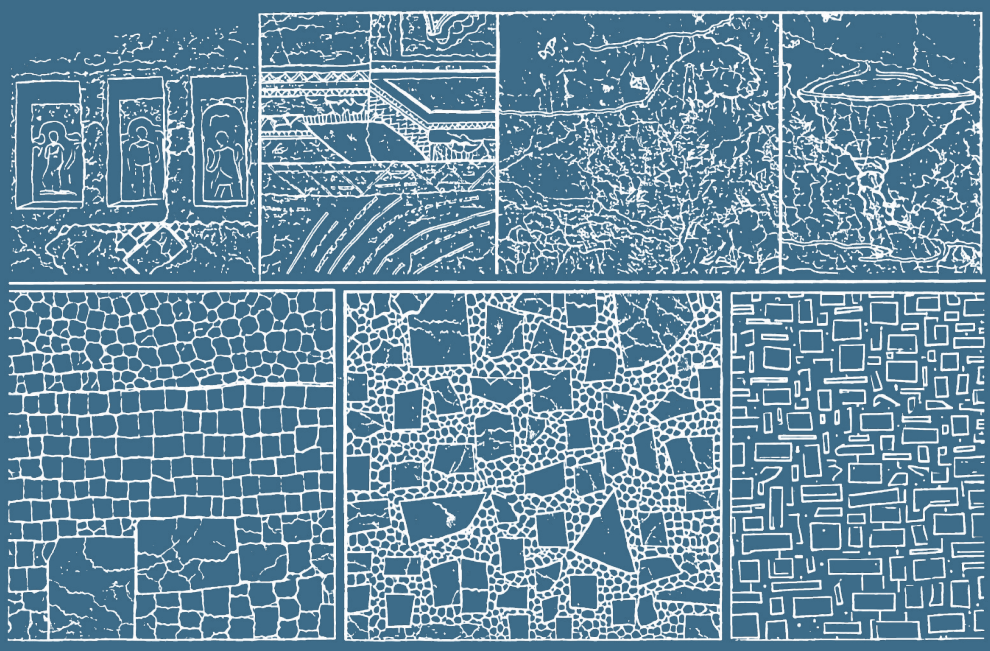
EUC ebook

CLIMATE CHANGE E SOSTENIBILITÀ DEI TERRITORI TRA RISCHI AMBIENTALI E ANTROPICI

a cura di
IRENE FANTAPPIÈ e SARA ZUCCARINO



EUC - EDIZIONI UNIVERSITÀ DI CASSINO

Che cosa significa oggi abitare il pianeta? Questo volume affronta la domanda attraversando saperi e linguaggi diversi: dalle scienze ambientali al diritto, dalla matematica alle scienze sociali, dalla filosofia alla letteratura. Articolato in tre sezioni – cornici etiche, culturali e letterarie; strumenti e governance per la sostenibilità dei territori; ruolo delle università e della ricerca – il volume propone dunque una lettura transdisciplinare del cambiamento climatico come una questione insieme scientifica, politica e simbolica. Al centro, il territorio come luogo di crisi ma anche di sperimentazione, in cui si ridefiniscono le relazioni tra umano, non umano e tecnologia. I saggi indagano sia i rischi e le trasformazioni del passato e del presente, sia anche le possibilità di risposta: modelli sostenibili, strategie di mitigazione e adattamento, pratiche di coabitazione, nuove forme di consapevolezza. Ne emerge un invito a pensare la transizione ecologica come processo culturale e sociale oltre che tecnico, fondato su responsabilità condivisa e giustizia intergenerazionale.

What does it mean to inhabit the planet today? This volume addresses the question by bringing into dialogue diverse fields of knowledge and forms of expression: from environmental sciences to law, from mathematics to the social sciences, from philosophy to literature. Organized into three sections – ethical, cultural and literary frameworks; tools and governance for the sustainability of territories; and the role of universities and research – the volume offers a transdisciplinary perspective on climate change as at once a scientific, political, and symbolic issue. The territory is conceived as both a site of crisis and a space of experimentation, where relationships between humans, non-humans, and technology are being reconfigured. The essays explore not only risks and transformations, but also possible responses: sustainable models, strategies for mitigation and adaptation, practices of cohabitation, and new forms of awareness. Ultimately, the volume invites readers to rethink ecological transition as a cultural and social process, as well as a technical one, grounded in shared responsibility and intergenerational justice.

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RUOLO DELLE UNIVERSITÀ E DELLA RICERCA NELLA TRANSIZIONE CLIMATICA

The University and the Need for Bifurcation for Sustainable Futures

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Riassunto: L'urgente necessità di una biforcazione sociale verso un futuro sostenibile mette alla prova l'università e la produzione di conoscenza universitaria: ricerca e formazione, così come scienza, tecnologia e innovazione. Vengono messi in discussione i tipi di conoscenza consolidati e le loro epistemologie dominanti: in generale, le epistemologie che sono e sono sempre state intrecciate con potere, interessi e valori devono subire una biforcazione. La questione è cosa costituisca conoscenza legittima e, sulla base di ciò, cosa costituisca una struttura ragionevole del sistema economico e una 'tecnologia sociale desiderabile'. Sono necessari un nuovo assetto e una nuova *forma mentis*, combinati con consapevolezza inter- e intragenerativa, giustizia e valori per una nuova cultura dell'essere e del divenire umano orientata ai futuri. In questo capitolo, discutiamo il contesto e il *background* di assetti e *forma mentis* rivolti all'Università per consentire un pensiero critico sulla (infrastruttura) struttura, il framing e il pensiero ('dispositivo') tecno-capitalista. Affrontiamo le opzioni per reimmaginare l'università sostenibile (autonoma) e il ruolo che possano svolgere gli approcci *open source* e *low-tech*. L'idea principale sviluppare strumenti adeguati per promuovere le biforcazioni istituzionali. La visione delineata in questo capitolo è un'Università di pratica etica, partecipativa, interdisciplinare e transdisciplinare, organizzata secondo il pensiero critico-riflessivo, l'etica eudemonistica, una maggiore partecipazione e la ricerca contributiva. La pratica universitaria promuove la creazione di senso e di obiettivi per lo sviluppo sostenibile in modo deliberativo. Esploriamo la biforcazione epistemologica, che può essere considerata un elemento centrale dell'Università responsabile immaginata. Chiarifichiamo la relazione intrinseca tra

biforcazione ed epistemologia e riveliamo che il sistema capitalista si fonda su una specifica *epistēmē* (positivista). Problematizziamo questo tipo di epistemologia, riflettiamo sulle opzioni per nuovi valori e mostriamo prospettive: l'Università può diventare un laboratorio di biforcazione per uno sviluppo sostenibile della società nel suo complesso.

Parole chiave: *low-tech*, *epistēmē*, etica, inter/transdisciplinarità, ricerca contributiva.

Abstract: The urgent needed societal bifurcation towards a sustainable future challenges the university and the university's knowledge production: research and education as well as science, technology and innovation. The established knowledge types and its dominant epistemologies are questioned: In general, epistemologies which are and have always been interlaced with power, interests and values need to undergo a bifurcation. At issue is what counts as legitimate knowledge, and based on this, what counts as a reasonable structure of the economics system and as societally desirable technology. Required is a new spirit and mindset, combined with inter- and intragenerative awareness, justice and virtues for a new future-oriented culture of being and becoming human. In this chapter, we discuss the context and the background for a new spirit and mindset of the university that enables critical thinking about techno-capitalist (infra-)structure, framing and thinking (*dispositif*). We face options on how to re-imagine the sustainable (autonomous) university and which role open-source and low-tech approaches can play. The main idea is to develop appropriate tools for fostering institutional bifurcations. The vision sketched in this chapter is a university of ethical, participatory and inter- and transdisciplinary practice organised around critical-reflexive thinking, *eudaimonistic* ethics, broader participation, and contributory research. The university's practice fosters sense-making and purpose-creation for sustainable development in a deliberative way. We explore the epistemological bifurcation which can be considered as a core element of the envisioned responsible university. We clarify the inherent relation of bifurcation and epistemology, and we reveal that the capitalist system is based on a specific (positivist) *epistēmē*. We problematise this type of epistemology, reflect options for new values and show perspective and prospects: The university can become a bifurcation lab for a sustainable development of society at large.

Keywords: Low-Tech, Epistēmē, Ethics, Inter/Trans-Disciplinarity, Contributory Research.

1. Introduction

Today, technology, especially digital technology, is pervasive in the lifeworld of our late-modern societies. The design, development, adoption and the consequences of technological artefacts, systems and infrastructures are intrinsic aspects of human activity and the becoming of the individual and collective. Technology cannot and should not be reduced simply to an instrument or tool but regarded as an integral element of being and becoming human. Hence, technological artefacts and systems are not value neutral; they create or restrict affordances or possibilities for action, they transform and facilitate the creation of new social, cultural, political and educational practices, new modes of being in the world, in particular they potentially fundamentally transform how we relate to each-other, the environment, and its constituents (the other-than-human as such). In this sense, more than 60 years ago, Arnold Gehlen [1] pointed out that «technology not only surrounds modern man but also penetrates his blood». Further underlining the indivisibility of society and technology[2], Simondon gave us a comprehensive examination of the mode of existence of technical objects, argued that: «The opposition drawn between culture and technics, between man and machine, is false and has no foundation; it is merely a sign of ignorance or resentment».

The evolution and uptake of digital technologies have been notably rapid; indeed, Bernard Stiegler has noted that the temporal gap between innovation and technological transfer is dramatically diminishing, and this rapid development poses challenges for ethical and sustainable adoption of new technologies. The impact on all spheres of life of digital technologies is evident, from the professional to recreational, as digital platforms such as social media like Facebook, Instagram, Tik Tok or even LinkedIn (as just a few examples), mediate how we relate to each other both personally and professionally, and even how we consume and interact with entertainment and the news. The advent and rise of generative artificial intelligence, as well as broader applications of AI more generally, have been sensational and emblematic of the ambiguous transformative capabilities of technology, reshaping global economic activity and social and professional practices from milieux as diverse as

[1] GEHLEN 1961, p 102.
[2] SIMONDON 2017, p 9.

education, entertainment and the arts, to manufacturing industries, healthcare and defence.

