

Against Dystopias with Ecological Literacy

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Abstract: The longstanding dismissal of the ecological in civilisations that have developed dramatic ecology-altering and planetary boundary crossing technologies is at the crux of contemporary planetary polycrisis. Desirable and even viable futures depend on the design of new ways of living on the planet based on understanding humans in dynamic entanglement with the more-than-human context. Prioritising ecological relations is a fundamental break with assumptions of modernity and associated technologies, social practices, and future visions. We bring design and ecological knowledge together to describe foundational work in designing transitions to Ecocene Protopias, i.e., places of continuous ecological transition. As our springboard, we identify defuturing work in particular formulations of utopian thought. By describing future visions that accelerate ecological harms, we draw attention to the ecology-denying assumptions underlying techno-utopian stories and ideologies. This paper presents ecological literacy as a foundational critical and imaginative capacity to avoid dystopias emerging from traditions that dismiss the ecological. Sustainable and regenerative design practice depends on bolstering designers' ecological literacies to enable more effective collective reimagining and redesigning future ways of living within planetary boundaries.

Keywords: Ecological literacy - Utopia - Protopia - Techno-utopian - TESCREAL - Transition design - Sociotechnical imaginaries - Dystopia - Ecocene - Polycene - Accelerationism - Discourse - Ideology - Futures

[Resúmenes en castellano y en portugués en las páginas 62-63]

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Introduction

Ecological literacy is an action frame that enables the design of viable futures in the context of planetary polycrises. Notably, environmental awareness is not ecological literacy. Seeing the problem is different from understanding what is causing the problem and developing capacities to effectively assess and address ecological harms. Ecological literacy is a learning theory that asserts that ecological knowledge must be integrated into contemporary ways of knowing and knowledge traditions to enable effective responses. This ecological learning is happening –but it is not happening fast enough– and it is constantly threatened by powerful anti-ecological cultural and political movements. Ecological literacy includes capacities to identify cultural and socio-political dynamics that cause, or threaten to cause, ecological harms. It can serve as a lens that reveals how future visions can work both for and against sustainable ways of living on the planet, helping designers avoid ecological harms. In this paper we describe how utopian visions of better futures animate design movements while also noting the dangers of particular types of utopian thought. We identify historical and contemporary utopian movements that threaten ecological transition with their ecology-denying assumptions. Utopian visions in an age of ecological and social crises that are not ecologically literate generate dystopias. Ecological literacy challenges the dysfunctional assumptions of modernity and provides a necessary action frame for design transitions. All social progress, prosperity, wellbeing, and even survival depends on human ability to think with, and not against, the ecological.

1. Unlearning Unsustainability with Ecological Literacy

No civilisation will flourish in the context of widespread climate chaos with associated polycrisis. The historic dismissal of the ecological in the Western mindset has led to the development of ways of living that destabilise planetary systems in the pursuit of impossible goals. The pursuit of infinite economic growth would not exist if Western knowledge traditions were not built on erroneous assumptions based on the denial of basic ecological relations. Ecological thought breaks the epistemic errors of modernity by addressing and remedying fragmented knowledge traditions. Ecological literacy is a learning theory that integrates ecological knowledge into all other knowledge traditions and ways of knowing to undo the ecological harms created by these foundational errors. With this learning, we learn to see and attend to relations. Activities and technologies can be redirected toward

nurturing eco-social relationships. Understanding the world as relationally entangled and participatory requires shifts in design practice reflecting expanded sense of relational and emphatic sensibilities. This learning presents challenges to traditional Western knowledge systems, social practices, social structures, social institutions, and social imaginaries. These difficulties are a primary reason why it is so hard to mitigate and adapt to the ecological crises.

The concept of ecological literacy (Orr 1992, Capra 1996, Sterling 2001, 2003, Boehnert 2012) is relevant across disciplines but particularly relevant in the education of designers (Orr 2002, Boehnert 2018, 2019) and other professionals involved in developing future ways of living. With ecological literacy, we learn to understand the world as complex, non-linear, uncertain, and unpredictable – with attention to the intersecting systems that enable everyday life. Over the last fifty years ecological knowledge and ways of knowing have been slowly integrated into contemporary ontoepistemologies as environmental movements and scholars have theorised and enacted a definitive break with the broken ideologies of modernity. The multi-dimensional complexity of environmental challenges depends on ecologically literate citizens and professionals in all disciplines – and especially in futures-making practices such as design. Transition design (Irwin, Kossoff, & Tonkinwise 2025; Irwin 2015, Coops *et al* 2024) can become a powerful means of designing sustainable transitions across scales and domains as some of the most ecologically engaged – and explicitly ecologically literate, of all design practices.

Ecological literacy challenges and transforms intellectual assumptions and constructs that justify the exploitation of nature while supporting new capacities to design transitions to ecologically viable ways of living on the planet: “The ambitious aim of ecological literacy is to create the frame of mind that recognizes the ecological and organises cultural, political, legal and economic priorities accordingly” (Boehnert 2018, 74). Design practice is still catching up with the insights of ecology theory including a process of unlearning unsustainability in design knowledge and practice (Boehnert & Dewberry 2024; Tlostanova, 2021). Ecological literacy includes ecological, sociological, and political learning. This hybrid learning creates hybrid design knowledge with new practices and agencies to advance the sustainability agenda. To be clear, ecological literacy is not about avoiding plastic straws, green marketing, and recycling. It is about learning how to participate in building a culture of ecological transitions so our default ways of living will be regenerative rather than ecologically harmful. Everyone needs to understand and attend to basic ecological relationships. There will be as many ways of doing this work as there are current ways of earning a living in extractive and ecoidal modes of development.

Design has yet to integrate ecological literacy into mainstream theory and practice. In an absence of ecological literacy, practices such as planned obsolescence, excessive waste, the design of products that accelerate GHG emissions, etc. continue. Defuturing design remains a norm with a result of unsustainable everyday living practices. Tony Fry describes processes of defuturing, as the creation of ecological crises by unsustainable development and design (2009, 2020). Defuturing is “an outcome of making: the product of our ‘civilisational model’” (Dilcot 2020, xii). The recognition of normative defuturing generates a new design philosophy – and a new direction for design (Fry 2020, Dilcot 2020, xvi). Ecological literacy supports this learning as an ecological turn in design. Ecological literacy includes

learning how to identify, challenge, and transform ideas, practices, future imaginaries, ideologies, and power structures that propel defuturing unsustainability. While ideas and practices are changing, the legacy assumptions and imaginaries of modernity continue to obstruct sustainable transitions. The danger these forces represent might not be clear to those who have only superficially engaged with ecological learning. In his paper we describe some of these anti-ecological movements and the ideas that drive these traditions.

