

Design Futures; a new educational framework for design education for the 21st Century

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Abstract. Amidst the environmental collapse, it is imperative that academia reflects on how future designers need to unlearn and shift the industrial design mindset to proactively and responsibly design to remediate the present and create more ecological and just futures. The next generation of designers must consider the systemic implications of their creations catalysing a shift in design reflecting ecological and social values into their professional outputs. This paper sets up the contested issues for Design Futures against a background of exponential industrialisation, climate change, de-anthropocentrism and moves towards asking how Design Futures can develop restorative avenues. Here we aim to address the Royal College of Art (RCA) educational challenge of moving away from traditional future design approaches (design fictions, futures visions and speculative design) to transition towards re-futuring. In the paper, we describe a selection of PhD research projects at the RCA which take different trajectories in exploring new practices and approaches to Design Futures. From this point, we will triangulate literatures between contemporary ecological critiques, systems, and contemporary future critiques to underpin the problems and opportunities emerging for design to propose a new academic model for replacing Industrial Design. As distant as these futures are or may be, they are a useful tool to explore unthinkable possibilities, remediate prevalent problems and help us to move towards preferable design practices.

Keywords: design education, responsibility, futures, systems, pedagogy.

1 Introduction

Guided by automation, mechanisation, use of chemicals (among them fossil fuels) and extractivism, Industrial Design emerged from the industrial revolution to advance technological processes resulting in mass produced products and consumer goods. While much progress was made in areas such as healthcare improving the quality of life, saving lives, improving economy and democratising access to information at a global scale, this has also come at the expense of ecological systems resulting in an existential threat to humanity.

Amidst the environmental collapse characterised by human alteration of a broad range of the planet's geological processes [1], it is imperative that academia reflects on

how future designers need to unlearn and shift the industrial design mindset to proactively and responsibly design to remediate the present creating a more ecological and just future. The state of environmental degradation requires a reformulation of the ethos and principles of design. The next generation of designers must consider systems interrelations and catalyse a shift in design reflecting ecological and social values into their professional outputs.

Designers urgently need to acknowledge and remediate the catastrophic implications of the human-centred approach that for several decades has been using indiscriminately natural resources with little or no consideration to more-than-humans (more-than-human approaches include care for other species and abiotic environmental elements). As we move forward, design needs to backpedal on its aggressive, selfish and extractive approach by giving others (animals, plants, abiotic resources) equality of care and status.

In a recent article Emanuele Quinz [2] refers to Tomas Maldonado's [3] urge to avoid the trap that "to overcome the catastrophic consequences of industrialisation, mass production and consumption (and therefore of design), the project and discipline of design should be abandoned". Along these lines, Quinz [2], proposes "design as a survival strategy, as a tactic of coexistence, as a technique of metamorphosis: design as a technology of hope". On hope, Quinz notes Maldonado suggested moderately, "positivity always guarded by a critical spirit". As Quinz emphasises;

if sciences offer us fundamental knowledge for our survival, and philosophy and art offer us equally fundamental doubts, design speaks to us of hope. It is based on hope. And, vice versa, hope is based on design: there is no hope if there is no possibility to act on reality, to transform the environment, to adapt the habitat, to intervene in society - there is no hope. [2]

Quinz identifies in hope a committed approach where critical awareness does not renounce action. In fact, it proposes critical action as a fundamental element for the future of design, and humanity. Similarly, in *Designing in Dark Times: An Arentian Lexicon*, Virginia Tassinari and Eduardo Staszowsky [4] turned Hannah Arendt's political philosophy of theorising a possibility of action where "thinking and action are deeply intertwined" in dark times towards political action-oriented design and the critical need for new beginnings.

Maria Puig de la Bellacasa [5] in *Matters of Care; Speculative Ethics in More Than Human Worlds* proposes futures and critical ethics of care de-centred from humans. de la Bellacasa [5:161] proposes a "naturecultural" notion of care indicating that "care is everything that is done (v/s what we do) to maintain, continue, and repair 'the world' so that all (v/s 'we') can live in it as well as possible". That world includes "all that we seek to interweave in a complex, life-sustaining web" [5: 161].

Designers are facing an opportunity to positively conceptualise restorative and regenerative futures. Aiming for this, new design academic programmes need to integrate futures with reparation, regeneration, accountability, and the ubiquity of fluid cyber-blended and hyper-connected ecologies into a new design paradigm at the intersection of systems design, the natural, social and formal sciences and applied ethics.