Digital technologies possess the potential to innovate, create and/or restrict opportunities for economic activity and resource optimisation through the power of big data and artificial intelligence (for example), and many other prospective benefits that ostensibly promise to put humanity on a more sustainable path (for instance, digital technologies have the potential to contribute towards the Sustainable Development Goals through precision agriculture and forecasting[3]).

This is why multi-sectoral digital transformation is an attractive proposition – the promise that paradigm shifting technologies can contribute to human welfare and environmental sustainability by extending and enhancing our human capabilities (to both understand and solve problems). We need to approach such promises with circumspection and tempered expectations.

The hype and the promise of technological innovation, or pervasive technological solutionism[4] and techno-optimism can tend towards obscuring the adverse societal impacts of technology. Even as technologies like AI promise positive transformative changes, often when scrutinised their design and development tell an expansive story of environmentally and socially/societally destructive mineral extraction, labour exploitation, and intensive energy use[5], even before we reflect on the immediate and long-term impacts of their use. Such technologies are *pharmaka*, as Stiegler[6] has discussed extensively and can be both curative and poisonous. Within the apparatus or *dispositif* of neoliberal capitalist production and consumption models, frequently digital technologies are turned towards undermining our very attention, making us less capable of 'taking care' as such, whilst also demonstrating substantial potential to undermine important values such as privacy, equality, autonomy, and democracy and civility itself when one considers digital platforms and AI applications respectively as substrates and agents of disinformation[7]. This pharmacology then has serious implications for sustainable ecology or ecologies in the sense elaborated by Felix Guattari[8], the toxicity of the *pharmaka*

[3] RYAN *ET AL.* 2020; STAHL, SCHROEDER, RODRIGUES 2023.
[4] MOROZOV 2013.
[5] CRAWFORD 2022.
[6] STIEGLER 2015.
[7] HAYES, VAN DE POEL, STEEN 2020.
[8] GUATTARI 2008.

can tend to undermine the healthy ecology of the environment, social relations, and human subjectivity (or mental ecology) – our technologies which have the capacity to enhance welfare also promote and/or enable socially and environmentally destructive practices.

Facing the inherent ambivalence of the economic-technological convergence – namely, the amalgam of an accelerated capitalism and a pervasive digitalisation – in this chapter we proceed from the premise that a paradigm shift away from the *dispositifs* of our late-modern societies is necessary. There is an urgent need for a bifurcation or a fundamental phase transition[9], as demanded by scholars including Guattari and Stiegler[10]. The current political economy and complex of education, research and innovation, production and consumption are not successfully building societal capacities that enable the changes necessary to avoid global catastrophe, nor are the technologies emerging within these frameworks satisfactorily mitigating the risks of catastrophic global threats such as climate change and widespread civil and political unrest, indeed they may be exacerbating them[11].

[9] In earlier work, we clarified bifurcation as: «challenging the present-day late-modern mindset, in particular the way of conceptualizing, thinking and framing humans, societal human-nature relations as well as societal human-technology relations. The established human-centric perspectives – interlaced with the neoliberal profit-maximizing *homo economicus* and the instrumentalist view of technology – that induced the problematic Anthropocene and its grand challenges, need to be revealed, scrutinized, and revised. Novel processual and inherently critical concepts should be developed in order to relate humans, nature, technology, society and economics in a different, namely in a relational way, beyond various reductionist takes on them. And, in a broader sense, to bifurcate can also mean to take different (onto-) epistemological paths based on transdisciplinary crossovers between embodiment, sciences, and the arts» (FITZPATRICK *ET AL.* 2025). In this sense, bifurcation clearly indicates that we are on the razor's edge of catastrophe, decisions on alternative ways of living need to be taken. It is not a time of a smooth 'transition' or 'transformation', as these (somewhat innocent) terms might implicitly suggest. We argue that we should (a) perceive the present-day situation as a necessary point of 'bifurcation(s)' and (b) should shape the bifurcation from a societal humanist perspective (based on 'little ethics' and equipped with a mindset of the imperative of responsibility (JONAS 1985) and an alternative recognition, approach to and access of the human-nature-relation.

[10] STIEGLER 2015; *ID.* 2021.

[11] For an overview of the research and innovation policy of investment in Higher Education see (MITCHAM 2022) and more recently (DRAGHI 2024) for a European context on research and innovation and disruptive technologies.

A series of bifurcations from daily conventional practices will need to be observed for an ambitious and paradigm-changing shift to occur. Hence, such a significant bifurcation from our prescribed course of development (or progress) will not happen without concerted micro-bifurcations or deviations from the accumulated and ostensible conventional wisdom (and practices) so far. Here, we are interested in how the university as a provider of education and a key influence in research and innovation can begin bifurcating from its standard and increasingly unsustainable or untenable practices to promote a shift towards more sustainable ones and especially how it can facilitate not a digital transformation but a digital bifurcation, that is, the design, development and deployment of technologies with questions of ecology and ethics at their heart – or the creation and adoption of technologies that allow us to take care of ourselves, each other, and the planet. Building on the work of Bernard Stiegler (2015), the proposition is to refound the university by undertaking to overcome the repression of the role of technics in the constitution of thought and the noetic soul in general, and in the development of knowledge in all its forms. The university needs to be transformed into a 'bifurcation enabling institution' that builds capacities for a fundamental change in the human-nature-technology-relation. Such is the responsibility of education institutions that impart skills and knowledge to generations of engineers and other professionals, and which hold a key role in the creation of tomorrow's technological artefacts and practices. The risk of failing to explore the pharmacological questions of technological innovation and education is not only continued planetary devastation, but the loss of confidence of existing and prospective students, who as the speeches of the '2022 AgroParisTech' students during that year's graduation ceremony suggest, may increasingly wish to abandon the careers (which they argue to be unethical) that universities prepare them for (RFI, 2022). Indeed, the *telos* of the university, linked as it is the supply and demand market dynamics (matching skills to market and labour demand), and its contribution to research aligned with market forces and not strictly societal need, renders the university complicit and therefore responsible in the toxic pharmacology of research, innovation, and education.

In what follows we will provide reflections on how the university can support a bifurcation from the business-as-usual neoliberal, free-market and capitalist paradigm, and how it can foster responsible educational, research and innovation practices (of and with technology) that can support a shift to more

sustainable ways of being in and understanding the world. Fundamentally, we are interested in exploring the question of how to build higher education's capacities for societal and digital bifurcations that create paths to sustainable futures, how universities can be exemplars in sustainable (technological) practices at multiple institutional levels from operations, to pedagogy and research and innovation. It is our thesis then that bifurcation can start within the university with micro-bifurcations of (often-times technical) practice, which can unfold and reverberate across sectoral and global boundaries.

This chapter is structured as follows. In Section 2 we provide additional context and background for motivating and understanding a new pharmacology of the university, one which is refounded not to instrumentally serve and be defined by market dynamics, but to reconstruct attention, care and new therapeutics of (responsible and sustainable) technology. Building on this, in Section 3 we argue that the very digital and technological infrastructure of the university should resist the dominant late-modern techno-capitalist *dispositifs* through exploration and adoption of Open-Source Software, Open Source Hardware, and Low Tech technologies, moving away from proprietary systems and advancing decentralisation and local autonomy, whilst promoting philosophies of resilience, sufficiency, and care that ultimately enable the university to exercise more control over its own data and ecological footprint, and allow it to be an exemplar of bifurcation in its own operations and procurement. In Section 4 we explore the role of ethics, inter- and trans-disciplinarity, and contributory research in making the university a centre of bifurcation. We argue that affectively oriented ethics (with solicitude or care at its centre) is a condition of bifurcation that enables drawing the objects of plural visions of the good life into our circle of concern, including the welfare of the other (where the other can be construed as other-than-oneself including the other-than-human), thereby supporting a critical approach to technological innovation. Furthermore, we explore how both inter- and transdisciplinarity, including citizen-centric research models like contributory research, are essential to developing the societal bifurcation capacities of the university system. Finally, in Section 5 we argue that capitalism itself is an epistēmē, and one from which the university must alter its current course away and critically reflect upon the implications this has had for the management of the university and the goals it pursues. We argue that the university must re-define its values – and the ways in which it produces knowledge – which emerged from

and are entrenched in a techno-capitalist paradigm, that is, the university must refound itself for a more therapeutic pharmacology that embraces plural forms of knowledge and innovation for enhanced societal bifurcation capacities. Our overall point is that the university which bifurcates from within, is also positioned to support bifurcations across society more broadly, that is, to facilitate the production of knowledge for sustainable futures, crucially in a project that recognises the role of technology in shaping possible futures.

2. The Context and Background for a New Pharmacology of the University: Escaping the Techno-Capitalist Dispositif

The kinds of socio-technological innovation that characterise digital transformation take place within a political and societal framework that motivate their trajectory and goals, often within a paradigm of supply and demand market dynamics that are properties of the hegemonic political economy of free-market capitalism. In Stiegler's work he discusses the neoliberal apparatus of production and consumption as driving technological innovation. It is important to draw attention to this concept of the *dispositif* (or apparatus). We can trace this idea of apparatus or *dispositif* to Michel Foucault[12] who explained it thusly: «What I'm trying to pick out with this term is, firstly, a thoroughly heterogeneous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions, in short, the said as much as the unsaid. Such are the elements of the apparatus. The apparatus itself is the system of relations that can be established between these elements». Foucault argued that the *dispositif* created subjectivities through a dual process of creating the subject of self-knowledge, as well as those subjugated in political processes[13]. The *dispositif* gives rise to opportunities and boundaries for action and shapes our techno-materialised options and the action-spaces that preform and predetermine our being, knowing, doing[14]. They «shape the fields of human possibility in terms of action and knowledge»[15].

[12] FOUCAULT 1980, p 194.
[13] MAY 2014; FROST 2019.
[14] DELEUZE 2014; CALLEWAERT 2017.
[15] HAYES, FITZPATRICK, FERRÁNDEZ 2025, p 1234.

