposal is to build design solutions that also consider the nurturing of the very social and ecological systems that it will depend on for the long-term. This means SCD comprehends a rehumanised role of people and communities to participate in the creation and production of the very technological futures where they get to choose the futures they desire and change it at will, in accordance to social and ecological consciousness.

In this regard, concepts like Social Ecology (Bookchin 1981), Ecological Economics (Jakobsen 2015), Participatory Economics(Albert 1991), Platform Cooperatives (Schneider 2018), Symbiotic Economy(García-Olivares and Solé 2015), Bio-Design (Karana et al. 2018), and Socially Useful Production(Cooley 1987) might serve as foundations for explorations and further inform the articulation of the ecological discourse through the cases pursued. Founding these on "what-if" propositions might build the ecological frame for this design research without resorting to 'ecological dogmatism'. The

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[56] Contemporary design tools and methods as part of design practise are employed such as:
Design sketching and rendering (analog and digital), CAD, 3D rendering and Virtual Reality, Digital Manufacturing, Prototyping and other craft-based knowledge, Diegetic Artefacts, Design Fiction, Film sketching, Biomimicry and Biodesign to name a few.
[57] (Merrie et al. 2018) As explored by the speculative design fictions and science fiction prototyping method in the Radical Ocean Futures research project.

notion of 'sustainable design' therefore, might move beyond "green-washing" which look at *peripheral* changes but confront the larger *wicked hyperobject* of climate change as an unravelling of the larger systemic failures of globalised industrial society. In order to keep the *gains* of industrialisation, SCD might help break new ground on new, seemingly impossible yet poetic technologies, *nurtured* into existence in synergy with the natural world.

Design Led Mediation

Given the urgency of climate change (Ripple et al. 2017), the speculative design fictions explored and communicated in the Radical Ocean Futures project (Merrie et al. 2018) further shows the possibilities of taking forward sustainability and futures research, forms of which might be emulated within the frames of this research agenda. This proposal will borrow an adapted framework of Participatory Action Research (PAR) (MacDonald 2012; Bergold and Thomas 2012) and lead with a Research through/by Design (Sevaldson 2010; Durrant et al. 2017) framework where the design-doing is at the *forefront* of the research activity. This is followed with *Participation* from various other research/activist groups who might direct it towards climate *Action*.

Design *as* research foreshadows the participatory action where the research *through/by* the design-doing is a generative activity (Sevaldson 2010). This is followed by forms of *designerly* mediations towards participation and action. This adaptation of PAR framing implies that the tacit knowledge embedded in the designed artefact 'speaks' for itself and thus is 'peer-reviewed' within the participatory setting, which might lead to forms of action in the "real world". Once the artefacts are generated, they can serve as a 'point of departure' for creating the possibilities of change and strategies within already existing frameworks within educational institutions, tech and policy research institutions and even commercial design practise.

The *designerly futuring* this research attempts to carry out will not attempt to *prove* the modalities of action itself but offer alternative visions for *triggering* discourse *through* the designed artefacts where forms of mediation open up possibilities of transformative social and ecological change. The design activity therefore functions within those existing frames but as a proverbial "trojan horse" for anchoring the discourse of these possibilities. On this basis, 'design as research' is *pre*-intentioned as a *point of departure* for other forms of enquiry to follow. But for these *other forms of enquiry* to occur, the design activity must come first.

This design research will be situated within the research project designBRICS[58] project within the Centre for Design Research at The Oslo School of Architecture and Design (AHO). Here designBRICS will be the primary partner of this research. Thus, the research activities proposed here will leverage the frameworks already established within the research project and possibly carrying over to other research centres at AHO. Here, designBRICS serves as the base from which mediations for the design activity reach out to the larger research community.

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[58] The designBRICS project is a platform for a lean network of different design institutes in BRICS countries and the Oslo School of Architecture and Design (AHO). The BRICS are represented by the design departments at Hunan University (HNU) in China and Cape Peninsula University of Technology (CPUT) in South Africa. What brings these three together is a profound belief that the single most urgent issue for designers to work with today – and unfortunately also tomorrow – are ways to address Climate Change on a local and global scale. More details on the designBRICS project and network can be found at:
http://designresearch.no/projects/designbrics-a-global-design-network-addressing-climate-change.

Design competitions and exhibitions such as the Cumulus Green Prize and the Stockholm Design Week will be used as a platform for testing "trojan horse" design probes as alternative, speculative solutions to 'Business as Usual' by exploring how an ecological society would emerge from within the present un-ecological one. These various forms of mediations will be varied depend on the core intentions of the research outcomes as I will reach out to the research community and the larger public audience and present these speculative futures and study their "participation".

These projects/cases will be shared, disseminated and opened up on the research networks of designBRICS through webpages, exhibitions and may even lead to a possible Massive Open Online Course (MOOC), taking the research towards a pedagogical outcome. Beyond these conventional platforms, the designed artefacts, might also subvert crowd-funding platforms such as Kickstarter and Patreon, as a form of design activism pushing the mediation on these channels for triggering climate action by leveraging and engaging with existing means of social discourse.