This introduction sets up the contested issues for Design Futures against a background of industrialisation, climate change, de-anthropocentrism and moves towards asking how Design Futures can develop restorative and regenerative futures [6]. Here we aim to address the educational challenge that goes beyond traditional design futures approaches (design fictions, futures visions and speculative design among others) and transition towards re-futuring. In *Critical and Speculative Design* [7], one of the fundamental design approach advantages is that it removes a range of constraints typically used in product and commercial design. Yet, it often lacks questioning issues on the systems and feedback loops on which the speculations relied. As much as it can open up alternative design propositions for dialogue, it can lack the influence mechanisms to deliver practice changes.

As a result, many of the proposed outputs end in what future studies expert Jennifer Gidley names ‘Pop Futurism’ (superficial and media-friendly outputs rather than impact driven outputs) [8]. We acknowledge that we need both critique and propositional models. There is currently a tendency of critical movements that highlight issues and generate calls to action, but we also need the enabling methods and knowledge for future transformation to positively tackle design issues. In other words, we transition the function of the critical from an end to a mean.

Transformational processes embodied around the notion of world-making involve this generative interweaving between practices and forms, methodologies and phenomena, doing and knowing, locality, communities and access. In terms of the green transition, design’s higher education in the UK has focused in recent years on sustainability, biomaterials and circularity. As sustainability has been proven to be insufficient, several programmes have recently emerged to focus on regenerative practices, responsible design and Industry 5.0 among others. We believe that the missing pedagogical model at the intersection of world-making, systems, critical studies, ecology, and futures, positions design practice and research as a contested field among researchers and practitioners. In this context we explore thinking around emerging practices and drivers for a new pedagogy of Design Futures.

From this point, we will draw value between contemporary ecological critiques (Decolonial and plural; LO-TEK, Design Dematerialisation; Regenerative Design), systems, and contemporary future critiques (Speculative Design; Co-Speculative design; Prospective Design; Xenodesign) to underpin the problems and opportunities emerging for design to propose a new model for replacing Industrial Design. This process will support a distinctive perspective to build a new design pedagogy which

aims to inform practice-based research projects in which experimentation, reflection, critical practices, impact and analysis are taking place simultaneously. It aims to enhance cross-cultural collaboration by proposing a distinctive model that can be understood across the three domains of thinking [9] by designers, art & humanities, and scientists.

2 Discussion

2.1 Beyond Design Products explorations at the RCA

From its early days the Royal College of Art was focused on creating a distinctive version of the Arts and Crafts philosophy. Throughout the 1930s and '40s the College's Industrial Design department started to form. In the 1960s under the leadership of eminent designer Misha Black the Industrial Design course established itself as a discipline in its own right. During the 1980s and 90s' as a comprehensive programme of cross-college reconstruction, re-equipment and expansion of departments began. This was reflected in the growth of Product Design with internationally renowned design graduates such as Thomas Heatherwick, Tomoko Azumi, Jasper Morrison, Sue Fowler and Ross Lovegrove [10]. In 1997, Ron Arad fused furniture design with Industrial Design to create the Design Products programme to expand design practice covering a wider spectrum of possibilities ranging from engineering to crafts, graduates include Martino Gamper and Assa Ashuach among others.

Amidst social and environmental crises, we have the responsibility to rethink where design is heading. The College is currently embarking on the most significant development in its history offering an opportunity to rethink and frame existing disciplines in new ways while allowing new ones to emerge. RCA authors Fantini van Ditmar, Hall and Galdon at DRS2022 explored the area of *Design Dematerialisation: Opportunities through Reduction* [11].

Design Dematerialisation can be viewed as an act to remove materiality from the world; a shift in focus from static, material things, to a change in behaviour and a reconception of lifestyles. This is a massive pivot from two centuries of cultural and economic norms that encouraged the transformation of the natural world into human commodities and unwanted by-products back into the natural world as pollution. From this research a couple of environmental design initiatives emerged; Deep Products [12, 13], and *Craft*³ [14].

Deep Products [13] builds on practices in which designers are envisioning new typologies of products aiming for instance to extract CO₂ from the environment or creating products from landfill waste. This theoretical proposition addresses the design of products from a life-cycle perspective through contemporary notions of subtraction-by-design. The model presented transitions in design to a model demanding extended projects considering every aspect of the life-cycle of products, from inception to

deployment, while addressing issues of impact and reuse with the characteristic of subtraction-by-design [12, 13, 14].