Foucault's approach is far reaching and can be seen as fundamental to understand recent late-modern societies and the various forms of self-governance and subject constructions. However, as Gernot Böhme[16] argues in his «*Philosophy of Invasive Technologization*», Foucault did not put enough emphasis on considering the techno-materialised structure, namely on technology, technical tools and technical systems, in detail. Foucault's approach needs to be deepened and extended from the *dispositif* to what Böhme calls «technology as a materialized societal *dispositif*». «Technology as a material societal *dispositif* is a condition that enables something but also restricts things and thereby gives shape to what is societally possible. […] What is possible in societal life [and in the lifeworld] today is given by the existing technological infrastructure of society and the technical things»[17]. Equipped with this understanding of a *dispositif* we can link the technical and economic dimensions that are essential for describing our situation today.

Occurring within the context of free-market capitalism is the era of the 'Anthropocene' in which we find ourselves, which it has been argued is «characterized by the tendency of human activity to destroy the conditions of possibility of human existence – both at the level of biological organizations (organisms, ecosystems) and at the level of the capacity to think (noesis)»[18]. The danger of this is our greatly diminished capacity to generate knowledge to mitigate the toxicity of technological innovations[19]. The *denoetisation* referred to here is characterised by and compounded by the transfer of human knowledge into machines, which leads to the loss of human skills and ultimately one could argue human resilience[20]. In the techno-capitalist *dispositif* defined by production and consumption, the media is mobilised to standardise response and technologies including algorithms and artificial intelligence are deployed to capture (and ultimately corrupt) attention, which further undermines the human capacity to care and attend to that which requires our care and attention (ourselves, the other, and the planet as a whole)[21].

Within such a paradigm we can also observe an aporia of sustainability, or a mismatch between aims and desires to both continue production and

[16] BÖHME 2008.
[17] BÖHME 2008, p 19 (our translation from German).
[18] MONTEVIL *ET AL.* 2021, p 51.
[19] MONTEVIL *ET AL.* 2021, p 51.
[20] MONTEVIL *ET AL.* 2021.
[21] STIEGLER 2015; MONTEVIL *ET AL.* 2021.

consumption-based growth *ad infinitum* and simultaneously reduce carbon emissions, seemingly within that endless growth model of economic development and technological innovation[22]. Technological innovations are mobilised towards the preservation of this paradigm, within the context of this *dispositif*, where the media, media technologies and algorithms including AI are deployed with the goal of shaping human desire itself within consumerist frameworks[23]. Retentional technologies then, though they possess curative potential, often undermine knowledge and enable continuing destructive, or toxic, practices that serve unsustainable ends (in every sense of sustainability, from the psychic, to the social and environmental).

It is under this techno-capitalist *dispositif* of production and consumption that the university ultimately operates, and it is through this *dispositif* that its educational, innovation, and operational frameworks are founded and shaped. As the AgroParisTech students appear to have discerned, and as Bernard Stiegler[24] has argued extensively: «universities and research organizations are mobilized in the service of an unlimited acceleration of innovation […], which is presented as the very condition of survival, a survival that itself seems, however, no longer possible except in the short term: at the expense of future life».

The current pharmacology of the university, and technological innovation, are not compatible with the sustainability of the three ecologies; they are arguably complicit in denoetisation, the attention diseconomy that undermines our ability to care, and environment harm. Among the more egregious examples of the university serving the ends of a toxic political economy, Stiegler refers to Columbia University business school, which «has been criticised for contributing to the legitimation of almost Mafia-like practices of the 'financial industry'»[25].

The university, as Stiegler[26] argues contra Derrida, is not without condition and one of the conditions upon which it is founded must be the examination of its own pharmacological condition. The university cannot simply be a platform for training tomorrow's experts in destructive industrial practices, but

[22] ROSS 2021.
[23] ROSS 2021.
[24] STIEGLER 2015, p 203.
[25] STIEGLER 2015, pp 168-169.
[26] STIEGLER 2015.

must reconstruct attention (and care), inquire into and advance new therapeutics of technology, consider new epistemologies and engage in programmes of re-noetisation, as well as champion slow and responsible innovation instead of accelerating reckless technological transfer[27]. The university can challenge existing *dispositifs* with new forms of knowledge and new therapeutics for more sustainable futures, and the university can also be a leader in sustainable practice through programmes of operational sustainability and digital sovereignty. The university can follow an agenda of bifurcation in its practices that supports technological innovation that better, more sustainably, serves society's needs.

In previous work by a number of the present authors we argued that «it is time for a paradigm shift in digital transformation that attempts to separate it from neoliberal economic models and mindsets, and looks to alternative political economies and epistemologies (and ontologies) for ecologically sustainable and ethical digital transformation», and argued for a conception of bifurcation as «a radical break or fork, or series of forks, from the deleterious and unsustainable practices and systems of the past that have led to a global ecological emergency and to a variety of crises»[28]. It is our belief that the university can act as an incubator or laboratory for bifurcation, experimenting with new and innovative ideas for sustainable futures, through futuring activities, and providing guidance on new and more sustainable directions across manifold technical and social practices and support a reconstruction of society and those practices that can reverse the impacts, or general trajectory, of the Anthropocene.

In what follows, we provide a partial (though not comprehensive, and one which invites future work and debate) framework of enabling and fostering bifurcation to support a university that is more curative in its pharmacology, and in its production of knowledge and graduates possessing the skills and knowledge to fruitfully imagine and support the delivery of better worlds.

[27] STIEGLER 2015; MONTEVIL *ET AL.* 2021; STEEN 2021; STIEGLER 2021.
[28] FITZPATRICK *ET AL.* 2025.

3. Re-imagining the Sustainable and Technologically Autonomous University: Open-Source and Low-Tech: Tools for Institutional Bifurcation

Centralised digital platforms have increasingly become enshrined within higher education institutions. Unintentionally, or not, this works to transform them from spaces for the development of public knowledge to vast consumers of digital products and services. Although they may be marked as such, these platforms and ecosystems are not neutral. Still, they are embodiments of projections of power and platform capitalism, embedding extractive economic logistics, datafication and surveillance within the daily activities of universities and colleges[29]. Scalability and efficiency are often prioritised in the implementation of an institute's technological implementation, mirroring the drivers of Big Tech, which ends up favouring profit over transparency, autonomy and care. In this context, universities face a critical decision point: whether to remain tethered to extractive infrastructures or to pursue a digital bifurcation; a purposeful departure toward technological practices that express sustainability, autonomy, and stewardship.

As well as diminishing institutional agency, this platform entanglement carries a heavy ecological cost. High-Powered Computing, frequent hardware upgrades and data-intensive services contribute significantly to both e-waste and increased electricity demand. It is estimated that the electricity consumption of data centres could reach over 1000 TWh by 2030, more than a 200% increase from 2022[30]. E-waste is also increasing massively, with only a fraction appropriately collected and recycled[31]. Universities, which are not only users but also, through their public position, legitimisers of these systems, face an ethical imperative to bifurcate from the extractive dominant paradigm. Instead, technologies built on the ethos of Low-Tech and Open-Source offer viable value-aligned alternatives to the Big Tech model. They are more than technical options, being both a philosophical and political position grounded in digital sovereignty and the ethics of care and stewardship in public digital infrastructure[32], not to mention the improvement in technical sustainability.

[29] WELBORN, INGRAM, 2022; ZILINSKAS-INTA *ET AL.* 2023.
[30] ÇAM *ET AL.* 2024.
[31] BALDÉ *ET AL.* 2024.
[32] BANDURA, MCLEAN, SULTAN 2023.

Within the context we are discussing, we understand digital sovereignty as the capacity of an institution to maintain control over its infrastructure, data, and possibly most importantly, its technological direction. Digital sovereignty is increasingly being recognised as a strategic imperative for public universities[33]. Reliance on proprietary, cloud-based tools often results in a situation where universities are locked to one vendor, have opaque data management and a limited capacity for adaptation – conditions which undermine a university's ethical and public service obligations to transparency and resiliency. One pathway that offers a viable approach to reclaiming autonomy is the implementation of Open-Source Software (OSS). Defined by publicly accessible source code and permissive licensing (the ability to allow users to use, modify and distribute software freely), OSS enables the co-development by university communities, allowing them to align their software strategies to institutional values around openness and critical enquiry[34]. Example software includes the VLE Moodle for learner management, Odoo for business management, Next Cloud for file storage and Zotero for reference management, to name but a few tools available to universities. OSS disavows the black box logic of proprietary ecosystems and empowers users to shape and govern their digital environment. Through this approach, OSS systems exemplify care as they are inherently designed for maintainability as well as legibility and mutual stewardship[35]. There is a growing international commitment to Open Technologies as seen through public sector and research initiatives such as the European Open Science Cloud and the Next Generation of Internet programme. These offer our university estates a greater foundation for infrastructure independence and digital sovereignty[36].

The adoption of alternative technology structures within universities and institutes of higher learning is often stifled by procurement frameworks which favour commercial vendors. This is reinforced and exacerbated by the limited technical capacity or resources in-house. Universities must push past this one-dimensional analysis of cost and invest in OSS as infrastructure in the public good. One model which is emerging in academia to encourage this is the

[33] EUROPEAN UNIVERSITY ASSOCIATION 2024; THE YOUNG ACADEMY 2025.
[34] NAGLE 2022.
[35] WELBORN, INGRAM 2022.
[36] EUROPEAN COMMISSION 2020, 2024, 2025.

foundation within university hierarchies of offices specifically to coordinate contributions and stewardship of open-source properties[37].

Alongside developing strategies and adopting Open-Source Software, universities should explore and develop Open-Source Hardware (OSH) initiatives. There is growing strategic value within OSH as well as longstanding historic roots within the university sector. Within the discipline of computing, projects like RISC-V and the European Processor Initiative are central to reducing dependency on proprietary silicon as well as diversifying markets to enable greater digital sovereignty within Europe.

As well as these high-level computing initiatives, there are practical and widely adopted platforms such as Arduino and Raspberry Pi, which embody the spirit of open and accessible computing. Outside of student and research projects, these platforms offer universities an opportunity to implement greater autonomy across their digital estates by co-developing open systems that replace proprietary technologies. This includes areas such as building management systems, thermostatic controls, and environmental monitoring networks, which are typically dominated by commercial solutions from companies such as Honeywell, Siemens, and Johnson Controls. The adoption of open-source alternatives in these contexts can reduce long-term vendor lock-in, enhance transparency, and allow institutions to further align infrastructure with their values. More importantly, it enables the integration of real-world system development into teaching and research, fostering hands-on experimentation across engineering, communications, media, and the arts.