2. Designing Protopia

Designers have often used utopian ideas as inspiration. Victor Margolin's "Social Design: From Utopia to the Good Society" surveyed historic utopias in socially oriented design including classics such as William Morris' 1890's *News from Nowhere*. In *Design, Nature & Revolution: Towards a Critical Ecology* (1971) design theorist Tomas Maldonado describes utopias as a preparatory exercise to designing better worlds and "example[s] of designing without doing" that are "not subjected to the exigencies of the 'here and now'" (1971, 10-11). By creating space to envision genuine alternatives, designers can align their work more closely with their values and most ambitious goals. Maldonado describes design for eco-social change as necessarily a political process and uses Buckminster Fuller's utopian visions, where design could somehow resolve social problems without the messy sphere of politics, as an example of how not to think about utopian design:

In other words design and planning would be called in to substitute for politics, to abolish it and cancel it from history. "Politics," [Fuller] said, "will become obsolete." It is not surprising, then, that [Fuller] considers the "Revolution by Design" to be exclusively an act of technological: a position of technological utopianism (1971, 29).

For Maldonado, a "Revolution by Design" requires an "operative political praxis" and be "the result of both of the technical imagination and of what the great sociologist C Wright Mills called the 'sociological imagination' – both technical courage and social and political courage" (1971, 29). With this early critique of Fuller's techno-utopian visions in design, Maldonado started a tradition that we develop in this paper.

Ecological literacy can be understood as an action frame for design with radical transformative potential to enable ecological transitions in civilisations that have historically dismissed ecological knowledge. Victor Margolin emphasises the role of action frames in design for social change as:

"a set of assumptions of how the world is or could be that animates our human activity. The action frame is the source of the values that guide our actions as well as the source of the worldviews that justify our behaviour. The way design contributes to the action frame is crucial because it is that frame that provides both the opportunities and constraints for the activities of everyone" (2019, 19).

Margolin argues that the current action frame is inadequate (2019, 19, 24) and asks the international community of design educators and designers to “recognize its own power as a collective agent of change and undertake a radical rethinking of how we could live, a rethinking that this community, better than anyone, can translate into propositions for projects that inspire people to carry them out” (2015, 28). While Margolin is not recommending ecological literacy – we are using his description of the importance of an appropriate action frame for design to argue that ecological literacy is the most critical required frame of action for meaningful transitions.

In the tradition of critical design ecologies, we bring together ecological knowledge and design to envision progressive Ecocene Protopias, i.e., places of continuous ecological transition – in response to the errors of the Anthropocene. Ecocene Protopias emerge from collective and radical reimagining and redesigning our ways of living to work with, rather than in denial of, and against, the ecological context. The Ecocene concept emphasises ecological knowledge, literacies, values, and sensibilities as foundation for moving past the dysfunctional and ecocidal assumptions of the Anthropocene (Armstrong 2015; 2017; Boehnert 2018, 2023). In the context of climate and ecological emergencies, ecological knowledge must be prioritised in design and elsewhere.

Ecological and social problems are intersecting. The Polycene concept is an alternative proposal by Center for Complexity at the Rhode Island School of Design. The Polycene describes attention and care for more-than-human nature using plural perspectives, approaches and modes in transition work.

We are calling this era the Polycene to evoke a geological epoch that captures our aspirations for *what could be*, as we negotiate our way through the polycrisis. In this epoch, stewardship replaces dominion, and mastery is redefined as a balanced coexistence with the natural world. It encourages a multiplicity of approaches, ethical considerations, and community engagements to address the complex challenges ahead (RISD, 2024).

The Polycene complements the Ecocene. With the emphasis on the Ecocene concept, we argue that the dismissal of the ecological domain is the most serious mistake humans have ever made. Addressing this catastrophic error is an urgent priority to avoid even greater dystopian polycrisis. The most effective and powerful ways of addressing polycrises are with plural approaches. The explicit centering of ecological knowledge is necessary for human and more-than-human life on the planet. The explicit commitment to pluriversal perspectives and approaches is the most effective method for eco-social transitions. Together the Ecocene and the Polycene reframe the current epoch with action frames foregrounding ecologically and pluriversal values.

Protopias are places of ecological transition. The Protopia concept marries the activists’ mantra “other worlds are possible” with the optimism inherent in progressive design movements that embody the belief that human creativity, ingenuity, empathy, and solidarity can contribute to the design of better futures for all. The protopia concept has been developed by Monika Bielskyte to centre marginalised voices of ethnic minorities, indigenous people, disabled people, gender non-conforming and queer people. Bielskyte also highlights the

dangers of “techno-utopian propositions, which have roots in top-down, eugenic, colonial, and exclusionary understandings of ‘progress’ and in some cases trace the direct lineage to techno-fetishistic ‘futurist’ ideas described by Marinetti in his futuro-fascist manifesto published in Musollini’s Italy” (Griffiths, 2017). Bielskyte describes protopian futures as ending extractivism and infinite materialist growth and foregrounds plural perspectives to create a richer, more robust and inclusive vision of human and more-than-human flourishing.

A compatible proposal is the BioProtopia concept by architectural theorists Ruth Morrow, Ben Bridgens, and Louise Mackenzie. BioProtopias are spaces designed to be attuned to both human and non-humans to “grow, self-heal, and create virtuous cycles where the waste from one process feeds another” (Morrow, Bridgens, & Mackenzie 2023, 11). BioProtopias link biology to ecology “The prefix “bio-” comes from the Greek bios, or life, denoting biological processes for living organism; “proto-” indicates the earliest or original form suggesting new developments and prototypes, whilst also hinting at something ancient. The suffix “-topia” stems from topos, or place” (Ibid, 11). BioProtopia designers prioritise productive coexistence with sufficient ecological literacies to build ecologically and biologically regenerative spaces.