*Craft*³, on the other hand, aims to reduce ecological impacts and material use, through crafts principles combined with new technologies. Main approaches are reduction, considerate to its surroundings, contexts, non-human, and human species, whilst supporting skills to contextualise within environments for positive benefit. *Craft*³ establishes trans-disciplinary skills nurturing deep knowledge of materials, their cultivation, use, ecological issue(s) and ‘craft practices’ working contextually within environments for ecological remediation [14].

This framework may be followed by emerging future-led design areas e.g., via Deep Products or *Craft*³ (Fig. 1).

DEEP PRODUCTS				
UNIT 1	UNIT 2	UNIT 3	UNIT 4	UNIT 5
SUBTRACTIVE TECHNOLOGIES/PROCESSES	LANDFILL WASTE ACTIVATION	LOGISTIC CHAINS	NEW MATERIALS	TRACEABILITY
CRAFTS ³				
UNIT 1	UNIT 2	UNIT 3	UNIT 4	UNIT 5
CONSTRAINED IMPACT & REGENERATION	MATERIAL SOURCING	LOCAL WISDOM & HYBRID DATA	BIOREGIONAL & SOCIAL IMPACT	MATERIAL AFTERLIFE

Fig. 1. Areas to investigate in Deep Products and *Craft*³

In this context, undisciplined stewardship is introduced as an ethical responsibility principle to enable the creation of such products by building from notions of personal responsibility, alter-plinarity [15], and stewardship.

2.2 The value of systems and contemporary socio-ecological frameworks

As a response to the challenges emerging from dealing with the climate crisis, The Design Council, government’s advisor on design, released the report *Beyond Net Zero: A Systemic Design Approach*. The Design Council [16:27] describes the relevance of systems thinking as “a comprehensive approach that considers not only the individual elements involved in a project but also how these elements interrelate, how the system changes over time, and how it relates to its wider environment”.

In the manifesto of Decolonial Design authors stress “non-western ways of thinking and being, and on the way that class, gender, race, etc. issues are designed today through practices and acts of design, and the (re)design of institutions, design practices and design studies. Our goal is ontological rather than additive change. It is not sufficient for design institutions to simply include a greater diversity of actors or perspectives” [17].

Julia Watson [18] in *Lo-Tek: Design by Radical Indigenism* describes Lo (local)-TEK (Traditional Ecological Knowledge) as a movement that investigates traditional ecological knowledge, and indigenous cultural practices. Watson [18] notes that TEK is highly advanced when it comes to creating systems in symbiosis with the natural world as is a framework “to sustain not to exploit resources, fostering symbiosis between species by making biodiversity the building block used to construct green technologies”. Watson’s approach is based on collaboration and symbiosis with nature.

On the other hand, Regenerative Design is a systems approach towards design based on providing health back to the planet. As Bill Reed [19] notes, “instead of doing less damage to the environment, it is necessary to learn how we can participate with the environment — using the health of ecological systems as a basis for design”. Daniel C. Wahl proposed the Regenerative Cultures framework [20], where regenerative design from a systemic viewpoint, aims to sustain the pattern that joins and strengthens the entire system.

These approaches highlight the relevance of bringing into the curricula a diversity of perspectives/thinkings, traditional ecological knowledge of indigenous practices and embedding the relevance of regeneration as a salutogenic (providing health back) design approach. However, the intricacies of working with systems also present a fundamental challenge for designers. Traditionally, we embodied these issues around the idea of wicked problems. The notion of wicked problems approach was formulated by Horst Rittel in 1970 [21]. As Richard Buchanan notes Rittel sought an alternative to the linear, step-by-step model of the design process [22]. Wicked problems are not ‘solvable’ due to their complex and interconnected nature and often conflicting demands from multiple stakeholders. The output we project will be subjected to contextual forces; economic, social, and environmental, therefore the value of the proposition will be determined a posteriori and will be dependent on these factors. Furthermore, two other variables emerge at the intersection of complexity and contextuality; ambiguity and uncertainty (Fig. 2).