This approach, might perhaps make it possible for the larger citizenry to engage with these futures raising the general scientific temper and discourse on climate change as the Radical Ocean Futures project has managed to achieve (Merrie et al. 2018)—but this time *starting* with designed solutions. Given the urgency of the climate crisis, implicates my role as design-researcher towards a form of futures oriented, 'design-*as*-action research'. It is possible for such a move to potentially unlock new frontiers of future-making that "demonstrate" the time-travelling (Candy 2013) and *solution-finding* potentialities of SCD by showing the potential for better *designed* futures with diegetic prototypes (Kirby 2010).

Methods and Methodology:

The methodology driving the proposal is based on Research Through/by Design(Sevaldson 2010; Durrant et al. 2017) combined with Participatory Action Research (PAR) (MacDonald 2012; Bergold and Thomas 2012), where design is the *generative activity* for the research. Here the design activity is a starting point for research where the designed artefacts are generated through a Speculative Design Framework. The outcomes of this design-research would serve as *catalyst* that *trigger* the discourse and participatory *action* that follows. The "real world" mediation and climate action occurs is intended to occur through the artefact with *embedded* design knowledge. While documenting the changes that follow, it will be important to note that not all of the interactions and changes created or lack thereof might be documented in detail. However, field notes, photographs, videos, artefacts, audio recordings, interviews and surveys would still be recorded along with generated artefacts which themselves embody the tacit design knowledge.

Speculative Design Framework

The research proposal will explore and test the proposed SCD framework shown in Figure 2 whereby the artefacts generated on a multiple 'case studies' that serve as data milestones for collating a rich methodological space for exploring the feasibility of this framework and how it could work within industrial design research and practise. In Figure 2, Step 1 explores *Future Mapping* where we map the unknown future through speculative scenario building by projecting a hopeful future through futures literacy tools such as horizon mapping (Hodgson and Midgley 2014) and gaming futures (Candy 2018). In Step 2, *Speculative Design Fictions* (Bleecker 2009) are created from the drivers of these "hopeful futures" that creatively explore these scenarios[59] with a focus on *discovering* designed artefacts that can be *imagined* to have "solved" some contentious issue in the futures.
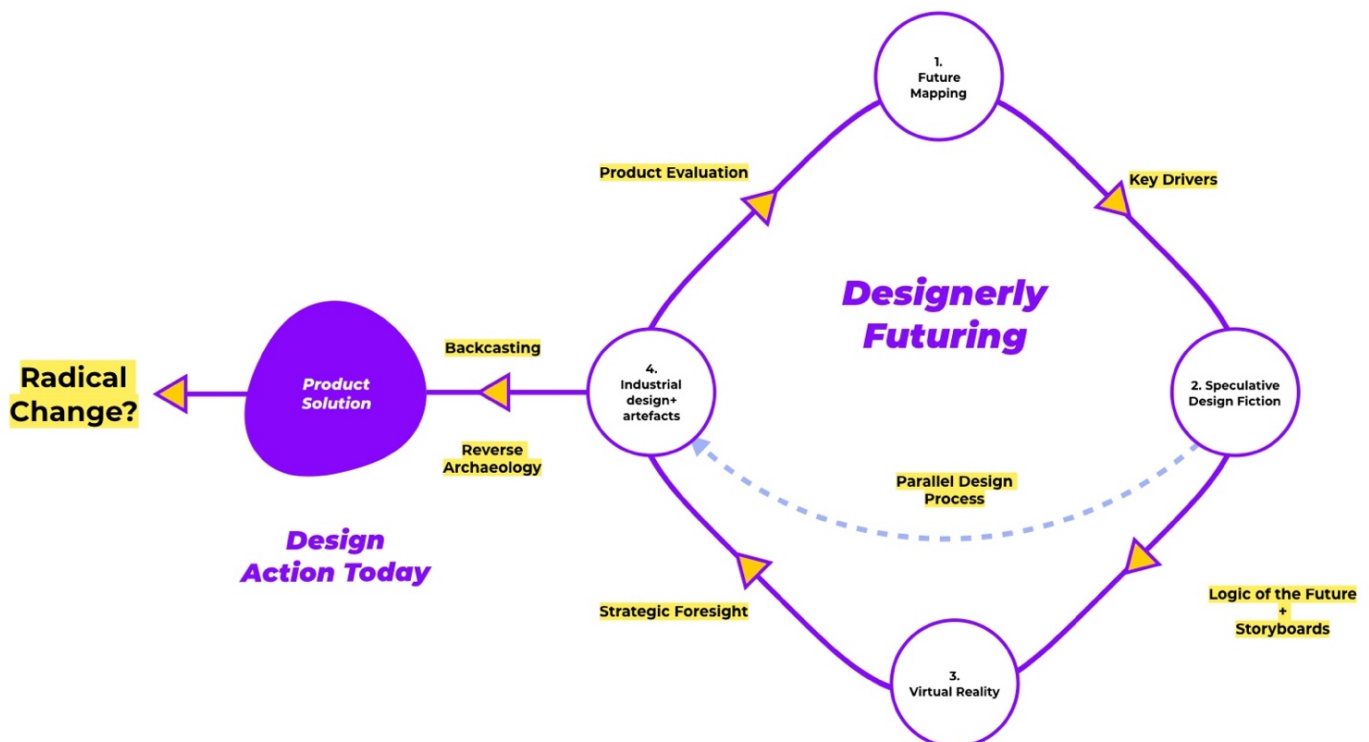
Figure 2 Proposed Speculative Design Method for creating designerly artefacts from the pluriverse. (Jomy Joseph, 2018)