Designing sustainable transitions requires processes of unlearning dysfunctional ways of knowing and doing built on the historic denial of the ecological (Boehnert 2018, 2019). Unlearning unsustainable ideas, assumptions, and practices is a foundation for resisting and transforming the forces that present dangers to transition work addressing ecological crises. In the rest of this paper we identify some particular extreme examples of anti-ecological cultural movements. Techno-utopian visions manifest in popular culture and they gain momentum from the activities of Silicon Valley where techno-fetishist ideologies drive the direction of the tech industry, projecting these values on technological structures, platforms, and devices that organise our daily lives. As our springboard, we identify historical defuturing utopian traditions. These inform contemporary ideas and ideologies. Following Bielskyte, we replace “optimism” with “fetishistic” where these ideas become ideologies increasingly unhinged from material circumstances.

The Ecocene-Polycene Protopias proposal reclaims both optimism and utopianism with a deep reaching critique of the ideas and practices that created ecological crises and the wider polycrisis – as a basis for design transitions. The critique inherent in this proposal responds to what Cameron Tonkinwise calls for when he asks “designers to combine utopian and cynical attitudes in a constant state of creative hypocrisy” (2017, 433). Tonkinwise quotes Tony Fry on the value of envisioning what “currently seems utopian” (Ibid, 443):

For all of us who attempt to grasp the scale, complexity and seriousness of the problems the human race currently faces, it can seem that overcoming them is actually impossible. Yet we need to ask if we actually can, in fact, distinguish between what, at any given moment, is empirically impossible from what our limited perceptual reach tells us is impossible. . . . Not withstanding a bleak analysis and the total inadequacy of current action against the forces of defuturing unleashed by human action . . . it has to be affirmed that the history of humanity is a history of the realization of the impossible (Fry 2009: 248, in Tonkinwise, 2017, 443).

We cannot know exactly what futures will bring but we can create conditions of the emergence of activities, practices, designed artefacts, technologies, buildings and infrastructure that works with, rather than against, the ecological context.

3. Dystopias and Protopias

Utopian visions can inspire and guide design responses to ecological crises. They can alternatively accelerate all the errors of modernity that created polycrisis conditions in the first place. In this section we examine how visions of utopia embody ideas about human-nature relationships. Historical utopias reveal how ideal societies have been imagined in different times and spaces. Contemporary utopian visions reveal how futures are conceptualised and rationalised. Utopian Theorist Erik Olin Wright describes envisioning alternatives to existing social structures that are desirable, viable, and achievable (2010, 20-29). Viable and achievable are both tricky to judge but the practice of utopian construction will expand possibilities for transition interventions by design.

Utopias can be the creation of an individual but they can also become collective and systemic ways of thinking about futures. When contemporary utopian visions are collectively shared, sociotechnical imaginaries are constructed. Sheila Jasanoff defines sociotechnical imaginaries as:

collectively held and performed visions of desirable futures” (or of resistance against the undesirable), and they are also “animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology.” Unlike mere ideas and fashions, sociotechnical imaginaries are collective, durable, capable of being performed; yet they are also temporally situated and culturally particular. Moreover, as captured by the adjective “sociotechnical,” these imaginaries are at once products of and instruments of the coproduction of science, technology, and society in modernity (2015, 19).

Sociotechnical imaginaries are related to both discourse and ideology as all are collective and systemic (*Ibid*, 20). We believe that techno-optimistic sociotechnical imaginaries are ideas that are inadequately interrogated in light of the polycrisis (Tooze 2022; Lawrence, Janzwood & Homer-Dixon, 2022). Jasanoff suggests that “the most indispensable method for studying sociotechnical imaginaries is comparison” (2015, 24). We compare Techno-Utopias and Ecocene-Polycene Protopias in this section, while diving into more extreme contemporary Techno Utopias in the following section.

Utopias create spaces for imagining desired futures. As ways of describing social, economic and political visions (Sargent 2016, 300) they are a good starting point for thinking about transition design. Some common characteristics of utopias are described by utopian theorist Crane Brinton:

The utopian starts with the proposition... that things (no more exact word is useful here) are bad; next, things must become much better, perhaps perfect, here on earth and soon, or fairly soon [and that] things will not improve to this degree by themselves, by a “natural” growth or development of things-as-they-are; a plan must be developed and put into execution (1965, 348).

This definition invokes the possibility of perfection as an end point, which is a common characteristic of utopias. Kevin Kelly, the founding editor of *Wired* magazine and a publisher of the *Whole Earth Review*, has described his invention of the term ‘protopia’ as a direct response to this characteristic of utopian thought. Kelly defines Protopia as “a state of becoming rather than a destination” (2016, 13). We consider this focus on process as a better way of theorising better futures. Utopias are visions of imagined preferred worlds. If the worlds are not preferable for everyone involved, the vision needs to be understood as anti-democratic and authoritarian. More starkly, these are visions for people who believe they have the right to exploit those who they consider to be less deserving and the inert more-than-human ecologies.

Plato’s *The Republic* (c.360 BC/2007) has been described as the earliest surviving European utopia (Carey, 2000, 12-15) and is a useful introduction to utopias. With its proposals for slavery of foreigners, eugenics, and euthanasia of the sick, what is presented as desirable by some is clearly undesirable for others. Here it is worth returning to Brinton’s (1965) definition of utopia, adding that it

implies - even necessitates - the existence of an enlightened few, or even one enlightened individual, who will think and act in a way the many by themselves will not, cannot, think and act. In short, traditional utopian thought tends to be more or less openly the work of an elite (1965, 348).

Not only are traditional utopias the work of an elite, but Lyman Tower Sargent writes that many are historically colonial – a mode that started with Thomas More’s *Utopia* in 1516 (2016, 300). Francis Bacon’s (1627/2016) *New Atlantis* was the first to describe a utopia in which science and rationality is the basis of human happiness. A clear thread runs from More and Bacon through later works such as:

- *Sketch for an Historical Picture of the Progress of the Human Mind* (Antoine Nicolas de Condorcet, 1795/2004): Considered a key text of the Enlightenment, de Condorcet argues that scientific knowledge will lead to the perfectibility of the masses. Lifespan, intellectual and moral faculties will all increase.
- *The Paradise Within the Reach of All Men, Without Labour, by Powers of Nature and Machinery* (John Adolphus Etzler, 1833): A plan for the transformation of the United States harnessing wind, tidal and solar power, levelling mountains, and straightening rivers to produce materials for vast communal palaces.
- *Limanora: The Island of Progress* (John Macmillan Brown, 1903): A technologically advanced society based on selective breeding, banishment of undesirables, and euthanasia.