The ethos of openness can extend much further than mere CPUs and microcontrollers. In the past, universities have played a critical role in the development of open-source digital fabrication tools, most notably the Rep-Rap project, which has laid the foundation for much of today's consumer 3D printing landscape. Organisations such as Prusa Research maintain open-source design principles in the face of competition from global giants such as Ultimaker and Bambu Labs, who often lock users into closed hardware and software ecosystems, sacrificing modifiability, repairability and transparency for convenience. Similar trends can be found in other domains that find their home across the university campus: Open-Source Microscopes (OpenFlexure), robotics platforms (Robot Operating System, Farmbot), and CNC tools (GBRL, OpenBuilds) all provide opportunities for universities to build,

[37] HADDAD 2022; NAGLE 2022.

maintain and develop their own research infrastructure. These systems encourage and support learning and experimentation in a way that closed systems simply cannot.

Importantly, many of these systems are built with simplicity, repairability and modularity from the outset. They not only embody a commitment to transparency, but their very nature develops a philosophy of sufficiency (doing more with less) and doing so openly. Through a re-engagement with OSH across all university domains, institutions can reclaim their role as creators of technology and begin providing an alternative path to consumers, rather than being consumers themselves.

Alongside the ethical concerns of ownership and data, the material and ecological footprint of a university's technology systems can be extended by embracing the philosophies of Low-Tech. This approach advances the thinking of sufficiency over acceleration and of designing systems for long-term adaptability rather than short-term performance. The core principles of the Low-Tech movement include ideas of modularity, repairability, decentralisation, and, in the case of information technology, minimal computing[38].

Earlier, it was discussed how Stiegler[39] cautions that the rapid acceleration of innovation, if left unchecked, leads to a *denoetisation* of society, a diminishing of our capacity for reflection, attention, and care. In this light, Low-Tech design philosophy is not simply a technical or ecological choice, but a conscious resistance to systems that erode our ability to think and cooperate. Rather than choosing the always connected and increasing processor speeds which have been the hallmark of post-Moore's computing, Low-Tech approaches prioritise stability, frugality and institutional control. This could be embodied through campus services running on local, low-power servers, replacing often bloated and high-bandwidth software with lightweight offline-first static alternatives or applying principles of digital sovereignty to pedagogical implementation through basic editors, terminal tools and simplified network systems[40]. More than any, applying digital sobriety practices to computing and technology systems to truly understand necessity and plan for longevity can reduce the impact of out-of-date and obsolete systems, allowing for minimal resource impact. Low-Tech Magazine's solar website can be seen

[38] TANGUY, CARRIÈRE, LAFOREST 2023.
[39] STIEGLER 2015.
[40] RISAM and GIL 2022; CUBERO-CASTAN 2025.

as an exemplar of sufficient and resource-aware development where static pages, dithered images and uptime trade-offs are embraced as conscious design choices[41].

Low-Tech philosophies provide an opportunity for universities to challenge deeply embedded narratives of efficiency and performance combined with constant upgrade cycles. By doing so, a space is created which allows for a progressive digital ethos which is grounded in long-term resilience, sufficiency and care. This perspective is particularly aligned with pedagogical contexts and challenges often taught narratives where students are encouraged to pursue technological optimisation without questioning the costs to ecology, infrastructure or the greater society. If Low-Tech principles are embedded within studio briefs, laboratory exercises and computing curricula, an increased and critical digital literacy can be facilitated within our student bodies.

When we consider infrastructure within our institutions, Low-Tech approaches support a relationship with energy and connectivity that is more intentional and reconsiders the requirements to increase complexity. Networks on our campus could look to adopt a local-first storage approach, reducing external cloud services and utilising lightweight internal web tools on energy-efficient microservers. This should lead to a lowering of emissions and operational costs, whilst also allowing IT departments to properly account for the ecological and energy costs of the systems and data for which they are responsible. Most importantly, by making our computing systems more Low-Tech, we are not looking to move to a nostalgic return to an obsolete past. This is no hiraeth view of earlier technological paradigms, but a conscious and forward-focused approach which prioritises the appropriateness of our use of technology. This approach allows universities to consider and align their digital presence with an emerging ethical standpoint that they must define to justify their position in the public interest. When implemented alongside Open-Source tools, Low-Tech practices offer a cohesive pedagogical and infrastructural strategy which will shape an intentionally resilient and autonomous future.

In our classrooms, Low-Tech operates as a driver of digital humility, prompting students to enquire as to where and who makes the tools they use, how and by whom they are maintained and at what social and ecological

[41] DECKER 2024.

cost[42]. Implementation requires a policy shift within institutions, and universities need to develop and implement Minimal Computing guidelines for ICT and procurement, as well as conduct sufficiency and digital sovereignty audits, whilst incentivising departments to adopt and implement low-power infrastructure coupled with carbon-conscious development.

What is clear is that both the Open-Source movement and the Low-Tech one have a shared set of principles that demonstrate a stark technological bifurcation. Their embrace of decentralisation and local autonomy enables institutions to administer their own infrastructure to their own specific needs rather than outsource control and, with it, choice. By their very nature, they embed transparency in both their underlying code and systems (OSS and OSH) as well as through their future-focused implementation concerning accessibility, repairability and long-term resilience (Low-Tech). Both models support sustainability through a tripartite model of university responsibility: environmental stewardship, academic governance, and infrastructural autonomy. Environmentally, they reduce energy consumption, e-waste, and the carbon intensity of digital systems. Scholarly, they enhance information governance, surface critical debates around data use and reuse, and reduce system opacity, including in areas such as AI model training and surveillance infrastructure. Institutionally, they promote internal capacity building and long-term resilience, enabling self-determination and the cultivation of skills necessary for stewarding public digital infrastructure.

To embrace open-source and Low-Tech is to commit to a bifurcation that is ethical and institutional as much as it is technological. It is a rejection of extractive infrastructures and a move toward systems and services that provide and build care and autonomy whilst respecting ecological limits. Universities have both a legitimacy and a responsibility to lead in this technology transition, and digital bifurcation in this sense is not a retreat from progress but a redefinition of it that centres on sustainability, autonomy and the public good.

[42] RISAM, GIL 2022.

4. A University of Ethical, Contributory, and Inter/Trans-Disciplinary Practice

4.1 Virtue and Solicitude

Stiegler[43] has argued that «*unless we project ourselves* onto another plane – which could only be the *bifurcation of something genuinely new*, as a motive formed by the future in becoming, beyond innovation that changes everything in order that nothing changes», the nature of civilization itself would be threatened, and also that unless we can open up the prospect of a new era including new processes of organic and 'organological solidarity', and new social forms, «the disruptive fulfilment of nihilism is bound to unleash an immense murderous violence». Much of Stiegler's work examined the combination of social, technical, political and economic forces that converge into a demoralising alienation that perpetuates the different kinds of violence and catastrophe emblematic of the Anthropocene, where the Anthropocene and absence of epoch destroy reasons for hope, and can contribute to despair (the loss of reasons for hope)[44]. The thoughtlessness, and malice, inherent in algorithmic governmentality (a significant element of the late-modern *dispositif* and a phenomenon to which universities contribute directly in research and innovation projects) and its preconditional practices of resource exploitation and extraction have unleashed kinds of violence that impact environmental, social, and political sustainability. AI applications across numerous contexts operate with carceral logics and sustain systems of austerity, all the while generating significant carbon footprints, and following from environmentally destructive mineral-extractive industries, simultaneously perpetuating and entrenching the status quo that gives rise to them[45]. Inherent in the political economy of production and consumption and the concomitant outgrowth of algorithmic governmentality and the totalisation of the 'we' into the 'they', or the herd, as they fall into the calculative order, is the destruction or liquidation of what Stiegler[46] calls «primordial narcissism», the capacity for self-love which, although it can become pathological, is needed to eventually

[43] STIEGLER 2019, pp 191, 221.
[44] STIEGLER 2019.
[45] HAYES, VAN DE POEL, STEEN 2020; CRAWFORD 2022; MCQUILLAN 2022.
[46] STIEGLER 2009.

project love to the other, but thrives in singularity and in its absence gives rise to transgression. Dominant industrial and commercial processes then disrupt the capacity to care about oneself, the other, and the planet – and such processes typically find support in the university system with an all too myopic regard for the ethical impacts of 'digital innovations'. The liquidation of primordial narcissism as a liquidation of an intrinsic process of care represents an impediment then to the construction of the ethical self – one who aims at, as per Paul Ricoeur's triadic structure of the ethical intention: the good life, with and for others, in just institutions[47].

The hegemonic late-modern *dispositif* (of production and consumption), itself reproduced and endorsed in contemporary academic cultures, is sustained by and motivates development of digital technologies and artificial intelligence systems that are deployed in securing that *dispositif* through algorithmic governmentality, however they are *pharmaka*, and the possibility (and responsibility) remains of gaining and using knowledge such that *pharmaka* are beneficial rather than detrimental to existence, and are «beneficial through […][their] existence to the universe of living things in totality»[48]. Stiegler took an interest in moral philosophy and its own pharmacological role in countering the nihilist and demoralising trajectory we are on, with it being an important element of a critique of political economy. Moreover, Stiegler took an interest in virtues as he recognised their potential to protect singularity, and of course it is in protecting singularity that we can ultimately protect care and allow it to flourish[49].

When we talk about using knowledge for ensuring beneficial *pharmaka*, we can more specifically speak of the ethics of technology as a discipline in creating and using knowledge for the ethical design and deployment of digital technologies as *pharmaka*. The imperative of responsible research and innovation is well inscribed (at least in lip service) within the European innovation environment and promotes conscientious and reflexive development, deployment and implementation of sustainable and ethical technologies, yet arguably the overarching thrust of this framework is one that pursues the question of an ethical capitalism, rather than a more radical framework of intense critique of socio-technical systems, and instead looks upon ethics and morality

[47] RICOEUR 1994.
[48] STIEGLER 2019, p 228.
[49] STIEGLER 2019.

as supplying the tools for 'hotfixes' of ethical problems with technology. There are distinctively problematic elements to mainstream ethical theories that are both taught in universities and form the basis of ethical research practice in universities, and which variously underpin international institutional frameworks for the ethics of technology or the practice of responsible innovation.