In step 3, the design fictions are converted into a low fidelity, immersive Virtual Reality (VR) experience that is meant to be "read" together with the design fiction. One could always get to this diegetic prototype directly from the design fiction and make a concept film instead, but exploring the VR together with the artefact and design fiction however gives an 'edge' for the diegesis to take hold since the VR helps 'break from reality' and helps suspend disbelief. The use of film here serves to document the future context in film and to explore this discursive elements of design in this future (Arnall and Martinussen 2010). Thus, this VR future functions as a 'diegetic landscape' for a 'concept film' which can be 'shot' as though a real cameraman was recording on film[60]. In Step 4, the speculative *solution* for this speculative future

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[59] The Futures Poker game shown in Figure 2 is an adaptation of the Futures Poker game made by Strange Telemetry, a London based consultancy. "Projects." n.d. Strange Telemetry. Accessed January 19, 2018. *http://www.strangetelemetry.com/projects/*.

[60] See "Blockchain Radioactive" a film shot in a speculative VR future: https://youtu.be/6ZQrbOBcWxk

that function as the *diegetic* artefacts of the speculative future (Kirby 2010) is constructed using contemporary industrial design tools.

This diegetic artefact *solution* is then 'brought back' into a product solution which completes a single iteration of this process—opening up the door to further explore other radically alternative future artefacts. This solution might be further projected and iterated on which might open up the pathways to other pluriversal, alternative futures. This framework, by constructing the visions of better futures, might even "*invent*" technological artefacts, *designed* in the here and now. In order to build a rich dataset for this framework to be valuable to SCD, "case" studies exploring different types of diegetic artefacts from pluriversal futures could might be taken up explored in three or more "acts" as discussed below.

ACT I: Future Dreaming

This act includes setting up a two-week intensive futures workshop module called "Refuture Labs" which would plug into existing Masters studio courses at AHO. This workshop module will engage with climate action through a form of design activism for climate action, focussed on a solution finding approach and defined earlier using different data generating activities through virtual reality, design fiction, film sketching, digital manufacturing. The workshop would pursue design activities in Speculative Design and engage with students who will explore designerly solutions for climate action through narrative storytelling and design fiction as explained in Figure 2.

The data generated through this '*designerly*' framework will explore how student apply the design doing as means of imagining sustainable futures either through products, design sketches and renders, concept films, virtual reality experiences or design fictions of scenarios for climate change mitigation. This can be supplemented by creating tangible artefacts through digital manufacturing which would train students to further train themselves in the craft knowledge. This module would also be function in multidisciplinary settings at AHO where students of architecture and landscape architecture work together with student of design work together for common future visions. This form of design-based futures enquiry will also engage the students by employing a 'material hackathon' framework for "Critical Jugaad" (Butoliya 2016)—frugal explorations of diegetic prototypes in critical futures enquiry. This might also be combined together with a biomimicry workshops already established with the Master's program at AHO. The data gathered from these modules might be taken further to explore and analyse for the thesis.

ACT II: Designs from the Pluriversal Futures

The primary focus of this act will be to focus on applying industrial design towards the generative activity with designBRICS as an 'umbrella project' but still exploring the SCD framework shown in Figure 2. The generative outcomes of this act are the speculative scenarios and designerly artefacts that will be sent in for design competitions. Competitions such as the Cumulus Green Award[61] will be used as mediums for 'testing' the speculative artefacts in contemporary "sustainable design" environments. Exhibitions at design weeks will also play a part in this act as the designs "commissioned" by

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[61] The theme for the competition to be held in June 2020 focusses on Sustainable Development Goal 12, that is, "design for circular economy". For more see: "Cumulus." n.d. Accessed May 10, 2019. *https://www.cumulusassociation.org/call-for-entries-cumulus-green-2020-for-a-new-circular-economy/.*

designBRICS will be presented at the Stockholm Design Week[62] together with radical future scenarios possible industrial design artefact solutions for *better* long-term sustainable futures. The purpose of this act is to use design artefacts as "trojan horses" in order to *embed* the discourse on sustainability within the usually 'Business as Usual' setting of design competitions and exhibitions.