Limanorans have eliminated animals and agriculture (food is grown in laboratories) and communicate by telepathy.

- *Galt's Gulch* in *Atlas Shrugged* (Ayn Rand, 1957): A scientific-rationalist haven for persecuted capitalists, hidden from outside view by a 'mirage ray' supporting a largely self-sufficient industrial economy.
- *Making Humans a Multi-Planetary Species* (Elon Musk, 2017): The SpaceX vision for the establishment of a self-sustaining city on Mars. Musk presented this vision to the 67th International Astronautical Congress in Guadalajara, Mexico.

These utopias are built on a story of a singular human future on land that is "discovered" and mastered through superior intellect. Central to these utopian imaginaries is a view of the more-than-human world as inert and available for exploitation. Sargent describes this lineage as colonial utopianism:

Utopianism and colonialism have had direct connections from the time Thomas More inadvertently created a genre of literature when he published what is now known as his *Utopia*, in 1516. *Utopia* reflected the process of exploration taking place in the early sixteenth century that resulted in the discovery of the lands that were to become colonies. Colonists generally have the expectation of achieving a much better life by settling, while producing an actual dystopia for the original inhabitants (2016, 300).

These narratives follow the historical visions of settlers claiming and developing land. This trajectory is advanced today in Elon Musk's vision of colonising Mars. This has precipitated a new gold rush for the precious and rare earth metals that can be mined from asteroids and planets (Rubenstein, 2022, 127-131). Contemporary visions of the colonisation of Mars and other planets continue the utopian tradition of justifying the exploitation of 'unknown' worlds. Following Sargent, we describe this lineage of utopian theory as colonial utopias in Figure 1. These visions rely on the exploitation of people and land to create ideal conditions for those generating the utopian vision.

Protopias come in diverse forms according to local cultures but they are all spaces where design and technology serve ecological and pluriversal values. A partial lineage of ecological utopian thought can be traced with the following examples:

- The Diggers, from *The Law of Freedom in a Platform* (Gerrard Winstanley, 1652): Winstanley's description of his participation in an egalitarian community of agrarian English peasants, who held the Earth to be a common treasury and private property to be sin. Also known as the True Levellers.
- Model Villages, from *A New View of Society and Other Writings* (Gregory Claeys (ed), 1991): Mill owner Robert Owen's 1816 vision of a more humane approach to factory labour became the blueprint for model villages such as Bournville in Birmingham and Port Sunlight near Liverpool. In later writings (1817-1849) Owen advocated populations moving from cities to cooperative villages.

- *News From Nowhere* (William Morris, 1890): A ‘friend’ travels 200 years into the future to find England transformed by revolution. Cities have depopulated in favour of a rural lifestyle where pride in the quality of one’s work is the driving force of the economy and of societal relations.
- *Ecotopia* (Ernest Callenbach, 1975): The west-coast states secede from the US to form an eco-republic. Entrepreneurship, ingenuity in the production of long-lasting products, and recreation in a rewilded nature are all highly prized.
- *A Manifesto for Governing Life on Mars* (Robert Cowley, 2019): Not a vision of Mars colonisation but a set of principles to consider if Mars was to be colonised. These include respect for the Martian natural environment, a Bill of Rights, attending to ageing and disability, and the need for privacy. We have included this utopian theory text in this section because it highlights social and environmental concerns for colonisation of Mars. To be clear, there are no prospects for Ecocene Protopias on Mars because the resources used to get there and sustain settlement are defuturing for life on Earth.

Scholars classify utopias to reveal their social function. Utopias are living traditions that are created in particular times and places (Sargent, 1994, 3) that evolve to meet the needs of new generations. With this paper, we participate in this tradition by theorising utopian traditions with an ecological lens. Sargent identifies utopian literature, social theories, and intentional societies as comprising “the three faces of utopianism” (1994, 3). We use these classification systems in our visual proposal in *Figure 1: Levels and Types of Dystopias, Utopias, and Protopias*. The Colonial-Authoritarian Utopias are situated on the left. The Ecocene-Polycene Protopias on the right side. The chart features different scales of utopia from interplanetary to community from top to bottom. The legend illustrates a labelling system identifying utopian literature, social theories, intentional societies and technological proposals.

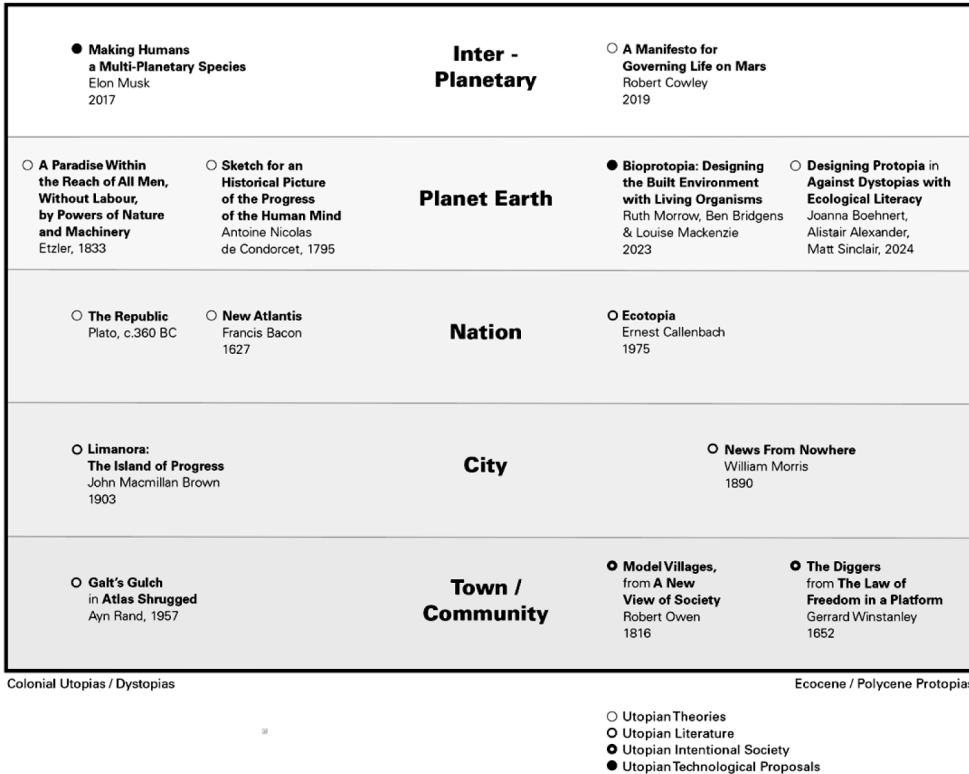


Figure 1. Levels and Types of Dystopias, Utopias, and Protopias.