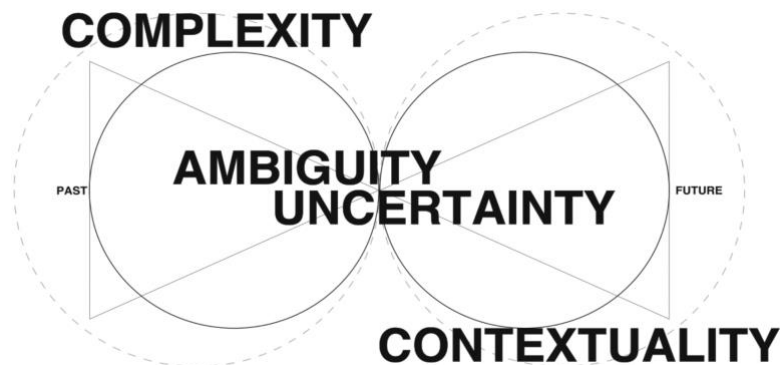


Fig. 2. Four dynamic forces interacting with systems. F. Galdon, 2023

2.3 Design Futures and Relational Thinking at the RCA

Complexity, contextually, ambiguity, uncertainty and their ontological nature need to be translated into an operational design framework to maintain its integrity in design practice and research. The elements of this design framework are; abductivity, prospectivity, contextuality, and probabilism [23]. By introducing the dimension of time (future), we acknowledge that product development only accounts for a fraction of the story. There is another part that can only be known a posteriori, determined by context and the unfolding future levels of exchange, and that knowledge is not complete but transient, therefore open for refutation, and modification. With the introduction of time comes accountability (the executed past), and responsibility (the constructed future). If we believe that design has unlimited capacity for change, then it follows, we have infinite responsibility and accountability for changes in an ongoing futuring.

In the past, our core research practices were enclosed in workshops and studios. They have now been liberated into the real world and ecosystem via the evolution of design towards transformational future impact. **In this context, our practices have expanded beyond the artefact to integrate with other thinking domains and cultures.** In this process our expertise has shifted towards distinctiveness and a culture aiming to lead responsible practices and cross domain collaborations. Design research and practice is directional and transformational at its core, and the prospective preliminary nature of our abductively led knowledge for future transformation leads the manner in which we approach design research and practice.

The origin of the word design *designare* implies a future element: projection and “to make, shape”. Future is one integral element followed by the active meaning of the word. As Glanville [24:3] points out, design can be used as a noun and a verb. By combining our understanding, the problems and injustices of the past and the present, with our projective and future-led imagination deep-rooted with a sense of responsibility for others, the planet and non-humans, design has the potential to positively impact tomorrow’s world. Design has a long trajectory engaging with designing in future scenarios as a method to envision and speculate alternative futures. **Design is about actively and critically creating futures. This opens up endless possibilities for designers.**

When speaking about the future it is important to address that designers have different backgrounds and come from different cultures and therefore diverse positions in how they understand the problems and how they envision going forward. This diversity of perspectives allows a variety of questions, responses and propositions to respond to unknown complex scenarios. Here diversity and plurality of visions are crucial elements of futures. In the era of climate emergency design needs several visions and approaches at different scales from a variety of angles. In Pluriversal Politic, Arturo Escobar [25] stresses the relevance of the pluriverse described as “a world consisting of many worlds, each with its own ontological and epistemic grounding”. Escobar [25]

notes that the resulting politics of a diverse set of possible futures has the potential to address the deep social transformations needed for the environmental emergency. Alex Wilke in *Speculative Research: The Lure of Possible Future* [26] addresses the need to bring heterogeneous actors and a plurality of actions when engaging with futures. Responding to the current crisis in future making characterised by “calculative logics and rationalities”, Wilke stresses the need for alternative approaches (non-hegemonic futures) demanding “new habits and practices of attention, invention, and experimentation”.

Within futures and design, design theorist Anthony Fry proposes the notion of *defuturing* [27]. In *Defuturing: A New Design Philosophy*, Fry suggests that in the creative process of designing, designers should consider what is being defutured (as the negation of *other* futures). This critical methodological approach designers project the consequences of their project in the future, and design back from that future to the present. In the area of future studies in design a plethora of new methodologies have emerged by offering new avenues going beyond the limitations of Speculative/Critical Design such as Transition Design [28], Co-speculative Design [29], Xenodesign [30] or Prospective Design [31]. The Future allows designers to go beyond what exists and focus on re-conceived human beings who understand the relevance of caring for other humans and non-humans. Futures reflects on science, culture, politics, technology, morality, society, dreams and hopes. Future scenarios require critical, creative imagination: how can the future be radically different? How to reshape systems to avoid challenges society is facing today e.g., environmental collapse, inequality, AI biases? This requires a motivation to act responsibly and re-conceptualise materiality, or social/political systems towards radical new grounds, ethical questioning aimed at more desirable futures and bringing critical thinking into action. As distant as these futures are or may be, they are a useful tool to explore unthinkable possibilities, remediate prevalent problems and help us to move towards preferable design grounds.