This act requires a wide range of design and technological expertise where possibilities of rapid prototyping and additive manufacturing could play an important role in the exploration and realisation of such artefacts. What is important to note here is that ACT II is perhaps the "living project" as in these artefacts will keep being designed to build on "commissions" from designBRICS as a repository of these speculative explorations. As shown in Figure 3 and 4, we can see the kinds of data we can expect to see generated when applying the Speculative Design framework explored in Figure 2 with Research through/by Design.
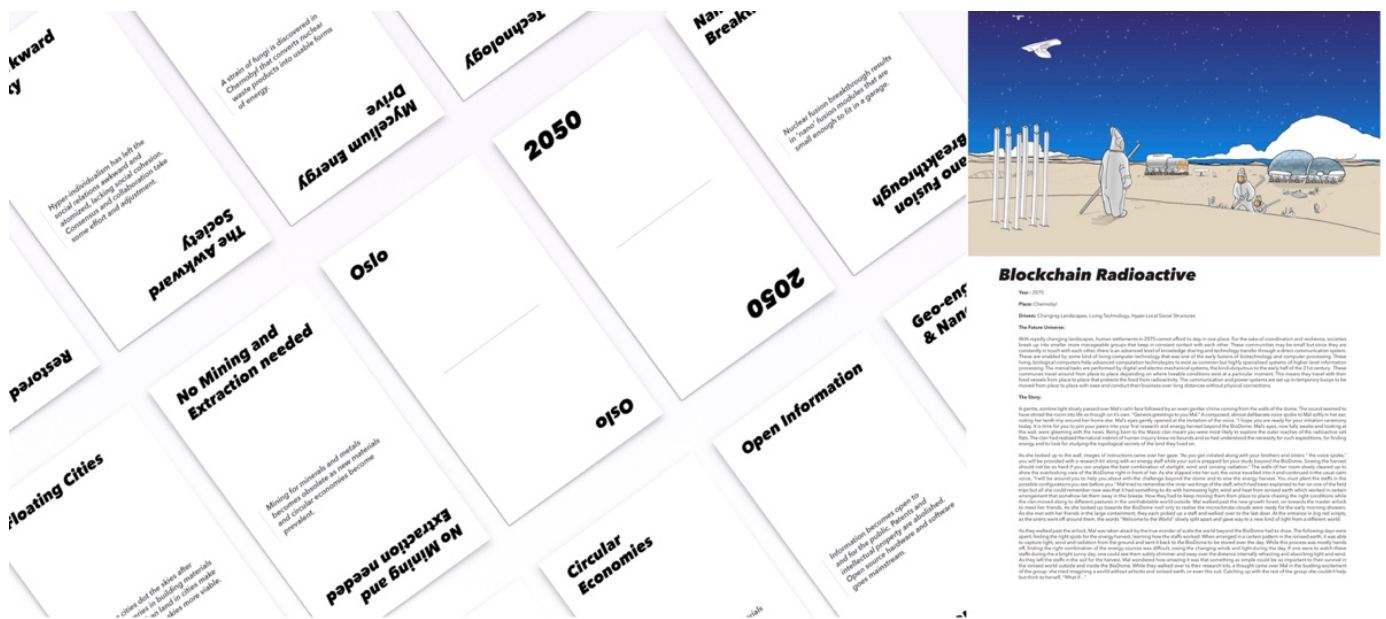
Figure 3 Examples of Data generated from Step 1 and 2 of Speculative Design Framework. Left- Future scenario building for future of solar cells using Futures Poker game. Right- Speculative Design fiction from the futures poker game that generates the speculative scenarios of the future with focus on speculative solar cell artefact as shown in sketch and fiction format. (Jomy Joseph, 2018)

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[62] The Stockholm Design week has hosted previous designBRICS exhibitions for speculative artefacts and experiences for sustainable futures. For more information see: "Exhibitions." n.d. DesignBRICS. Accessed May 10, 2019. *https://www.designbrics.net/exhibitions*.
And the Project webpage "RESHAPED FUTURE." n.d. RESHAPED FUTURE. Accessed April 20, 2019. *https://reshapedfuture.com/*.
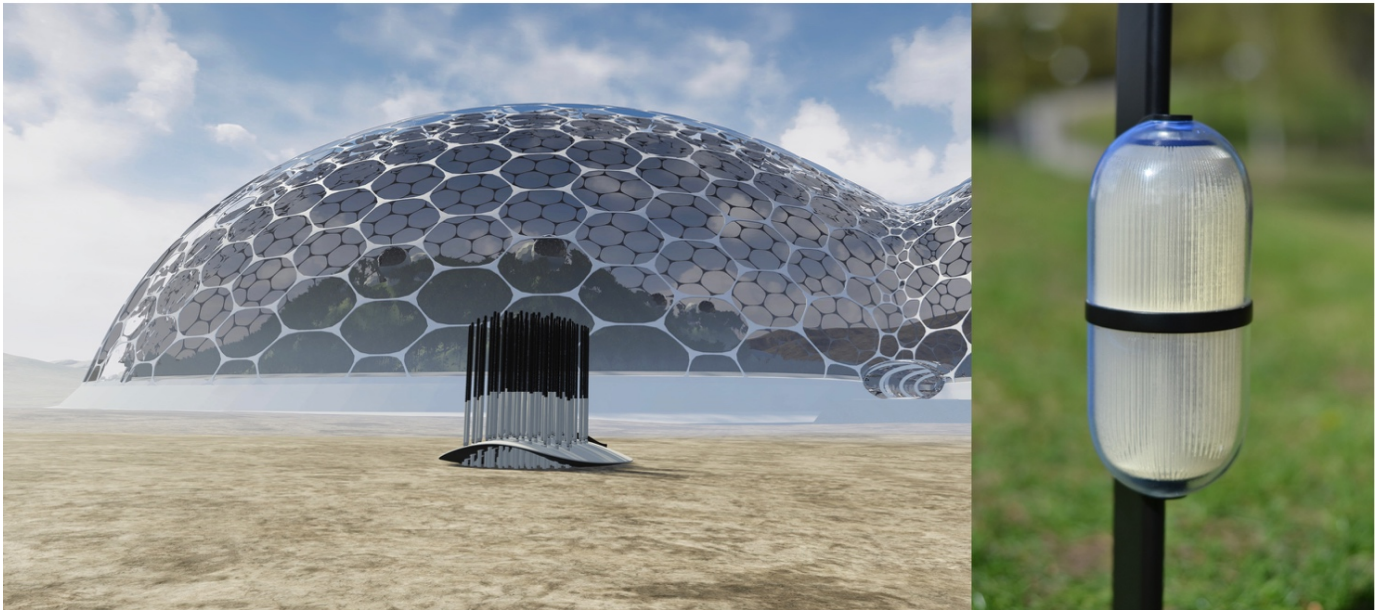
Figure 4. Examples of Data generated from Step 3, 4 and backcasting of the Speculative Design Framework. Left- Immersive Virtual Reality experience of the future solar cell solution for the future scenario. Right- The backcasted 3d printed optical solar cell concept for climate action today. (Jomy Joseph, 2018)