Firstly, there is utilitarianism or consequentialism which posit that an action is permissible to the extent that its direct positive impacts are not outweighed by its negative impacts (or in the former case, the ethical action is the one which creates the most happiness for the greatest number of people). This is problematic as it reduces complex moral phenomena to the calculative order and serves the immediate impetus of capitalism as deployed in cost-benefit analyses, being myopic to the extent that it may prioritise immediate benefits and satisfaction over long-term sustainability – not to mention this theory prioritising the needs of the many over persons' and groups' more singular needs[50].

Secondly, there is deontology, which focuses on adherence to duties or moral norms and arguably forms the basis of the kind of AI ethics principlism that has rapidly proliferated in recent years, exemplified in the European case by the *High Level Expert Group's Guidelines for Trustworthy AI* (2019). Such an approach forms the foundation of many ethical guidelines and codes of ethics that prescribe duties. Such principles and approaches invoke the alarm of ethics washing, and moreover they have been argued to be too abstract to be applicable to particular cases – they are totalising and ignore singularity, thereby falling into the other dangers of modernity[51]. Stiegler[52] himself may have categorised this type of morality, in its worst manifestation, as a bourgeois one, being a symptom of nihilism itself, focusing on uncritical adherence to dogma.

In our work we have been exploring the contribution of *eudaimonistic*, or virtue, ethics to the ethics of technology, with a particular focus on contemporary iterations of Paul Ricoeur's «little ethics», one which proposes a kind of tripartite ethics of the self who cultivates the ethical self in pursuit of the good life; with and for others in collective practices engaged in towards the

[50] HAYES, FITZPATRICK, FERRÁNDEZ 2025.
[51] WAGNER 2018; BIETTI 2021; MUNN 2022.
[52] STIEGLER 2019.

end (and living) of the good life; moderated by the moral norm; and in just institutions, that is, under civil and legal institutions that arbitrate between competing claims (that is, the ethical intention of aiming at the good life, with and for others, in just institutions). Such an ethics of technology is vital both at the level of the university curriculum and in its approach to responsible innovation in research projects.

Virtues are intrinsic to our social practices, which each pursue internal goods consistent with our visions of the good life. They may be defined as: «[…] fixed traits of character or mind that involve dispositions to think, feel and act in particular ways appropriate to various circumstances, and where a person of practical wisdom (*phronimoi and phronesis*) recognises the particular morally salient features of different situations, and recognises the correct virtues applicable to different situations and thereby ways to think, feel, and act called for by them. Such traits of character are acquired from habit and are required in pursuing our ends in the course of our functions, the ultimate good (flourishing, *eudaimonia*, or the good life)»[53].

The theory of «little ethics» leaves a place for deontology in the form of the moral norm, or rules, which act as constraints to the ethical aim, however the moral norm remains subordinate to the ethical aim and ultimately *phronetic* deliberation. Ricoeur acknowledges the importance of the rule, but that it must be responsive to the particularities of a given context and the judgement of the virtuous, *phronetic*, agent. A significant element of this yielding of the norm is solicitude, something which we have ourselves considered a virtue, which can be elucidated as, drawing from Ricoeur and Martha Nussbaum[54]: «1) the skilful other-regarding extension to others with whom we bear some potentially asymmetrical relation into our circle of concern, 2) a keen desire to understand their needs supported by empathy and inclusion, and 3) the will and capability to act upon those needs compassionately to relieve their suffering or any foreseeable suffering they may endure. Solicitude is an openness to the other, a recognition of the import of their well-being to one's own projects and goals, and is as a rich affective state and mode of caring»[55].

[53] HAYES, FITZPATRICK, FERRÁNDEZ 2025, p 1222.
[54] RICOEUR, NUSSBAUM 2003.
[55] HAYES, FITZPATRICK 2024, p 138.

The addition of affective content in the virtues and «little ethics» marks an important distinction from other theories, embracing excluded human capabilities (*feeling* as such) and acknowledging their important role in moral judgment; the emotions, and moreover solicitude, draw one's attention to the morally important features of different contexts[56], and allow one in turn to modulate their actions appropriately to respond to the particularities of varying contexts which cannot be captured within abstract principles. The kernel of empathy in solicitude allows one to see what is important to others, and to draw that into their own scheme of goals and ends as things that are important in their lives, to incorporate the pre-requisites for the good life as experienced or envisioned by the other into one's own vision of the good life. Solicitude can promote seeing the value in the relation between individual and their environment and its constituents (animal and plant life, and so forth), and hopefully one's solicitude as care can evolve to include the other-than-human directly within their circle of concern, not only as instrumental for the good life, but as ends in themselves whose relative flourishing is an imperative.

The recognition of affect in this theory, and contemplation on the good life and the self as one who interprets themselves as an ethical self by their actions, promotes a cultivation of the self (and self-esteem) that supports 'primordial narcissism' before encouraging its projection of love to the other, whilst encouraging the recognition of both singularity and sameness and collective need. The contemplation on the good life it encourages counters the hopeless despair of the future about which Stiegler warns. Moreover, when considering the design and development of technologies and technical practice through the lens of this 'little ethics' and the virtues, the question can now shift from 'hotfixing' technologies to perform ethically, to instead more seriously asking whether certain technologies are necessary at all, and whether they should be resisted because of the inevitable social and environmental harm they can cause. A *phronimoi* exhibiting advanced courage and solicitude will more likely respond to such difficult questions in a meaningful way than one who adheres to simple principles with mindless morality. Solicitude can be an answer to the thoughtless malice that embeds itself in and perpetuates itself through our contemporary socio-technical (and AI) systems and can help us search better for innovations that serve humanity and the planet.

[56] ROESER 2011.

Here we do not propose that virtue ethics or «little ethics» are a radical departure or bifurcation from university curricula, but insist that their general inclusion in third level programmes and policies (i.e., both in curricula and research and innovation practice), especially engineering, will provide learners with the intellectual and conceptual tools, and inspiration, they need to reflect on for themselves, and with others, new points of bifurcation for sustainable and ethical innovation.

4.2 Inter- and Transdisciplinarity

A basic requirement for the development of the university system's societal bifurcation capacities towards sustainable knowledge is 'inter and transdisciplinarity'[57].

This still holds, although inter and transdisciplinarity have lost their critical momentum and their original spirit. They have been reduced to a trendy, tame, and toothless notions[58]. The terms are omnipresent in science, technology, and economy as well as in society and higher education – fuelling the rhetoric of knowledge politics in our late-modern knowledge societies. Since Erich Jantsch[59] introduced the umbrella term to a larger audience in the early 1970s, 'interdisciplinarity' has experienced an impressive rise in recognition. It is attributed to a plethora of research, innovation, or education programs. A highly esteemed initiative of the National Science Foundation regards the development of 'Converging Technologies' – namely nanotechnology, biotechnology, information technology, and cognitive science (NBIC) – as being necessarily interdisciplinary[60]. Interdisciplinarity serves as a fashionable label for innovation programs, for economics, for business and management studies, for military research, or for institutional programmatic strategies.

But that is not the whole story. On the other hand, the university system is still dominated by disciplinary silos, career paths and authorities. Here, our visionary concept of 'building higher educational capacities for societal bifurcations' can be understood as a reference to the pioneering work of Jantsch.

[57] SCHMIDT 2022.
[58] FRODEMAN 2014; SCHMIDT 2022, 2024.
[59] JANTSCH 1970, 1972.
[60] ROCO, BAINBRIDGE 2003.

According to Jantsch[61], 'inter and transdisciplinarity' are the key notions for «renew[ing] the [higher] education and innovation system». For Jantsch, there is an obvious need for a renewal. He observes «degrading side-effects of technology on the systems of human life», particularly on the «natural environment». Moreover, «there does not seem to be any alternative if a rational, one might even say, an ecological approach to science and technology is mandatory, as indeed it has to be so considered in the present situation». What is strongly required, Jantsch states, is a different way of shaping and designing the «joint systems of society and technology»[62]. In this vein, Jantsch argues for a new agenda and a different orientation of higher education, science and society, an orientation that, today, is frequently labelled with the umbrella term «sustainable development»[63]. Recognising deficits in the academy, the university system and their research practices, Jantsch sees 'inter and transdisciplinarity' as a lever and a momentum for the self-renewal of the academic system[64]. Our concept 'building higher educational capacities for societal bifurcations', proposed here, concurs with Jantsch's intention, but puts more emphasis on recent developments. And it is in line with Robert Frodeman's fundamental approach, namely that 'sustainable knowledge' needs a critical orientation of 'inter and trans disciplinarity'[65].

Now, in contrast to the term's ubiquitous usage today, the original idea(l) of interdisciplinarity was more distinctive and richer in content when Jantsch first used it[66]. Interdisciplinarity was intertwined with concerns about the environment and loss of biodiversity; it was interlinked with an in-depth consideration of the 'human-nature' relations and with the predominantly scientific view of nature and the environment; it was interlaced with a call for the university system to take responsibility and accountability for society at large; and it was interwoven with the recognition of the inherent ambivalence of the university system, including science and technology throughout the emerging knowledge societies: Scientific knowledge is a doubled-edged sword. Science has contributed to inducing the environmental crisis, on the one hand, but at

[61] JANTSCH 1972, p 107.
[62] JANTSCH 1972, p 119.
[63] WORLD COMMISSION on ENVIRONMENT, DEVELOPMENT 1987.
[64] JANTSCH 1972.
[65] FRODEMAN 2014.
[66] SCHMIDT 2022.

the same time it is deemed key to finding possible solutions. The ecological crisis is, in fact, a cultural and societal crisis.

The cultural background of the crisis, characterised by disciplinary blindness to the complex human-society-nature relations, has been seen as intricately intertwined with the sciences and the academy[67]. In this vein, John Ziman[68] raises doubts about whether disciplinary «knowing everything about nothing» is a reliable basis for shaping the future of our knowledge societies: Interdisciplinarity is the response to the overspecialisation of the academy and to the isolated silos created by disciplinary methods, languages, and frameworks.