In creating futures in a severe discouraging crisis, critically acting with an element of hope and delight (*venustas*) is essential. Glanville [32] in *A (Cybernetic) Musing: Design and Cybernetics* reinforces the central act of design research as the reflective conversation which brings “empowerment, coupled with an insistence on the value of delight” – delight as presented in Vitruvius. Glanville [32] suggests that delight has historically been seen as superfluous, being particularly apparent in Engineering Design. Instead, Glanville’s [32] constructivist and circular approach results in the conception that designers not only think straightforwardly: “functional requirements should be satisfied, the outcome should be fit for purpose, and well-enough constructed”. Glanville [32] describes what makes design special and what leads to a unique outcome is that designers:

1. Construct his/her own meaning and value (therefore, bringing responsibility);
2. Develop and amplify ideas, make the new from differences in meanings—when difference in expression is welcomed, not hidden;
3. Implicit in conversation (and thus design) are many ethical qualities.

2.4 Futures on Doctorate level at the RCA

Futures in design have matured as a field in the last decade. Here we describe a selection of research projects at the RCA which take different trajectories in exploring new practices and approaches to design futures.

‘SMART’

‘The IdIoT’ by Delfina Fantini van Ditmar (2016) [33]

Fantini van Ditmar’s PhD was centred on critical second-order cybernetics futures. Her research explored how complex, lived, human experience is represented within the quantified approaches inherent in the current notions of ‘smart’ technology derived from Artificial Intelligence (AI). This experience is characterised in the thesis as the ‘Algorithmic Paradigm’. The research outcome highlights the importance of developing a critical approach towards prevalent algorithmic dynamics of our surroundings, addresses the relevance of embedding the observer and questions the embedded epistemologies in Internet of Things (IoT) technology. As part of her methodological approach, in order to question what we mean by ‘smart’ interactions Delfina situated herself in the position of the algorithm and opened up an expanded discussion on what intelligence means when seen as relational v/s a deterministic vision or commodity stored in a computer.

Designing With Others

Co-speculative design by Julia Lohmann (2018) [29]

Lohmann’s PhD resulted in the creation of the Department of Seaweed (DoS), as a community of practice (CoP) it is centred around the development of seaweed as a material for making. Lohmann also developed a framework on how to co-develop and co-speculate design outcomes leading to new futures by working with natural resources. Lohmann proposed a new method for co-speculative design that integrates open-ended material exploration and systems-level speculation through participatory public critical practice. The outlook of the design thus shifts from critical speculation towards design for transition, set against the challenges of the 21st century and beyond. In 2020 Julia was invited to install The Department of Seaweed (DoS) entitled *Hidaka Ohmu* at the World Economic Forum’s (WEF) Annual Meeting in Davos. The installation encouraged participants to get closer to lifeforms and highlighted the need to put the needs of other species at the centre of decisions [34]. Lohmann also called for new ways of working, arguing the relevance of designing as another form of dialogue with world leaders [34].

Multi-Perspective Design for the 'Other'
Xenodesign: towards transversal engagement in design by Johanna Schmeer (2021) [30]

Schmeer's Ph.D aimed to develop design and engagement approaches that allow new, collaboratively developed posthuman imaginaries to emerge. In *Arguing for the development of more inclusive, multi-perspective design practices* Schmeer [28] defines Xenodesign as, “an approach guided by principles and theories from speculative design as well as from *xeno* discourses and speculative realism, which are characterised by an engagement with experiences and perspectives beyond the human and an understanding of all entities on an equal level — humans, ecologies, bacteria, air, soil, artificial intelligences, etc”. The research emerges from within traditional critical-speculative practices to directly address multispecies and ‘other’ actors leading to new avenues for addressing pressing global design issues.