While the competitions on their own are immaterial to the research, they serve as a means to climate action and its mediation in ACT III. Besides these competitions, a repository of designerly artefacts of climate action will be pursued within designBRICS that tackle different themes such as food security, water scarcity, energy security and biodiversity loss intended to serve as cases for *how* "an ecological society emerge from within our present one" (Bookchin 1981) and if so, how much room is there for such an *exaptation* (Barve and Wagner 2013) towards climate action today.

Therefore, the internal research framework of designBRICS allows for many such internal, "moon-shot" projects to *emerge* throughout the research period—collating research data in the form of designed artefacts. These themes could be disseminated by connecting with research partners within the designBRICS network and outside of it as the artefacts get realised. Some of these designed objects might also be taken as the *trigger* for applying for "innovation funds" and build new research partnerships both within and outside AHO.

ACT III: Mediation Towards creating Change

With a sufficiently adequate number of projects carried out in Act II, I will reach out to relevant research organisations and activist/policy networks building on the designBRICS network and beyond. These meetings and discourses would form a primary form of *peer review* of the embedded knowledge within the designed artefacts themselves. Fully comprehending the *urgency* of climate action, this act would explore the ways in which the participatory action can be mediated *through* the design solutions as discursive probes towards radical change.

While Act II meant participation in professional design competitions and exhibitions, Act III would be a means to reaching out to research communities and sustainable design practise. This means setting up meetings with social and grassroots movements such as The New Lucas Plan (UK), The Sunrise Movement (USA), Extinction Rebellion (Global) along with research

institutions such as the Stockholm Resilience Centre (Sweden), STEPS Centre (Brighton, UK), Srishti School of Art Design and Technology (Bangalore, India), School of Design (SDes) Ambedkar University (Delhi, India). This is a preliminary list of activist groups and institutions and are bound to change as the research progresses. Beyond these closed frames, projects from Act II would also be shared over the designBRICS network through websites, videos, massive open online courses (MOOCs), and other forms of online mediation—blog posts, news articles, design magazines and design curation websites. It is yet to be seen how these interactions will turn out considering that they depend on the outcomes of Act I and II.

IV. Form and Outline of the Thesis

This thesis will be written as a compilation and it will be finished by June 2022. The thesis and the articles within it will be based upon the work done within the designBRICS project, possible other related research projects at AHO and my own PhD work, where the outcome will contribute to the competencies and methods related to addressing long-term sustainability and climate change within Industrial Design. This section presents an outline of the dissertation.

Introduction:

In the introduction, I state the nature and urgency of climate breakdown and the moves being made in order to address and adapt to the state of the changes that might have taken place in the coming years. This would be connected to the state of Industrial Design practice taken up by within the design for long-term sustainability which would lay out a brief outline of the failings or successes of the practice as explored within the research frames. This would also means expanding on the urgency of generating a design practice well adapted to addressing climate crisis which look at how the research addresses the question of visions of better futures through a research driven by design in order to compile the thesis. This chapter would describe theories and practices from relevant fields and give insights on the new role of industrial designers to create artefacts from speculative futures for climate change mitigation. The end of the chapter describes how this context is connected to the main research question:

"How can Industrial Design be an enabler for imagining better, more hopeful futures towards long-term sustainability in the age of climate change?"

Literature Review:

The literature review chapter gives an overview of the various fields of research and research strategies that are linked to the main research question. It presents state-of-the art literature in the global climate change research, product design, speculative design, future studies, design fiction as well as related fields in the climate change question such as political economy, eco-philosophy, systems theory to name a few. Each field will be introduced through a general overview of its philosophies and theories and how it plays out within the context of the notion of long-term sustainability.

Research Methodology: Research through/by Design

In this chapter I introduce research by design and how it has been carried out as a core long running project of designBRICS with offshoots taking different trajectories. I present the challenges in shifting in using design as tool for climate mitigation research both in academia and the design practice. I also describe my reflections on these challenges and how it influences the positioning of the research. The PhD is divided into several acts within a core "designBRICS" project where each act addresses the main research question through a different lens and activities. I will here describe the core methodology of the Speculative and Critical Design (SCD) approach uses as a strategic tool to support the *solution finding* approach in multiple cases that lead to artefact outcomes with the explicit goal of creating product visions for the cases and as such will define the proposed method to be expanded upon. This section will detail out the framework of research through/by design that were used to create possibilities of more long-term sustainable futures and how to achieve them through designed artefacts.