In theorising Colonial-Authoritarian Utopias vs Ecocene-Polycene Protopias, we highlight the discursive and ideological work performed by these visions. Utopias embody assumptions about the nature of ideal (and even viable) relationships with both other people and the more-than-human ecological context. In the context of climate change and other ecological crises, future visions that do not attend to the ecological context can only make dystopian futures as they reproduce the errors at the crux of the polycrisis.

4. Defuturing Techno-Fetishistic Dystopias

Utopian imaginaries have been central to the development of technology –both the industry itself and also the culture, discourse, and ideologies that define the industry. This relationship can be traced back to the enlightenment and early industrialisation where technologies were not just the means for advancement and “progress” –but also the means for changing the ways the workplace was organised, imposing new types of order on workers and colonised peoples, and with extractive technologies establishing new ways of drawing value out of territories, and of all of nature. In this section we will describe how contemporary techno-utopias, and their associated sociotechnical imaginaries, reproduce, and accelerate the tradition of colonial dystopias described in the previous section.

As Silicon Valley grew in economic power and cultural influence through the 80s and 90s, the relationship between technological utopias and ecology was complex and often contradictory. A foundational, visually iconic and influential book was Stewart Brand’s *Whole Earth Catalog*, first published in 1968 and then periodically into the 70s. With the subtitle “Access to Tools”, the *Whole Earth Catalog* defined tools in the broadest possible sense, and while certainly practical, in that it was a carefully curated listing of items for sale, it was also utopian in so far as it envisioned very different futures aligned with the counterculture values of 60s and 70s California: self-sufficiency, ecology, DIY, and alternative education. Despite the catalogue’s ecological framing, Brand –who went on to be a leading figure in early Internet culture– was fixated on technology as a means of exerting human supremacy over nature, as articulated in the first edition: “We are as gods and might as well get good at it” (Brand 1968). This techno-optimism found form and focus with the emergence of personal computing and networked information technologies.

The distinctive mix of countercultural new age mysticism, techno-optimism, and aggressive libertarianism was documented by Richard Barbrook and Andy Cameron in their influential essay “The Californian Ideology”:

This new faith has emerged from a bizarre fusion of the cultural bohemianism of San Francisco with the hi-tech industries of Silicon Valley.the Californian Ideology promiscuously combines the free-wheeling spirit of the hippies and the entrepreneurial zeal of the yuppies. This amalgamation of opposites has been achieved through a profound faith in the emancipatory potential of the new information technologies (1995).

Barbrook and Cameron chart the emerging tension in the early internet era between the broadly leftist and environmental ideals of some early internet pioneers who dreamt of ecotopia (Callenbach 1975) - and those with individualist and libertarian principles. This dichotomy is an over-simplification, as clearly many environmentalists were then, and still are, also keen technologists, but the capitalistic and right wing libertarian currents in technology culture began to dominate along with the view of technology as a transcendent force overcoming human biological limitations. And as technology seemed to triumph over human biology, the view of the more-than-human world as a passive and inert realm unconditionally available for human extractivism became even more deeply embedded in

these spaces. This notion of ecological worlds as being open to exploitation was a convenient ideology for the techno-optimist focus on technologies that were resource intensive and polluting.

Philosopher Émile Torres and computer scientist and ethicist researcher Timnit Gebru recently documented the evolution of early Silicon Valley techno-utopianism through a sequence of increasingly more extreme techno-utopian ideologies. They use the acronym “TESCREAL” – with each letter representing a new set of ideas and a movement in chronological sequence: Transhumanism, Extropianism, Singularitarianism, Cosmism, Rationalism, Effective Altruism and Longtermism (Torres, 2023). We review these movements and the ideas they propose as obstacles to the sustainable transitions.

The “Tescreal Bundle” begins with Transhumanism, a philosophy that can be traced back to the 1950s and an essay by Julian Huxley that described how super intelligence and humanity can extend their lives, and augment physical and intellectual powers with technology.

Extropianism is represented by the first E in Tescreal. Extropianism was a mailing list of transhumanists active in the late eighties and early nineties. This list notably included Nick Bostrom, a philosopher who has been influential in developing ideas on existential risk, mostly in regard to artificial intelligence. Bostrom’s preoccupation with artificial superintelligence is associated with later divisions between TESCREAL techno-utopians who see AI as an existential threat and those who do not. With recent developments in AI those splits have come into the open with for example Sam Altman’s recent removal as CEO at Open AI and then reinstatement (Goode & Knight 2023). While both sides are profoundly techno-utopian, some are preoccupied with caution in AI development – while Altman and others advocate acceleration.

Singularitarianism, the S in TESCREAL, fixates on the so-called “singularity” that is the proposed future moment when AI develops into super-intelligence. This is the critical moment for TESCREAL techno-utopian futures – where humans become largely redundant. The first ideas of singularity are often attributed to mathematician I.J. Good’s 1965 essay on superintelligence, “Speculations Concerning the First Ultra-intelligent Machine” where Good speculated on an “intelligence explosion...and the intelligence of man would be left far behind” (Good 1965). The concept of singularity was later popularised by computer scientist Ray Kurzweil in his 2005 book “The Singularity is Near”. Kurzweil became influential in Silicon Valley and was recruited by Google founder Larry Page to work on AI research for Google. Page and Kurzweil also founded Singularity University. Singularitarianism additionally contributes fantasies of radical post-scarcity abundance (Torres 2023) – as a fictitious future vision where resource constraints and planetary boundaries do not exist.