In our view, 'inter and transdisciplinarity' is a rich concept that should not just limited to the following three traditional types:

- First, object-oriented or ontology of interdisciplinarity can be defined in terms of objects, entities or structures of reality such as the human brain, the evolution of the earth, the ozone hole, the cosmos, nanoparticles, nuclear power plants, personal computers, skyscrapers, water supply systems or military infrastructures. When it comes to this kind of interdisciplinarity, the basic assumption is that the historical, functional differentiation of the academic world into institutionalised disciplines is not contingent. Rather, the differentiation mirrors and represents aspects of the nature of the things and entities themselves. Interdisciplinary objects are deemed to be located within or built into the deep structure of reality. Edmund Husserl, Nicolai Hartmann, Alfred North Whitehead and others argue for a structural layered understanding of reality, according to which interdisciplinary objects were to be seen located at the boundaries between different 'micro', 'meso', 'macro' and other cosms, i.e., on, at or in the border zones between the disciplines. When advocating for the position of object-oriented interdisciplinarity, one must presuppose an ontological realism or at least a 'real constructivism' concerning objects, interlaced with a layered concept of reality on this basis, an ontological non-reductionism. Old and ongoing philosophical issues about ontological monism, dualism and pluralism emerge in this debate. Interdisciplinarity according to this view is not primarily concerned with knowledge, methods or research goals, but above all with a reality that is assumed to be independent of humans. A minimal realist view is involved.

[67] FRODEMAN 2014.
[68] JOHN ZIMAN 2000.

- Second, the knowledge and theory-oriented type of interdisciplinarity emphasises epistemological aspects as its central criterion. The underlying motive for this kind of interdisciplinarity is intertwined with the traditional epistemic values of truth, explanation and intersubjectively justified belief. The focus lies on knowledge, propositions, theories, models and concepts – and not primarily on objects or methods. The crucial question in this case: How can we demarcate interdisciplinary knowledge from disciplinary knowledge or from non-scientific knowledge? How should we specify interdisciplinary theories, models, laws, descriptions and explanations? Do these provide a specific conceptual understanding of the objects under consideration? Interdisciplinary theories or concepts can be applied to describe very different disciplinary objects. According to this understanding, an interdisciplinary theory highlights structural similarities among the properties of objects from different disciplines. Systems theory is one of the most prominent examples of an interdisciplinary theory, as is cybernetics and, to a certain extent, some variants of the theory of evolution. Furthermore, strong arguments have been put forward over the last fifty years claiming that, on a deeper level, we are witnessing the emergence of novel interdisciplinary theories – specifically self-organisation theories – which provide an evolutionary, dynamic, self-organising understanding of the entire world.
- Third, the mainstream approach to interdisciplinarity recognises interdisciplinarity from a methodological angle and primarily regards it as a challenge to scientific methodology and to ways of collaboration. Interdisciplinarity appears as a method. In other words, a method-oriented type of interdisciplinarity can be identified. Methodology generally refers to knowledge production, the research process, rule-based actions of scientists, procedures of inquiry, and the languages used therein. In methodology, the main issue is how, and by which rules and procedures, we obtain knowledge and insight. This procedural understanding of the sciences – science as research – is sometimes called «context of discovery» or the «research form» of science to distinguish it from the context of justification, which refers to knowledge, theories or propositions. Rough, classical categorisations distinguish between empirical and hermeneutic, nomothetic and ideographic methods as well as, more generally, between the methods of the natural sciences and those of the humanities or between explanation and understanding. Interdisciplinary methods appear to be irreducible to disciplinary ones. Outstanding prospects

are ascribed to interdisciplinary methods that facilitate the transfer of knowledge between disciplines and to those that combine descriptive, normative and abductive methods of reasoning beyond disciplinary havens. In addition, some scholars see interdisciplinarity (and its cognate transdisciplinarity) as a method to bridge the gap between the academic system and society – in other words, methods are interdisciplinary when they enable, facilitate and foster knowledge production between the academy and society in one way or another. Most recently, AI methods used in the natural, engineering and social sciences as well as in the humanities appear as a form of method-oriented interdisciplinarity.

The list above, in particular the three types, is not fully satisfactory. These types overlook the starting points and underlying motives – in particular societal problems, issues and goals – of many interdisciplinary research programs and activities. To overcome this deficit, we need to consider a *fourth* perspective that opens up a more fundamental level of reflection. This type of interdisciplinarity is often described as problem-oriented, purpose-driven, issue-focused or – with a slightly different meaning – as transdisciplinary. Compared with the other three types of interdisciplinarity, *problem-oriented interdisciplinarity* views science and research from a more comprehensive and inclusive perspective. Its focus is on societal problems and ethical-relevant issues. It focuses more on the starting points, goals, purposes and motives of interdisciplinary activities in research and education and on the constitutional conditions, in other words, the problem-framing and problem-perception dimensions. Jürgen Habermas[69] draws attention to the guiding interests of the sciences and to the purposes of research processes: the will to achieve a certain knowledge and the intention to know something are the first steps that precede both the context of discovery and the context of justification, i.e., the methods and theories. This dimension of interdisciplinarity – sometimes called transdisciplinarity – stresses the immanent teleological structure in the process of knowledge production. However, the very first step of scientific inquiry is usually judged to be an external contingent factor and, thus, has not attracted the attention of many philosophers of science, although extensive work has been done on problems called «wicked problems»[70]. This lack of reflection turns out to be a deficit in specifying this kind of

[69] HABERMAS 1972.
[70] RITTEL, WEBBER 1973.

interdisciplinarity. Reference to problems seems useful for demarcating interdisciplinarity and disciplinarity. Interdisciplinary problems are somewhat external to disciplines or to sciences: Such problems are primarily societal ones which are mainly due to and defined by society, lay people, politicians, and stakeholders. These problems demand a solution for society as whole. Interdisciplinarity has a functional side in the future development of scientific-technological civilization. Technology assessment (TA) and sustainability research might serve as excellent examples of interdisciplinarity in a specific sense – that of interdisciplinarity regarding 'problem perception' and 'problem solution' grounded in ethical considerations. In the early 1970s, the major reason Erich Jantsch, at an OECD conference, demanded 'interdisciplinarity' was not just an internal academic but also a societal one. The academic university system and the research system in general are accused of being unable to tackle and solve society's pressing 'real-world problems', e.g., problems in warfare with atomic, chemical, or biological weapons; environmental problems such as global warming; the loss of biodiversity; problems of waste in terms of both total amount and contamination; the problems of shrinking natural resources, like energy; problems with water quality, food, and soil; and the 'anthropological problems' of ambivalent attitude towards biomedical progress, the dignity of humankind, death and birth, etc.

To sum up, our plea is for the development of 'societal bifurcation capacities of the university system' that needs to be based on a critical-reflexive mode of problem-oriented interdisciplinarity. By referring to established positions in philosophy, different types of interdisciplinarity can be distinguished: the object-oriented type, the theory-oriented type, the method-oriented type and the problem-oriented type, the last of which can be regarded as an effective subset of what is known as transdisciplinarity. On a more general note, transdisciplinarity opens science to society. The reflection on, and revision of, goals seem to be beyond the scope of their professional expertise as scientists. But some problem-oriented projects include reflections on goals and ends, and explicitly on value and the normative dimension. These are *critical-reflexive* problem-oriented interdisciplinary projects that should guide the university development for a sustainable future of society at large[71].

[71] SCHMIDT 2022, 2024.

4.3 Contributory Research

As we have noted above, the analysis of technics and technologies needs to shift away from a reductionist instrumentalist conceptualisation towards one which takes into account the nature of technics as part of the becoming human. In the context of the university we could argue that in this shift away from a reductionist understanding of technics and technologies there is a need for a more expanded understanding of *techne*, one were the question of education as 'educare' and 'educere' is explored, where the intergenerational care (educare) which Stiegler develops in his two-volume work Taking Care (*Ce qu'on appelle 'Panser'*) is taken into account[72]. In French there is an interesting pun with the verb 'panser', literally 'to dress' as in to dress a wound, to take care of a wound, and the verb 'penser'. Stiegler takes as a starting point Martin Heidegger's lecture «What Calls for Thinking» or «What is Called Thinking» (*Was Heisst Denken?*) and poses the question what do we mean by caring? In the background to taking care of intergenerations is the question of the *pharmakon* or *pharmaka*, (which we have explored elsewhere). In his early works Stiegler explores the *pharmakon* in relation to technics and time, pointing to Derrida's analysis of the *pharmakon* as a negative enterprise. To summarise the question of the *pharmakon* in the original text by Derrida opens with the positive and negative *pharmakon* but never really develops the positive aspects of the *pharmakon* and this aspect of the *pharmakon* as a positive therapeutics is one which Stiegler (2013) will turn from 2012 on with the publication of *De la Pharmacologie du Front National* and *Ce qui fait que la Vie Vaut La peine d'être Vécue* (*Pharmacologie*)[73].

Elsewhere, Fitzpatrick has shown that questions of aesthetics and digital hermeneutics[74] are as also part of the development of therapeutics of the *pharmakon*. But in the question of the university, in this wider context of questions of therapeutics we can situate the development of the concept of contributory research, a concept which is not fully developed in his later works but attempts are made to demonstrate how it could be mobilised to overcome questions related to climate crisis and the questions of human impact on the planet referred to as the era of the Anthropocene.

[72] STIEGLER 2018a, 2018b.
[73] STIEGLER 2013.
[74] FITZPATRICK 2020, 2024.

Contributory research can find some of its roots in a German Green Party founder, Josef Beuys, who put forward the claim that everyone is an artist as a rallying cry against the contemporary art scene of the 1960s[75]. Everyone is an artist can be translated in the context of contributory research as everyone is a researcher. Secondly, in the context of social science research methodologies, contributory research can be positioned in relation to action research, or more precisely participatory action research, where the object of research is defined with the community rather than parachuted into it. This has close parallels with forms of socially engaged art practice, where the outcome or output is not defined in advance but co-constructed with the community as the project evolves. This parallel is important because the question of aesthetics is never far from the surface in Stiegler's approach and the context for some of the original discussions about contributory research was the Work Marathon at the Serpentine Gallery in London in 2018. The term participatory is also problematic and participatory action research did not capture the context of the Anthropocene. The proposition given to the United Nations on the 20th Jan 2020 was to negotiate the negative impacts humans were having on the planet by proposing mechanisms for a NegAnthropocence and the term contribution seems to capture that better[76]. It also enables a distinction between research which is applied and research which is fundamental, contributory research focuses on the community building responses to their issues (climate change) in a local context and contributing to change and to society as a whole. 'Participation' does not have the same connotations.