Research Articles:

The explorative nature of design research outcomes in the form of design probes and artefacts as a lead up to participatory action makes preformulating a rigid outcome a complicated endeavour. However, I will still suggest an outline for the focus area of each article regardless of the outcomes of the individual acts themselves.

1. **Conference Paper (short paper): "Critical Futures Today: Back-casting speculative product design towards long-term sustainability"**
   LenS World Distributed Conference, Milan
   Theme: Designing Sustainability for all
   Presented: 4th April 2019
   This article would be the outcome of the data and designerly artefacts generated from "Act II: Designs from the Pluriverse" where competitions and exhibitions will be used as a means to point towards research directions by creating the "trojan horse" analogy of showing possibilities of solutions through Speculative design artefacts as research probes. This article will explore the artefacts, their urgency and capacities for climate action in the form of design fiction as research papers.

2. **Article 2: Walking the Talk: An approach to 'designerly' transformations and knowledge building towards ecological futures**
   Journal: She-ji (Co-Authored Abstract submitted)
   This article explores a simple heuristic model that is termed as the "Walking the Talk" model, where both the 'walking' and 'talking' are discussed through the different approaches, or 'standpoints', leading to different strategies. It explores how design, as a profession, instead of promoting an "anthropocentric Business as Usual" can counteract it by making the seemingly unthinkable not only thinkable but also desirable and necessary.

3. **Article 3: Designerly Visions Beyond Climate Despair Journal: Design Futures, Journal for Future Studies**
   Journal: Futures, Journal for Future Studies
   This article will be an outcome of the data generated from "Act II: Future Dreaming". It will explore the ramifications for design practice and pedagogy in the age of climate breakdown and how by envisioning better futures we might create the discourse and the practice that will be needed for a new perspective on designing for long term futures, if at all that is possible. This article will explore the role of Speculative Design and design fiction in creating the imagination required to create the designerly solutions for a better future.

4. **Article 4: Artefacts Towards the Pluriverse**
   Journal: Design Issues, The Design Journal
   This article would be the outcome of the data and designerly artefacts generated from "Act II: Designs from the Pluriverse" where competitions and exhibitions will be used as a means to point towards research directions by creating the "trojan horse" analogy of showing possibilities of solutions through Speculative design artefacts as

research probes. This article will explore the artefacts, their urgency and capacities for climate action in the form of design fiction as research papers.

5. **Article 5: Mediating Speculations from the Pluriverse**
Journal: Modes of Criticism, Kairos
This article would be the outcome of the data around mediations and research and commercial interactions generated from "Act III: Mediation towards creating Change". This article would reflect on the interactions of the artefacts as they are mediated through competitions, exhibitions and research groups and by extension throughout the larger social sphere and as such would study the impact and intellectual moves made possible from Speculative artefacts created in Act II.

6. **Article 6: Design and the Eco-Social Futurist**
Journal: Design Philosophy
This article would be a set of reflections from Act I, Act II and Act III created using the Speculative Design framework. This article would make the case of how and why design practise might be liberated from its baggage of extractive industrial capital so as to be able to envision a more transformative approach to society within the context of ecological long-term sustainability directed towards long term futures. This reflection would suggest a framework as explored in the three papers and acts before it in how especially industrial designers can be called upon to practise within society the "organic intellectual" function of being "Eco-social Futurists" for long-term sustainability.

Discussion and Reflections:

This section will expand on the reflections on how far the research has created new directions for the disciplinary challenges in the research field pertaining to my research question. The relevance of the framework to create the future artefacts will be further discussed both how the methods and artefacts functioned towards generating and collecting data, and how I used them to analyse it in a useful way in order to answer the research question. This section will also contain an overall description of the final results, which will consist of a SCD frame work for solution finding, it's possibilities and impacts and the artefacts themselves which need to be considered when designing for long-term sustainable futures.

Conclusions:

This section will conclude with the research outcome in relation to the research question. Firstly, I will discuss how this new strategic SCD process works within the methods and frameworks, both design and technological, that will be developed throughout the project and what it can offer industrial design practise and research within climate change adaptation when confronted with climate breakdown. I will describe the implications of this research and its possibilities within the larger context of climate breakdown as it impacts society, academia, design practise and the role of an "ecological emancipatory technology" framework as a whole. Finally, this section will suggest directions and needs for further development within the industrial design field that needs to address climate change beyond the immediate and specific findings, towards a more humanised, ecological society.

V. Work Plan

The work plan outlined here is to be considered a foundational document, accruing further engagements from constant engaging connections once the design mediations are well and truly underway. The challenge of setting up a research engagement driven and led by design research is to develop a base first for the "stakeholders", and since in this case these are the "future generations", the mediations set in place through and by these *designerly* artefacts and visions would thus trigger the discourse and actions for the futures to be realised. In essence then, this plan starts off on a foot of using design as a generative activity very early in the process and seeks to create the interventions and mediations as a *living* body of research.