Cosmism, the C of TESCREAL, refers to The Cosmist Manifesto (2010) by Ben Goertzel. This text presents a distinctly anti-ecological version of cyborg futures: “Humans will merge with technology, to a rapidly increasing extent. This is a new phase of the evolution of our species, just picking up speed about now. The divide between natural and artificial will blur, then disappear” (Goertzel, 2010, 9). For Goertzel, technological harms to nature are “tragic” but temporary: “As technology advances further it will incur less and less envi-

ronmental destruction, not more and more” (*Ibid*, 130). This speculation feeds the obscuring narrative that technological progress is not associated with ecological harms.

Next is the R for “Rationalism”. As a term that has been adopted by, and ascribed to, philosophers from Pythagoras, through the Enlightenment era to Emmanuel Kant, in the TESCREAL context “rationalism” elevates a narrow, incomplete, and erroneous mode of thinking as the supposed height of intelligence. This so-called “Rationalism” plays a powerful role in the TESCREAL bundle with its preoccupation with (cherry picked) data, quantification (including, as we will see, things that cannot be quantified, such as the levels of happiness of people in the future), and an impoverished conceptualisation of the notion of “smartness” –which is to be optimised, mimicking computers (Torres, 2023b). This tradition includes a strategic ignoring of interests outside of the circle of “rationalist” believers. The interests of the more-than-human world are entirely dismissed, obscured, and denied. This colonial rationality is venerated in Silicon Valley.

The final three letters: Effective Altruism and Longtermism describe two intermeshed movements and ideologies (some would say cults) defining and driving Silicon Valley’s current fixation with AI. Longtermism further develops the ideas of TESCREAL version of Rationalism and applies these ideas to moral questions. In Longtermism, intangible qualities such as “good” are quantified according to a range of arbitrary metrics invented by the Longtermist community with far future extrapolations of human population. Longtermism claims that humans will exist for billions of years and that ethical frameworks can be built around the supposed longevity and growth of the human race to create prospects for more future happiness. In an extension of this disturbing logic, Longtermists subtract unhappiness from happiness to calculate if an action is ‘good’. With this pseudo-mathematical attempt to quantify “good” they assume that future humans living in a state of continual growth will produce (significantly) more happiness / good. In this value system, non-human life always comes off worse: “from the perspective of the wild animals themselves, the enormous growth and expansion of *Homo sapiens* has been a good thing” (McAskill, 2022). For Longtermists, the climate crisis is inconsequential compared to the potential value that trillions of humans will experience on the way to the far future – despite the fact that there is a distinct possibility that there will be no human future if we cannot stop destroying the stability of the climate system (IPPC2022). Longtermist philosophy depends on “subjugating nature, maximizing economic productivity, replacing humanity with a superior ‘posthuman’ species, colonizing the universe and ultimately creating an unfathomably huge population of conscious beings living... inside high resolution computer simulations” (Torres 2021). In dismissing environmental threats along with the calls for action by the community of climate scientists, Long Terminists end up in alignment with reactionary anti-science movements.

Like other TESCREALists, the “Effective Altruists” are fixated on their narrow understanding of “intelligence” and have developed a set of principles for optimising morality. “Effective Altruists” argue that to do the most quantifiable “good”, it is far better to accumulate as much wealth as possible and spend that money as “effectively” as possible on the most “quantifiable” beneficial causes. These ideas all rely on erroneous assumptions on what counts as intelligence, what is good, how things can be quantified, what can be quantified,

and what is effective. The answers to all these questions are whatever serves the interests of the “Effective Altruists.”

Taken together the TESCREAL ideologies describe a worldview in which building super-intelligent Artificial General Intelligence (AGI) will enable humanity to achieve “radical abundance... becoming immortal [and] colonizing the universe” (Torres, 2023b). In the context of this paper, “Longtermism” (an offshoot of effective altruism) is perhaps the most relevant of these techno-optimist dogmas. The TESCREAL trajectory towards ever more extreme and dystopic future imaginaries is now moving into a new phase. In 2023, as the Silicon Valley’s engineered hype over AI gained global momentum, many figures in the technology industry started adding “e/acc” to their X (formerly Twitter) profiles. The term stands for Effective Accelerationism.

The Effective Accelerationism agenda has been most forcefully articulated by Marc Andreessen in his *The Techno-Optimist Manifesto*: “We believe in accelerationism – the conscious and deliberate propulsion of technological development – to ensure the fulfilment of the Law of Accelerating Returns. To ensure the techno-capital upward spiral continues forever” (Andreessen 2023). Andreessen, who also proudly displays e/acc on his X profile, can fairly claim, as creator of the first browser, Mosaic, to be one of the most significant early internet pioneers. He is now co-founder and director of Andreessen Horowitz, the world’s largest venture capital company with \$38bn of investments (Sovereign Wealth Fund Institute, 2023), and arguably the most influential venture capitalist in Silicon Valley. Nevertheless, his manifesto attracted widespread criticism. Elizabeth Spiers wrote about Andreessen’s manifesto in *The New York Times* in an article titled “A Tech Overlord’s Horrifying, Silly Vision for Who Should Rule the World”:

As a piece of writing, the rambling and often contradictory manifesto has the pathos of the Unabomber manifesto...but lacks the ideological coherence... [Andreessen] articulates (albeit in a refrigerator magnet poetry kind of way) a strain of nihilism that has gained traction among tech elites, and reveals much of how they think about their few remaining responsibilities to society” (Spiers 2023).

Andreessen, like Brand and all Tescreal ideologies, sees humanity’s relationship to the more-than-human world in unabashedly God-like terms: “We believe in nature, but we also believe in overcoming nature. We are not primitives, cowering in fear of the lightning bolt. We are the apex predator; the lightning works for us” (Andreessen, 2023). Unfortunately, unlike the Unabomber, Anderson is in a position to embed his ideas into the technological infrastructure on which we all depend.

Somewhat unusually for a techno-utopian, Andreessen displays some awareness of the ecological impact of technology and human activity. This is fleeting and superficial, and, as Spiers noted, contradictory. If there are ecological consequences of technology, Andreessen considers technological development to be the best way to address them: “We believe there is no inherent conflict between the techno-capital machine and the natural environment” (Andreessen, 2023). Like most techno-utopians in recent years, Andreessen acknowledges climate change – as self-described rationalists, techno-utopians are obliged to

concede the data and empirical evidence is unarguable. Critically, acknowledging climate change has no real advantage if it is not followed by commitments and actions to change trajectory. For the techno-optimists, technology is always the answer: “We believe technology is the solution to environmental degradation and crisis. A technologically advanced society improves the natural environment, a technologically stagnant society ruins it” (Andreessen, 2023). While techno-utopians occasionally mention environmental degradation, their visions inevitably reach beyond the outer limits of credibility. There are two central and fundamental environmental and planetary constraints that their ideology refuses to acknowledge: energy and mineral resources.