The conceptualisation of contributory research is, therefore, intrinsically linked to the questions of sustainability or more precisely questions of ecology, ecology of the self (*noesis*), ecology of the other (techo-social imaginaries) and the ecology of the planet. Contributory research has from its initial developments been linked to localised questions of climate collapse. These are the therapeutic potentialities of the *pharmakon*. Contributory research is also linked to questions of the economy, again it is important to distinguish it from questions of the circular economy. Whilst there are similarities, there is a fundamental difference. Contributory economy attempts to valorise capabilities which counteracts loss of knowledge (deproletarianisation) and collective knowledge practices. Another important aspect of contributory

[75] BEUYS, HARLAN 2012; FITZPATRICK *ET AL.* 2021.
[76] FITZPATRICK, MCGARRIGLE 2022.

research is its interdisciplinary or transdisciplinary nature; it brings together various academic fields and territorial actors (such as local government) to develop the neganthropic potentialities of locality. The cited examples include the development of new economic activities the new concepts they require and the development of digital instruments to build new local ecosystems and learning communities. Digital instruments need to enable deliberation and conflict of interpretation where new forms of knowledge building can take place.

Within the context of the University of the 21st Century, the characteristics of contributory research should enable the university to be a place of open-ended enlightenment, where the original project of the enlightenment (Kant), grounded with the questions of counteracting the Anthropogenic processes of climate collapse through localised cosmotechnics. The role of the university is to become a destination where interdisciplinary or transdisciplinary research is accompanied by invention and innovation which develop new forms of economy and new forms of deliberation.

5. The Responsibility of Epistemological Bifurcation

5.1 Bifurcation and Epistemology

In his book *Bifurquer*, Bernard Stiegler together with the Internation Collective, lay the foundations for 'parting ways' with the current techno-capitalist model of extractivism/exploitation exploring alternative digital transition/transformation pathways potentially leading to an economy in sync with our biosphere[77]. Bernard Stiegler's arguments for bifurcation combine an epistemological critique –focused on the relationship between knowledge and technology – with a socio-political and ethical call to transition/transform how innovation and progress are conceived. For Stiegler, the only sustainable and emancipatory path forward is one where technology enables new forms of collective knowledge, participation, and individuation, rather than accelerating entropy and disenfranchisement (current model).

One of the pillars for this bifurcation is a reformulation of the way we work, currently set on a course of full mechanization (algorithmic automation) of

[77] STIEGLER 2021.

not only blue-collar occupations but also those in the knowledge and cultural sectors, including the university. However, for Stiegler there is an aspect of work that can resist automatization and is that of human beings transforming knowledge (epistemology), which contra current trends, is always local, collective and singular. In this sense, to bifurcate entails *savoir-faire*, reformulating knowledge work from the point of view of «craftsmanship»[78], understood as an activity involving a particular notion of care (desire to do a job well for its own sake) along with the capacity for innovation, invention and creation, having the potential to «de-automate automatisms» and to create novel knowledge through «intuitive leaps». These leaps supposing a change of course in the circuits of transindividuation. The appeal to craftsmanship echoes calls for a low-tech approach to technological innovation (and therefore technological education) along with the need for universities to exercise institutional digital sovereignty[79].

In turn, Yuk Hui problematises the very notion of a single technological innovation path and suggests looking beyond cultural variations into the local conditions and contexts in which individuations[80] are produced and reproduced. This problematisation aims to challenge traditional understandings of technology as a universal concept that ignores local differences and affinities. According to Hui[81], the universalist approach renders the concept empty. To bifurcate, we need to challenge the illusion created by the idea/episteme of a universal technology inherited from colonial and Eurocentric models and influenced by modernisation processes that have led different cultures and histories to follow the same path as Western modernity due to technology and globalisation[82]. Hui argues that our current global civilisation, sedimented on the thought of the European Illustration, demands to be taken apart and diversified. Globalisation was a process of technological colonisation and

[78] Building from Richard Sennet that used the concept 'craftsmanship' to go beyond Hannah Arendt's distinction between *homo faber* and *animal laborans.* For more refer to SENNETT 2009; ARENDT 2018.
[79] NAGLE 2022; BANDURA, MCLEAN, SULTAN 2023; TANGUY, CARRIÈRE, LAFOREST 2023.
[80] For Yuk Hui individuation addresses how entities manifest themselves ontologically. Hui employs this concept to analyse digital objects and technological systems beyond mere formal structure, integrating Simondon's ideas with Heidegger and Bachelard for a broader relational method. For more see, HUI 2016.
[81] HUI 2016, p 74.
[82] TORIBIO-ROURA 2024.

synchronisation that made different historical temporalities converge in the sequence: Premodernity-Modernity-Postmodernity-Apocalypse. The issue that this mono-technical episteme entails is that it favours specific forms of knowledge linked to the desire for domination – with devastating consequences for the planet[83]. This epistemic monoculture privileges [a few] humans in detriment of everything else – i.e., 'lesser- humans' and 'other-than-humans' – to the transhumanist fantasy of the 'Homo Deus' as stated by Yuk Hui[84].

5.2 Capitalism as *Epistēmē*

For Stiegler, the way capitalism has evolved confirms and goes beyond Marx's *Grundisse* thesis regarding automation[85], and the evolution of the economic function of knowledge in tune with transformations of value expressed in the informational and computational landscape that characterises today's fixed capital. «Capitalism amounts to an *epistēmē*, materialized by the fixed capital of the reticulated apparatus of production that capital has become»[86]. This *epistēmē* hegemonically shapes and integrates different instruments of calculation (e.g. statistics, marketing, production, 'quantified self' etc.), literally transforming psychic and social life into market calculations. What Stiegler means by capitalism as *epistēmē* is that capitalism is not simply an economic system but a 'dominant form of knowledge'. In this sense, it constitutes a framework that organises, produces and legitimates what counts as knowledge, value and truth in society. These include shaping not only scientific thought but also the very foundations of society, culture, and technology.

Stiegler's argument is that capitalism has merged with the technologies of information, communication, and automation in what he calls «fixed

[83] HUI 2020; TORIBIO-ROURA 2024.

[84] HUI 2020.

[85] Depending on the socio-political structures within it was deployed, automation could either liberate humanity or exacerbate its divisions and sufferings. In the *Grundrisse*, Marx describes the increasing redundancy of human labour in the face of automated systems. For more, MARX 1993.

[86] STIEGLER 2018c, p 139. *Epistēmē* (Greek) is often translated as 'Knowledge' and/or 'Understanding'. In this context, my interpretation is that Stiegler refers also to the underlying conditions of knowledge within a specific historical context that constitute the framework of the dominant knowledge (or 'truth') for that period.

capital»[87], becoming through computational networks, big data, statistics and ubiquitous digital platforms. These systems determine what has value from economic value to social attention, to academic performance. In this scenario, knowledge production is homogenised. In other words, by imposing a massive computational logic, the capitalist *epistēmē* turns calculation into the dominant mode of knowledge production and validation (e.g. modelling, simulation, quantitative data etc.). While qualitative, ambiguous, or non-quantifiable knowledge is systematically discarded as irrelevant[88]. As computational capitalism progresses, human knowledge, skills and memory are 'externalised' into machines (what he calls 'tertiary retentions') leading to a process of proletarianization in which workers and consumers lose agency, creativity and purpose as knowledge becomes the calculable and commodified resource controlled by capital[89]. As a consequence, there is a crisis of meaning and care of entropic dimensions that calls for a bifurcation towards alternative systems where technology enables new forms of collective knowledge, participation, and individuation.

5.3 The Epistemology of Value

In a similar vein, economist Mariana Mazzucato[90] challenges the foundational assumptions of mainstream capitalist economics regarding the epistemology of 'value' (and who gets to define it). Mazzucato argues that modern capitalism has systematically blurred the line between creating value and extracting it and calls for reclaiming 'value' as a vital public and political question. Activities that generate real social and economic wealth like production, innovation, or care work are often undervalued, while value extraction for profit (e.g. through financial speculation, rent-seeking, and monopolies) is disproportionately rewarded.

Mazzucato contends that the prevailing economic system has lost track of what value means, prioritising profits for shareholders and enabling parasitic behaviours generating income not through production but by controlling access to assets that undermine the productive foundations of society. These

[87] STIEGLER 2018c.
[88] TORIBIO-ROURA, MACDONALD, O' SULLIVAN 2023.
[89] STIEGLER 2016.
[90] MAZZUCATO 2018, 2021.

parasites, whom she calls 'takers', remind us of Yuk Hui's *Homo Deus* previously mentioned, as they extract value without contributing to new goods or services. For example, Big Pharma's astronomical drug pricing for essential medicines, digital platforms acting as toll-keepers to data or markets, and tech companies avoiding taxes, like, for Apple benefiting from Ireland's tax loophole between 1991 and 2014[91].

The problem for Mazzucato is that under the current system, a few get richer through non-productive activities that are mislabelled as valuable only because they generate profits under current accounting frameworks. For example, a public teacher's salary is currently accounted as a cost rather than an investment. At the same time, hedge fund profits are considered economic growth, even if they generate no net societal benefit. Mazzucato emphasises the critical role of the public sector in co-creating value for innovation. Contrary to the myth that the public sector is bureaucratic (well, there is some truth there) and passive, she shows how public investment grants (e.g. EU funding), have historically driven key innovations (e.g. the Internet, GPS, biotech). To 'fix' capitalism Mazzucato calls for a redefinition of value recognising which activities truly generate wealth and which reallocate or destroy it. By revisiting the epistemological foundations of the economic debates about value, Mazzucato urges for a transformation (one can presume a bifurcation) to a system that is more (actually) productive, sustainable, and fair, challenging us to build an economy that (actually) serves society (not only a few 'takers'). She calls for re-writing economic narratives, much like Stiegler and Hui, reintroducing the public debate on what kind of economy/technology/society we want. The economy should bifurcate from technocratic optimisation to deliberation around values, purpose and social outcome.

To achieve this, she proposes a series of key changes in perspective regarding how value is accounted for. For example, she calls for a shift in GDP economic indicators to reflect actual social contribution (rather than only market profit per se) and this means paying attention to undervalued sectors such as education, care, research, and infrastructure that generate long-term value but remain systematically underfunded.