Year 1: PhD school
- Futures Workshop (Masters Studio Protohype) VR Introductory Workshop (Masters Studio Protohype) and Rethinking Development and Sustainable Design Elective Course
- **Conference Presentation**- **"Critical Futures Today"** Full paper Presentation—LenS Distributed conference, Milan

Year 2: Imagining better futures and designs from the Pluriverse
- **Case 1**- Re-Futures Lab 1 Workshop Module (Masters Design Studio)
- **Case 2**- Cumulus Competition, production and mediation (30th January 2020 Deadline)
- **Article 2**- She-ji Journal article (Co-authored abstract submitted with Håkan Edeholt and Yue Zou)

Year 2: Designs from the Pluriverse
- **Article 3- Designerly Visions Beyond Climate Despair** (Futures, Journal for Future Studies)
- **Case 3** Production of designed artefacts for Stockholm Design Week (production and mediation)
- **Case 4**- Re-Futures Lab 2 Workshop Module (Masters Protohype Studio course
- **Article 4- Artefacts Towards the Pluriverse** (Design Issues, The Design Journal)

Year 3: Designs from the Pluriverse + Mediation Phase
- Set up Meeting with existing climate action and grassroots social movements, such as Lucas Plan+ Radical Ocean Futures at Stockholm Resilience Centre+ designBRICS network
- Planning out new frameworks such as setting up a Platform co-op/Start-up hybrid to launch the product visions into real world actions and use it as a vehicle for mediation by applying for further research grants.
- Work on expanding repository of designBRICS projects as cases.

Year 3: Mediation Phase
- Set up more meetings with designBRICS networks and take the Project to other digital media platforms.
- **Article 5 Mediating Speculations from the Pluriverse** (Online Journals like Modes of Criticism, Kairos)
- **Article 6 Design and the Eco-social Futurist** (Design Philosophy Journal)
- Work with Data

- Teaching Masters studio course Protohype and Rethinking
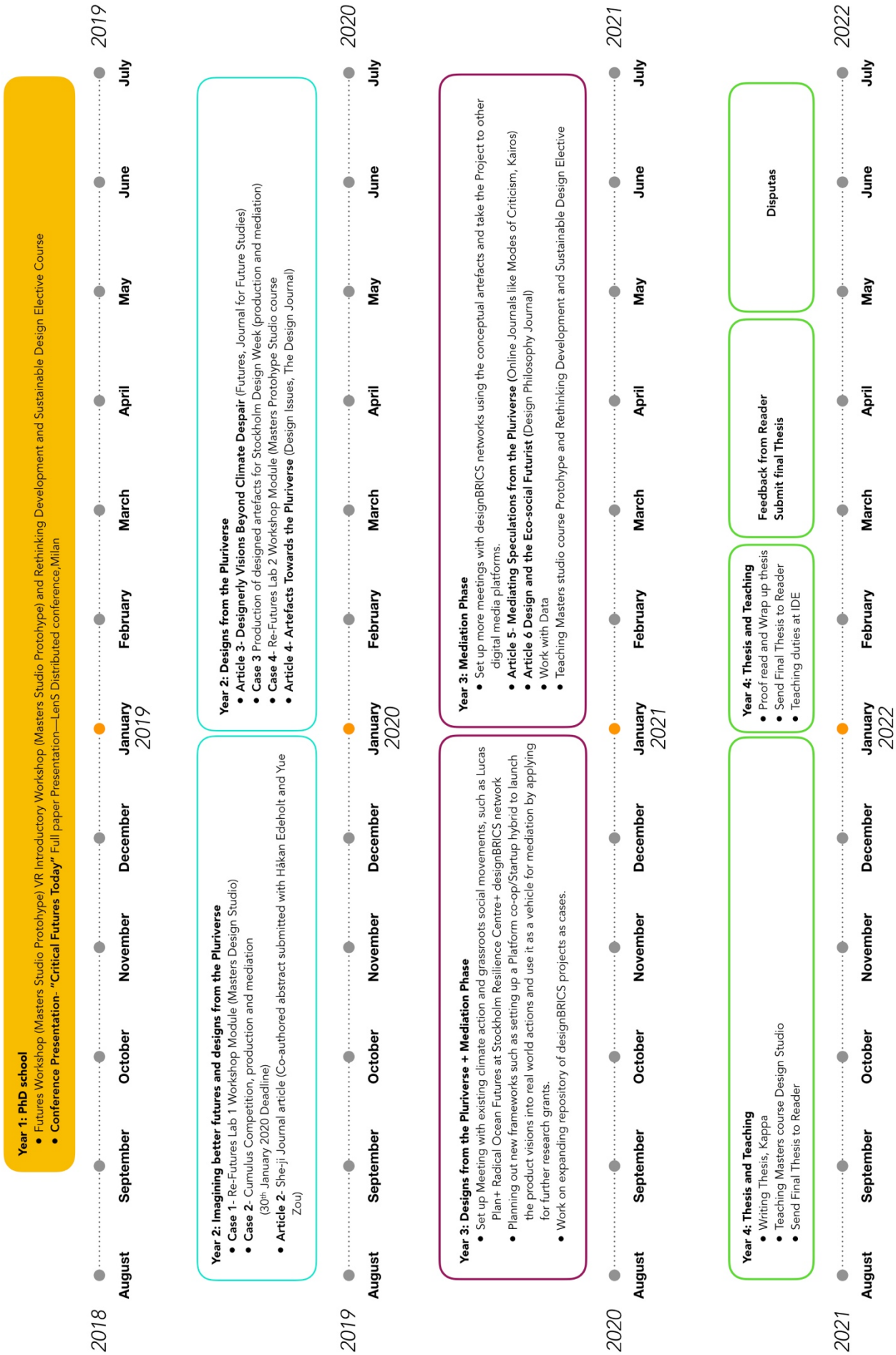Development and Sustainable Design Elective