Prospective Design
Designing trust; Evolving models and frameworks towards prospective design futures By Fernando Galdon (2021) [31]

In this thesis, the author proposes Prospective Design (PrD) as a future-led mixed methodology to mitigate unintended consequences in the context of Highly Automated Systems (HAS). This framework combines systems analysis with extrapolations and constructivist perspectives to reconcile confronted models of designing futures. It does so by exploring the context of the future development of virtual assistants (VAs). Although VAs are still in their infancy, they are expected to dominate digital interactions between humans and systems in the coming years. Investigating the prospective developments of this type of interaction device reveals the particular challenges of highly automated interactions for scholarly research. In this context, the intersection between the key issues of automation and accountability acts as a focal point.

Prospective design incorporates methods such as trajectories, probabilistic extrapolations, asymmetries, consequential analysis, and counter-fictions to design novel strategies to mitigate the unintended consequences of digital and prospective technological developments. In this process, Galdon suggests the need to develop ethical frameworks in design to address the main requirements for design in our exponential technological age; preparedness, readiness, and appropriateness.

3 Design Curriculum: Building a futures framework for the RCA

From an historical perspective, the RCA has been evolving its curriculum and understanding of what design does. We can structure this evolution in three generations. The first generation is the Misha Black post-war industrial design emergence and Bruce Archer's design thinking providing 'service to industry'. In this era Archer struggled to integrate time into an operational framework [35, 36], and systems and sustainability were generally absent on the taught educational curriculum.

This was followed by a second generation in which Frayling proposed researching *for, into, and through* art & design [37]. While Arad and Bootje were part of the practitioner-led academic model exploring new boundaries of design practice, design duo Dunne and Raby deliberately developed a non-industrial form of design via Critical and Speculative Design. This body of work was also developed through James Auger thesis 'Why Robot' [38].

From the middle of the second decade of the new millennium we have the current generation. In this generation researchers such as Delfina Fantini van Ditmar, Fernando Galdon (authors), Johanna Schemeer and Julia Lohmann, who all work in a space that deals with critical enactment of Design Futures. They all recognise others in the action research and all in one way or another recognise practices as impact-driven and future-led. This generation has become interested in systems and ecology through the integration of systems thinking into their research and including *others* as serious participants and collaborators in design led futuring. At the heart of the RCA programmes is a transdisciplinary approach in relation to many fields, allowing a variety of sets of responses at various scales e.g., new material and communities. This positions design practice and research as an integrative field creating opportunities for the wider public, researchers and practitioners in an ethical environmental pedagogic model at the intersection of world-making responsible futures.

As we discuss in this chapter care, ethics, responsibility, accountability, reparation, and plurality emerge as quintessential aspects to be part of this new condition. We need to approach this from a futures perspective in which applied ethics and systemic implications are at the centre of everything we do, from the inception to the completion of the project, and beyond. For Re-Futuring design these areas will be combined, bringing together a diverse set of ideas such as sustainability, decolonisation, de-futuring, systems studies, de-anthropocentrism, dematerialisation and regenerative design into a curriculum. We propose orchestrating the evolution of the critical towards tactical stances (Fig.3).

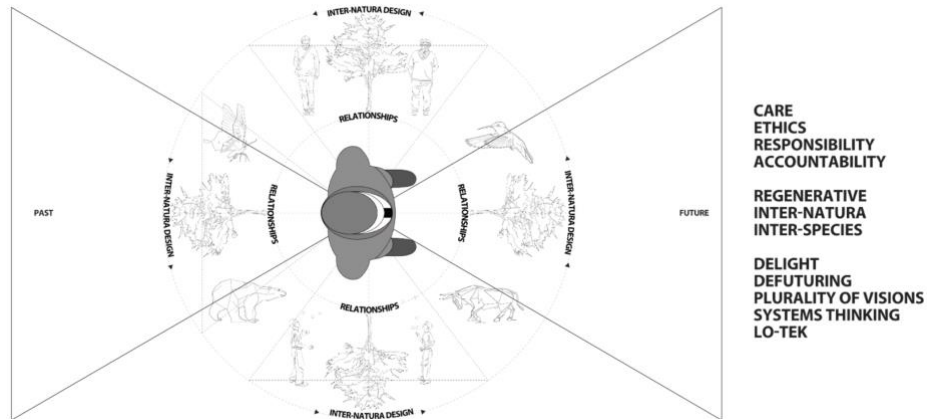


Fig. 3. Catalogue of elements for exploring Design Futures.