Much in line with Bernard Stiegler's proposal for a contributory economy achieved through collective intelligence, another critical aspect in Mazzucato's argument, is enabling mission-oriented investments in innovation

[91] GLUCROFT 2024.

(Moonshot projects). For example, in the case of digital transformation universities and civil society could drive innovation rather than reacting to/fixing what tech companies do. She advocates for public-private partnerships with a common purpose: responding to the wicked problems of our time. Mazzucato stresses that these partnerships involve bold long-term vision, along with shared risks but also shared rewards[92]. Some may interpret this bifurcation as interventionism, but it is rather about reimagining market narratives to enable demand for responsible innovation for the common good. Another key point in Mazzucato's thesis, is the reform of the tax system to redistribute excess returns from rent-seeking activities and reallocate wealth toward public goods and responsible innovation[93].

5.4 Knowledge makers: Universities bounded

If education is nothing more than a human science or the achievement of satisfactory outcomes by way of testing, then education has no future. Education is the manufacture of docile subjects and (as Bernard Stiegler has argued) it will do little more than short-circuit attention. Stiegler does, however, point out that education's power to orient bodies beyond themselves toward a complex future necessarily on the same technologies that contract and disorient individuals, reducing them to nothing more than captivation by already actualised forms. Education is at once necessary to bring forth a future distinct from what we already are, and yet that orientation toward a world of relations that is not oneself comes with the essential risk of stupidity[94].

Once upon a time, the mission of the university was to generate innovative knowledge and foster virtues, collegiality, and creativity by providing a space for critical thinking, debate, dissent, and academic innovation (or at least one would like to think so). This initial focus, under the influence of neoliberalism, have been gradually shifting towards a university more concerned with efficiency and budgetary surpluses, either by choice or out of necessity. Leading to a focus on short-term financial objectives and managerialism rather than long-term investments in research and education[95]. What is evident is

[92] MAZZUCATO 2021.
[93] MAZZUCATO 2018.
[94] COLEBROOK 2017, p 649.
[95] ALEXIOU, SARIDAKIS 2025.

that the conception of education is today bound up with a perverse relation between knowledge and power that increasingly allows governance to become merely managerial. As a consequence, there have been significant changes in the university. For example, reductions of funding for projects deemed less profitable, decrease in the recruitment and retention of academic staff compared to the expansion of managerial (permanent) positions, implementation of hard-core management practices such as performance control (e.g. KPI's), increase in tuition fees, particularly for postgrad courses and international students and so on. In addition, there is a marked tendency to outsource services that could be done in-house for example, maintenance or consultancy[96].

In his influential book «Design for the Real World» Victor Papanek sharply criticised the roles of designers, engineers and architects in shaping a certain model of world that «screwed» the environment[97]. With this work, Papanek foregrounded social and ecological responsibility as core principles in these professions. One may aspire that these core principles apply to technological innovation and education. Papanek's criticism of consumerism, environmental degradation and resource waste came with the proposal to reorient these professions, particularly design, to serve as political tools to promote sustainability, inclusivity and social justice. In Papanek's vision, designers/engineers should stop making unnecessary products in favour of those that genuinely meet human needs. He was one of the first to insist that design and engineering should serve entire populations not just the wealthy and to champion to use of local materials and methods to address local needs while promoting ecological balance and reducing resource consumption. Five decades later, his rejection of patents, encouragement of open-source solutions and activist stance continue to shape debates on eco-design, universal design, urban agriculture and critical design practices. Many contemporary movements such as inclusive design and the makers movement can trace their roots to the frameworks established by Papanek.

But despite Papanek's presence in European technological Universities' curricula (e.g. TU Delft, Politecnico di Milano, or TU Valencia to name only a few) his influence is hardly felt in the 'real world'. Why doesn't innovation

[96] KAIRUZ *ET AL.* 2016; GRAEBER 2018; MAZZUCATO, COLLINGTON 2023; ALEXIOU, SARIDAKIS 2025.
[97] PAPANEK 1973.

follow Papanek's path? Because contemporary universities tend to prioritize innovation that serves market demands and profitability rather than broader social or ecological concerns, despite numerous sustainability and inclusion (arguably greenwashing) discourses. The 'triple helix' model (university-business-state) often brings together conflicting values where business as usual tends to overshadow public concerns. While Papanek's educational model emphasises freedom, ethics and social responsibility, modern education increasingly aligns with labour-market demands and technical specialisation thereby reducing innovation goals to commercial viability. In addition, capitalist frameworks influence how innovation is funded, often responding to powerful political and economic interests that can sideline ethical considerations in favour of strategic, competitive and for-profit imperatives creating barriers that steer technological innovation towards serving a few rather than the common good[98].

Embracing a free-market ideology in universities may foreseeably or inadvertently undermine practical efforts to advance knowledge towards achieving the United Nations Sustainable Goals. Narrow market-focussed research can hardly contribute to challenging the neoliberal agenda, primarily responsible for the anthropogenic damage to the planet with its extractive practices. Hardly can individualism and fierce competition among universities (rankings), staff, students and academics (performance indicators, marks), facilitate strengthening scientific progress towards a more ethical and sustainable mode of existence.

In the current state of play, universities are forced to navigate situations that threaten their survival and they might see hard-core performance metrics as the only way to achieve institutional market share. However, parting ways with the current system of 'survival of the fittest' as described by Alexiou and Saridakis[99], is a necessity. «There is no alternative» as stressed by Stiegler[100]. Universities should prioritise pedagogy and education in their curricula, (re)claiming their role as the nurturing environments for epistemic diversity, including critical and independent thinking, academic freedom and pluralism, interdisciplinary and transdisciplinary research, and responsible innovation. This would entail a 'Moonshot' approach with long-term vision and purpose.

[98] ALEXIOU, SARIDAKIS 2025.
[99] ALEXIOU, SARIDAKIS 2025.
[100] STIEGLER 2021.

Enabling public-private enterprises (via non-commercial funding) invested in knowledge advancement for the common good in line with the ideas outlined above.

5.5 The Bifurcation Lab

Mazzucato, Stiegler and Hui argue that the prevailing free-market ideology has blurred the line between creating and extracting value, undermining the foundations of society and threatening the very survival of life on the planet. It is time to reclaim 'value' and '*savoir-faire/savoir-vivre'* as vital public and political questions. Universities, schools, as an integral part of society, were once upon a time places of *paideia*, which in Greek is the process of educating humans into well-rounded citizens. *Paideia* is manifested in the Platonic ideal of the 'true human' grounded in his/her *humanitas* and embodied in the community, the very opposite of individualism. In *The Republic*, Plato cautions about the storytellers who dominate the world. Current dominant narratives about technological progress and growth have terrible socio-political and ethical implications and must be challenged. To bifurcate, in epistemological terms, means transforming how we construct knowledge and how innovation and progress are conceived. For example, we could begin by critically challenging current performance metrics in education proposing new indicators more in line with the values of *paideia* and continue by asking questions such as who benefits from the knowledge we produce? This is an arduous task that requires constant questioning and careful consideration at every crossroads. Only then can we lay the foundations for new forking paths to emerge. This is a task of archaeological dimensions but universities, with structures already in place such as the European Culture and Technology Lab+ (ECT Lab+) of the European University of Technology (EUt+), have the capacity to act as true laboratories for bifurcation, if they care to see.

6. Conclusion

In this chapter we have argued that the urgent needed societal bifurcation towards a sustainable future challenges the university and academic knowledge, in particular the structure of the university system and purposes, the organisation and the management of higher education. From a normative perspective, we have shown that the university and higher education institutions should facilitate and foster capacity-building that enables this societal bifurcation. To become institutions for a new culture of sustainable knowledge production, they need to bifurcate and to develop the capabilities of true agents of change. A new spirit, combined with inter- and intragenerative awareness and virtues of 'little ethics' for a new future-oriented culture of being and becoming human in late-modern societies is required. In particular, epistemology which is and has always been interlaced with power, interests and values needs to undergo a bifurcation. At issue is what counts as legitimate/reasonable knowledge and based on this, what counts as a reasonable structure of the economic system and as a reasonable technology/technical system. Critical-reflexive thinking – more specifically: (a) critique of the accelerated global capitalism and the neoliberal concepts and framing of humans, society and nature, of higher education and the commons as well as (b) critique of the market-driven development and dissemination of technologies and technical systems – should be the core objectives and capacities of higher education. Therefore, the university system and higher education institutions can no longer be organised in disciplinary silos but the universities need themselves to become inter- and transdisciplinary institutions and, more specifically, 'bifurcation labs' where the purpose for a sustainable future is at the very centre of the common learning and debating process. The narrow traditional view, «knowing everything from nothing», as John Ziman puts it, might be in accordance with the recent neoliberal governance of universities, the neo-positivist incentive structures and disciplinary career strategies; however, it is not in line with the common future of humans and the earth[101]. The present-day imperative is to develop new visions and strategies, including new knowledge types, epistemologies and 'little' smart technologies for a sustainable societal future. To achieve this, common efforts are necessary, like the *Scientists for Future* argue: We think it's time for a shared agenda for a

[101] JOHN ZIMAN 2000.

university bifurcation in this direction. Beyond the mainstream, the EUt+, in particular the ECT Lab, is going down this pathway and it is on the way to broaden it and to open a roadmap in the direction of our common future.

Our chapter emphasises the various dimensions that technology reveals including the development of 'knowledge' that universities can and must generate, both through research and the dissemination of their findings, as well as the need to reformulate our approach to creating knowledge for the development of responsible technologies. From the perspective of universities, this underscores the significance of bifurcation as an inter- and transdisciplinary imperative for innovation, enabling the selection of more robust paradigms, the design of more efficient and responsible methodologies, and the mitigation of the environmental and ethical risks of the innovations emerging from the university's practices.

The critical inquiries surrounding the strategies employed and their consequences, particularly regarding how to counteract the anthropocentric inclination, necessitate a bifurcation aligned with a global New Deal. This requires individuals to cultivate a 'biospheric' consciousness[102] and to view themselves not as isolated entities but as part of interconnected communities, the university can foster this thinking and care for the other. While change is a natural part of historical evolution, technology can play a crucial role in fostering awareness of change for future generations and promoting a commitment to social justice but the condition of possibility of this is re-founding the university with a more therapeutic pharmacology.

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[102] RIFKIN 2019.

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