Year 4: Thesis and Teaching
- Writing Thesis, Kappa
- Teaching Masters course Design Studio
- Send Final Thesis to Reader
- Proof read and Wrap up thesis
- Send Final Thesis to Reader
- Teaching duties at IDE
- Feedback from Reader
- Submit Final Thesis
- Disputas

For Workplan see Figure 5, next page.

Figure 5 PhD Work Plan

WORK PLAN 2018-2022

2018

| August | September | October | November | December | January 2019 | February | March | April | May | June | July | 2019 |

Year 1: PhD school
- Futures Workshop (Masters Studio Protohype) VR Introductory Workshop (Masters Studio Protohype) and Rethinking Development and Sustainable Design Elective Course
- **Conference Presentation- "Critical Futures Today"** Full paper Presentation—LenS Distributed conference,Milan

Year 2: Imagining better futures and designs from the Pluriverse
- **Case 1**- Re-Futures Lab 1 Workshop Module (Masters Design Studio)
- **Case 2**- Cumulus Competition, production and mediation (30th January 2020 Deadline)
- **Article 2**- She-ji Journal article (Co-authored abstract submitted with Håkan Edeholt and Yue Zou)

Year 2: Designs from the Pluriverse
- **Article 3**- Designerly Visions Beyond Climate Despair (Futures, Journal for Future Studies)
- **Case 3** Production of designed artefacts for Stockholm Design Week (production and mediation)
- **Case 4**- Re-Futures Lab 2 Workshop Module (Masters Protohype Studio course
- **Article 4**- Artefacts Towards the Pluriverse (Design Issues, The Design Journal)

2019

| August | September | October | November | December | January 2020 | February | March | April | May | June | July | 2020 |

Year 3: Designs from the Pluriverse + Mediation Phase
- Set up Meeting with existing climate action and grassroots social movements, such as Lucas Plan+ Radical Ocean Futures at Stockholm Resilience Centre+ designBRICS network
- Planning out new frameworks such as setting up a Platform co-op/Startup hybrid to launch the product visions into real world actions and use it as a vehicle for mediation by applying for further research grants.
- Work on expanding repository of designBRICS projects as cases.

Year 3: Mediation Phase
- Set up more meetings with designBRICS networks using the conceptual artefacts and take the Project to other digital media platforms.
- **Article 5**- Mediating Speculations from the Pluriverse (Online Journals like Modes of Criticism, Kairos)
- **Article 6** Design and the Eco-social Futurist (Design Philosophy Journal)
- Work with Data
- Teaching Masters studio course Protohype and Rethinking Development and Sustainable Design Elective

2020

| August | September | October | November | December | January 2021 | February | March | April | May | June | July | 2021 |

Year 4: Thesis and Teaching
- Writing Thesis, Kappa
- Teaching Masters course Design Studio
- Send Final Thesis to Reader

Year 4: Thesis and Teaching
- Proof read and Wrap up thesis
- Send Final Thesis to Reader
- Teaching duties at IDE

Feedback from Reader
Submit final Thesis

2021

| August | September | October | November | December | January 2022 | February | March | April | May | June | July | 2022 |

Disputas

VI. Research Budget

Most of the research expenses will be carried out with the PhD Annum of 60000NOK spread out throughout four-year duration of the research. designBRICS will also contribute to allocating the necessary funds as and when needed for prototyping and exhibition expenses. Over and above these sources, the research proposal after the three acts might also lead to applications for further research grants and funds as such will be dependent on the outcomes of the acts themselves.

This PhD is funded by annum which is distributed of the following:
September- December 2018: 6 666 NOK
January-December 2019: 20 000 NOK
January-December 2020: 20 000 NOK
January-August 2021: 12 333 NOK

Expenses 2018: (September-December)
2 000 NOK   Travel for Research and PhD courses
3 000 NOK   Books

Expenses 2019:
 8 000 NOK   Conference
 1 500 NOK   Books/Software
 7 000 NOK   Equipment for Prototyping in VR
 4 000 NOK   Travel
10 000 NOK   Prototyping expenses

Expenses 2020:
8 000 NOK   Conferences
1 000 NOK   Books/Software
10 000 NOK   Prototyping Expenses
4 000 NOK   Travel

Expenses 2021:
8 000 NOK   Conferences
1 000 NOK   Books/Software
10 000 NOK   Prototyping Expenses
4 000 NOK   Travel

Expenses 2022: (January-August)
4 000 NOK   Proofreading
4 000 NOK   Graphic design assistance/infographics

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