At this point, we need a conceptual model to enable this proposition. Here we introduce undisciplined stewardship as a candidate for a provocative approach to design futures that engage diversity and systems, that works with industry, yet is not governed by it and combines critical and enabling approaches. This paradigm shift in design education has implications for a new environmentally and ethically led design pedagogy and the ways in which the design curriculum can be developed to engage students.

Galdon & Hall [11] introduced undisciplined stewardship as an ethical pedagogic responsibility principle at DRS2022. By building from notions of personal responsibility, alterplarity, and stewardship, this principle aims to address the harmful social and environmental issues emerging from open and uncompromised experimentation. This model marks a transition from Latour's object-subject relationship [39], to Ingold's impact of this relationship on the system/environment [40] with a specificity of care [41]. This model aims for systemic consequential experimentation at its heart.

Seeking to develop new knowledge models and practices for envisaging futures, at the Royal College of Art there is a long trajectory in interrogating the future of design education. Addressing how the curriculum meets the needs of a complex world has been discussed and researched in the broader university context (e.g. [42]). The paradigm shift in Design Higher Education developed in this paper suggests that the curriculum needs to be designed and delivered around new structures and approaches. Supporting student diversity and recognising a broader range of cultural knowledge and practices outside the historic disciplines underpins the need to decolonise new aspects of the curriculum and the university. We suggest that design students need access to broader bodies of knowledge and practices in the curriculum. We would propose that

this new design approach offers knowledge within futures studies, systems, applied ethics, regeneration and *more than human* ecologies.

3.1 Knowledge ‘for’: Towards an Ecological and Socially just Design Transition

Andrew Blauvelt [43] proposed that we are moving towards a relationally based, contextually specific design. He structures the evolution of design into three main epochs: modern design, from 1900-1950, focused on form, disseminated rationally and potentially universally. Post-modernist design, ranging from 1960-2000, focused on design’s meaning-making potential, symbolic value, semantic dimension, and narrative potential. And relational design, ranging from 2000 to the present, focuses on effects on users, pragmatic and programmatic constraints, rhetorical impact, and the ability to facilitate social interactions. What his account missed was the ecological and social justice transition. This aspect opens the door for an Industrial Design replacement model integrating prospective regenerative approaches and social responsibility.

We believe that the perspective presented methodologies emerging from the RCA combining design principles, methods, and futures design approaches (Speculative, Xenon, Cyber, Co-, and Prospective) with notions around dematerialisation, regeneration, deepness, crafts and ‘more than human’ care aiming for applied ethics may provide a distinctive and radical model in line with the cutting-edge and pioneering spirit of the RCA.

From this perspective, we have positioned design practice as a future activity in the context of abductive reasoning (making decisions without having all the information) (Douven [44]). This intrinsic prospective approach of design, based on abductive reasoning, planning, critical enquiry, problem shaping, synthesis, preparedness, readiness and appropriateness in the built environment, determines a different model of knowing. In this scenario, the designer is dealing with wicked problems in the context of procedural hyperobjects (entities with such vast temporal and spatial dimensions that defeat traditional ideas about what a thing is) (Morton [45]) by accessing areas yet-to-be or not-fully-formed (Rittel and Webber [21]; Buchanan [22]; Conklin [46]). Consequently, its output is based on potentialities, not certainties. We trade some degree of accuracy for access to areas that are partial and yet-to-be or not-fully-formed. Therefore, our output is probabilistic, and research is always preliminary in its nature. Moreover, in exchange we provide guiding knowledge – as Glanville [47] proposed, ‘knowledge for’ future action and possibilities rather than ‘knowledge of’ past actions and events.

4 Conclusions

In our discourse we do not aim for conclusiveness, but to provide a new axiom in the open-ended process called design education. We provide a guiding conceptual

framework to challenge established models of design (industrial and product design) whilst addressing notions of alternative futures, systemic considerations, subtraction and deep ecological responsibility in the context of future design practices. In this scenario, design research and practice must address complex systems and unintended consequences via prospectivity and autonomy, while dealing with uncertainty, and not-fully-knowing [48].

This conceptual framework encompasses all design disciplines as advanced practice liberating Design Futures from future studies history and thinking about it now orientating it onto new foundations built on emerging thinking in dematerialisation, post-humanism and multi species design.

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