Energy and mineral resource extraction are, of course, essential for virtually all forms of economic development. Energy and resources are essential for the TESCREAL techno-utopians whose future imaginaries aim to reach the “singularity” of artificial general intelligence. AI in its current form is already extraordinarily energy and resource intensive. AI companies and their hardware suppliers are reluctant to reveal details on their resource requirements, but a recent study suggests that the energy consumption of all the AI GPU processors made this year by market leader Nvidia, alone, will require 15GW (de Vries, 2023). For context, this amount is roughly the same power demands as the Netherlands (will add quote). The super intelligence TESCREAL techno-utopians imagine will require energy that is unprecedented. Andreessen is also clear on Energy’s centrality in his vision:

Energy is the foundational engine of our civilization. The more energy we have, the more people we can have, and the better everyone’s lives can be. We should raise everyone to the energy consumption level we have, then increase our energy 1,000x, then raise everyone else’s energy 1,000x as well (2023).

Andreessen makes no attempt to support this assertion with evidence that this infinite energy supply is remotely viable or achievable. This plan will accelerate climate change and resource scarcity. It will help consolidate the power of the technological elite in the short run.

Techno-utopian visions require an inexhaustible supply of both energy and mineral resources. Techno-utopians’ response to these constraints falls into one of two categories or both: either they deny or play down any future scarcity, or they claim technology will solve the problem. In his manifesto, Andreessen accepts some constraints on resources. “Natural resource utilization has sharp limits, both real and political” he concedes. Andreessen offers a glib response: “We believe that there is no material problem,” he says, “whether created by nature or by technology –that cannot be solved with more technology” (Andreessen, 2023). Andreessen is convinced technology will be the answer. For energy, the “silver bullet for virtually unlimited zero-emissions energy today [is] –nuclear fission” (2023). Putting aside environmental concerns and risks of nuclear power, there are more basic logical errors in Andreessen’s assumptions. Nuclear power stations take a minimum of 10 years to build (Park, 2017). While there are 60 nuclear power stations currently under construction, only one of those is in the US and 2 in Europe (where we can assume Andreessen’s demand for power is most likely to reside) (World Nuclear Association, 2024). So even if we are to believe that nuclear power is the answer, there is no possibility for it playing an

increased role in decarbonisation in the limited time (in the US and Europe) we have left to mitigate the worst levels of climate change.

Meanwhile, the biggest risk to humanity for Andreessen, in his imagination somehow far greater than climate change, is that we slow down or redirect the techno-capital spiral. Andreessen has his sights further into the future: “We believe a *second* energy silver bullet is coming – nuclear fusion.” Nuclear fusion has been an entirely speculative technology for at least 40 years, and it remains so. Even the most enthusiastic fusion advocates - who are themselves, by definition, committed Techno-optimists, caution that it will take at least another 30 years before it has any prospect of being operational (Cartlidge, 2017). All types of energy generation are dependent on natural resources and ecosystems. Resource constraints are well documented by the global scientific community and are a challenge for decarbonisation (World Resource Institute 2024; WU Viennab 2024; International Energy Agency, 2020, 118) – even without increased energy demand for AI and AGI. The scale of ecological destruction necessary to deliver AI and AGI in mineral extraction would also be immense on human societies and ecosystems. Estimates suggest most reserves are situated on or near indigenous territories (Kemp and Owen, 2022), territories which are also estimated to contain 80% of the world’s bio-diversity (Nitah, 2021).

Andreessen’s strongly held convictions align closely with his business interests. This is a recurring pattern across techno-utopianism who all rely on exponential macro- economic growth and support for “frontier” technologies often engineered by Silicon Valley itself. This entanglement of increasingly fantastical - and ecologically destructive - techno-utopian fantasies with business interests is a defining pattern in TESCREAL techno-utopianism. These sets of vested interest in technological development go some way to explain the aggressive ideological commitment to techno-utopian TESCREALism and Effective Accelerationism influence in Silicon Valley. This influence is widely acknowledged, but often hard to conclusively establish, as few will openly admit to its influence on their thinking. We can draw significant inferences from the following facts:

- Ray Kurzweil is considered the principal figure in singularitarianism after his book “The Singularity is Near” was published in 2005. In 2012 he was recruited by Google to work on special projects in AI (Grossman, 2001; Levy, 2013)
- Peter Thiel, co-founder of Paypal and OpenAI, and big data surveillance company Palantir, is prominent within the Effective Altruism movement and gave a keynote speech at the Effective Altruism Summit in 2013 (Thiel, 2013).
- Sam Bankman-Fried, the founder of FTX crypto-currency exchange who was convicted of fraud and conspiracy worth \$8bn in 2022, is one of the best known advocates of the “earn a lot to give a lot” (Szalai, 2022) rationale of Effective Altruism.
- Jaan Tallinn, co-founder of Skype and the Cambridge Centre for the Study of Existential Risk, is also a board member and donor to Longtermist organisations such as the Future of Life Institute and the Global Catastrophic Risk Institute (Future of Life Institute, 2024a).
- Elon Musk is known as a supporter of Longtermist beliefs. He stated that Longtermism is “a close match for my philosophy” (Musk, 2022).

TESCREAL is especially influential in the AI sector.

- Sam Altman, CEO of OpenAI, invests in Transhumanist ventures such as Nectome, a start up that plans to enable people to upload their brains to the cloud, and Retro bio-sciences, a start up that plans to slow aging (Cao, 2023).
- Dario Amodai, who was a senior engineer at Open AI, and now leads one of its main rivals Anthropic, is a prominent advocate of Effective Altruism (Amodai, 2023).

Whether we find these techno-utopian inspirational or absurd and dangerous, they are unquestionably shaping our present. Techno-utopian visions for AI, the metaverse or nuclear fusion are shaping the tech that Silicon Valley is investing in and presenting to us all as the future. It is a world that can only be realised with more capital investment, more resources and a massive supply of energy. Perhaps the most important consideration of these techno-utopian imaginaries, particularly in relation to ecological literacy, is not what they require, but what they exclude. Techno-utopian visions aggressively rule out any conservation of energy and any meaningful efforts to address climate change and other ecological crises with changes in ways of living – as opposed to more technology and development. These future visions exclude an re-evaluation of neo-liberal capitalist modes of production. While not all techno-utopians are TESCREAList, all should be aware of the future visions that powerful people at the top of the techno-utopian pyramid are developing for the rest of us. Techno-utopian imaginaries work to keep what Marc Andreessen describes as the “Techno-capital spiral” relentlessly turning upwards. The values are embedded in the technologies, including artificial intelligence, that regulate our lives. They leave traces on our ideas of what is possible and what is desirable. Techno-utopians offer very little evidence that their visions can ever be truly realised, or that they will even try to avert ever worsening climate chaos. Perhaps the strategic vision of TESCREALists is to prevent other visions less accommodating of their investment interests ever taking hold. Or perhaps colonial utopian thinking is going into overdrive to avoid having to acknowledge the inconvenient need to respond to the climate and ecological emergencies.

5. The end

Ecological literacy seeks to address the omission of the ecological in knowledge systems by re-orienting and redirecting ways of living towards sustainable ends. These transitions depend on appropriate socio-technical imaginaries. In a technological advanced civilisation, wide-spread ecological literacy and ecologically viable technical imaginaries are a basic necessity for collective survival. An ecological lens reveals flawed assumptions underlying movements that present themselves as techno-utopians with the extreme examples of Effective Altruists, Longtermist, and Effective Accelerationism. The future visions in these movements entrench historic errors, driving accelerating trajectories of dystopian polycrises. These techno-utopian cultural movements blunt basic empathetic social and ecological values and enable the worst characteristics of extractive colonial violence. Confronting these movements and the structural power they embody is one of the many, many challenges for ecological transition.

With this call for ecological literacy in design, we appeal to designers' empathic sensibility and encourage an expanded sphere of attention to include the more-than-human ecological contexts. Ultimately, ecological literacy is a foundation to an effective transition theory of change. Ecologically literate design with attention to the interests of the more-than-human context is in stark opposition to the techno-fetishtic mindsets. We present a vision of transition that depends on bolstering designers' ecological literacies to both identify the unsustainable and enable collective reimagining and redesigning ways of living. Creative acts transform notions of possibilities. The task is to ground these creative acts in ecological literacy and relational ethics, such that different futures may emerge. We have described ecological literacy as a foundation for necessary societal transitions towards ways of living that will address the global polycrises. While eco-modernist and TESCOREAL future obscure local harms, progressive future visions expand empathy and care in ways that include pluriversal worlds and more-than-humans. Ecocene and Polycene Protopias already exist and can be expanded. Murray Bookchin wrote: "if you don't do the impossible...we're going to wind up with the unthinkable — and that will be the destruction of the planet itself" (1978/2019). Ecological literacy can enable transitions to ecologically viable ways of living on the planet. Join the Protopian movement with politicised visions of a better world as a foundation for transitions by design.

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Resumen: La prolongada desestimación de lo ecológico en las civilizaciones que han desarrollado tecnologías que alteran drásticamente la ecología y traspasan los límites planetarios es el quid de la policrisis planetaria contemporánea. Los futuros deseables e incluso viables dependen del diseño de nuevas formas de vivir en el planeta basadas en la comprensión de los seres humanos en un enredo dinámico con el contexto más-que-humano. Dar prioridad a las relaciones ecológicas supone una ruptura fundamental con los supuestos de la modernidad y las tecnologías, prácticas sociales y visiones de futuro asociadas. Reunimos el diseño y el conocimiento ecológico para describir el trabajo fundamental en el diseño de transiciones a Protopías Ecocénicas, es decir, lugares de transición ecológica continua. Como trampolín, identificamos la labor defuturizadora en determinadas formulaciones del pensamiento utópico. Al describir visiones de futuro que aceleran los daños ecológicos, llamamos la atención sobre los supuestos negadores de la ecología que subyacen a los relatos e ideologías tecnoutópicos. Este artículo presenta la alfabetización ecológica como una capacidad crítica e imaginativa fundamental para evitar las distopías que surgen de tradiciones que desestiman lo ecológico. La práctica del diseño sostenible y regenerativo depende del refuerzo de la alfabetización ecológica de los diseñadores para

permitir una reimaginación colectiva más eficaz y rediseñar futuras formas de vida dentro de los límites planetarios.

Palabras clave: Alfabetización ecológica - Utopía - Protopía - Tecnoutopía - TESCREAL - Diseño de transición - Imaginarios sociotécnicos - Distopía - Ecoceno - Policeno - Aceleracionismo - Discurso - Ideología - Futuros.

Resumo: A rejeição de longa data do aspecto ecológico nas civilizações que desenvolvem tecnologias dramáticas que alteram a ecologia e ultrapassam os limites do planeta é o ponto crucial da policrise planetária contemporânea. Futuros desejáveis e até mesmo viáveis dependem da concepção de novas formas de viver no planeta com base na compreensão dos seres humanos em um emaranhado dinâmico com o contexto mais do que humano. Priorizar as relações ecológicas é uma ruptura fundamental com as suposições da modernidade e das tecnologias, práticas sociais e visões de futuro associadas. Reunimos o design e o conhecimento ecológico para descrever o trabalho fundamental na concepção de transições para as Protopias do Ecoceno, ou seja, locais de transição ecológica contínua. Como nosso trampolim, identificamos o trabalho de desestruturação em formulações específicas do pensamento utópico. Ao descrever visões futuras que aceleram os danos ecológicos, chamamos a atenção para as pressuposições de negação da ecologia subjacentes às histórias e ideologias tecno-utópicas. Este artigo apresenta a alfabetização ecológica como uma capacidade crítica e imaginativa fundamental para evitar distopias que emergem de tradições que rejeitam o ecológico. A prática do design sustentável e regenerativo depende do fortalecimento da alfabetização ecológica dos designers para possibilitar uma reimaginação coletiva mais eficaz e o redesenho de futuras formas de vida dentro dos limites planetários.

Palavras-chave: Alfabetização ecológica - Utopia - Protopia - Tecno-utopia - TESCREAL - Design de transição - Imaginários sociotécnicos - Distopia - Ecoceno - Policeno - Aceleracionismo - Discurso - Ideologia - Futuros
