

Anthropocene Economics and Design: Heterodox Economics for Design Transitions

Abstract Economics is a field under fierce contestation. In response to the intersecting challenges of the Anthropocene, scholars who take a broader and more critical view of current economic models have described the shortcomings of orthodox economic theory along with the severe consequences of its systemic discounting of the environment. Heterodox economists describe how the logic of neoclassical and neoliberal economics disregards the interests and needs of the natural world, women, workers, and other historically disadvantaged groups. Explorations of the household, the state, and the commons as alternative economies open space at the intersection of economics and design for incorporating and valuing the provisioning services provided by the ecological context and the undervalued work provided by certain groups of people. Design theorists, economists, social and cultural theorists, and anthropologists describe the relationship between value and values in ways that reveal how sustainable and socially just futures depend on the priorities (notions of value) embedded in the systems that determine what is designed. With these ideas, design can contribute to economic transitions with conceptualizing, modeling, mapping, framing, and other future making practices. Ecologically engaged, heterodox economics is a basis for societal responses to climate change on a scale that can make a difference.

Keywords

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1 The Anthropocene is a term used originally by physical scientists to describe a new geological epoch where humankind is dramatically altering the functioning of Earth systems and breaching planetary boundaries. The *anthropos* (Greek for 'humans') are transforming Earth system processes.

2 Tony Fry, *Design Futuring: Sustainability, Ethics and New Practice* (Oxford: Berg Publishers, 2008), 46; Joanna Boehnert, "Design vs. The Design Industry," *Design Philosophy Papers* 12, no. 2 (2014): 123–24, 130, 133, DOI: <https://doi.org/10.2752/144871314X14159818597513>; Joanna Boehnert, *Design, Ecology, Politics: Toward the Ecocene* (London: Bloomsbury Academic, 2018), 38–48; Clive Dilnot, introduction to John Heskest's *Design and the Creation of Value*, ed. Clive Dilnot and Susan Boztepe (London: Bloomsbury Academic, 2017), 14; David Orr, "The Political Economy of Design in a Hotter Time," in *Routledge Handbook of Sustainable Design*, ed. Rachel Beth Egenhoefer (Abingdon: Routledge, 2018), 7–8; Idil Gaziulusoy and Eeva Houtbeckers, "Convergences: Design for Sustainability Transitions and Degrowth" (presentation, the 6th International Degrowth Conference, Malmö, Sweden, August 21–25, 2018), 9.

3 Tim Jackson, *Prosperity without Growth? The Transition to a Sustainable Economy* (London: Sustainable Development Commission, 2009), 8.

4 Nicolas Stern, *Stern Review: The Economics of Climate Change* (Cambridge, UK: Cambridge University Press, 2007), i.

5 Will Steffen et al., "Trajectories of the Earth System in the Anthropocene," *Proceedings of the National Academy of Sciences* 115, no. 33 (2018): 8252–59, DOI: <https://doi.org/10.1073/pnas.1810141115>.

6 IPCC (Intergovernmental Panel on Climate Change), "Summary for Policymakers. Special Report on Global Warming of 1.5°C," October 6, 2018, 11, available at: <http://www.ipcc.ch/>.

7 Will Steffen et al., "Trajectories of the Earth System in the Anthropocene."

Introduction

The design of sustainable ways of living must be accelerated. The intersection of the economy and design is a site of attention for scholars attentive to Anthropocene¹ conditions including (but not limited to) climate change, biodiversity loss, and other global challenges. Design theorists² have recently described the urgency of acknowledging and addressing the fact that environmental problems arise from political economies that systemically prioritize profit-seeking options – planned obsolescence or fossil fuel intensive production processes, for example – over more sustainable options. Heterodox economists have charted how markets currently depend on fossil-fuel driven economic growth³ and how the results of these extractive and polluting modes of development have deteriorated Earth systems to such an extent that establishment economist Lord Nicholas Stern famously described climate change as "the greatest and widest-ranging market failure ever seen."⁴ While climate change is already causing irreparable environmental damages and injustices, the current trajectory of Hothouse Earth⁵ presents humankind with a clear and present danger to "health, livelihoods, food security, water supply, human security."⁶ The science is well-defined: "collective human action is required to steer the Earth system away from a potential threshold and stabilize it in a habitable interglacial-like state."⁷ The IPCC recommends "upscaling and acceleration of far-reaching, multi-level and cross sectoral climate mitigation and by both incremental and transformational adaptation."⁸ And yet despite these alarming reports from the scientific community, fossil fuel extraction continues unabated, and carbon emissions continue to rise. Renewable energy is adding additional power to the grids to satisfy growing energy demands in the context of ever-increasing carbon emissions.⁹ Meanwhile, wealth inequality is increasing in the United Kingdom, the United States and other nations committed to the most extreme forms of capitalism.¹⁰ The need for a theory of economics to reflect Anthropocene challenges is urgent – to enable a dramatic drop in carbon emissions, attend to myriad other environmental concerns, and address the increasing polarization of wealth with accompanying problems of social justice.

Design has a role to play in enabling economic transitions for sustainability. Heterodox economists and economic justice campaigners have recently started describing the economy as a design problem and looking for design approaches for potential solutions.¹¹ Designers can help – but their capacity to facilitate changes that affect complex social and environmental problems depends on more profound engagement with both ecological theory and heterodox economics. This article provides a foundation for this engagement by describing heterodox ecological, feminist, and Marxist economic theory as a basis for the design of sustainable transitions. These economic movements are the result of struggles in academic, policy, and activist spaces that represent profound challenges to neoclassical and neoliberal economics. The content I present here is informed by my participation in the "*Economic Theory of the Anthropocene: Towards Heterodox Understandings of Sustainable Economies*" workshop hosted by CUSP (Centre for the Understanding of Sustainable Prosperity) at University of Surrey (July 3–4th, 2018). CUSP Director Professor Tim Jackson, former Economics Commissioner at the UK Sustainable Development Commission and author of bestseller *Prosperity without Growth*, introduced the event with the goal of "building an economics fit for purpose."¹² I presented research in progress titled "Mapping the Political Economy of Design" that describes design as a practice poised to make critical contributions to the social change agenda of heterodox economics. At the end of this article, I describe how modeling, mapping, framing, and other transition facilitating design practices can support the redirection of economic processes. This potential is contingent on designers having an understanding of economic theory fit for the challenges of the Anthropocene,

and this article is a contribution toward that end. Understanding the relationship between economic value and social values is central to an understanding of how practices, behaviors, and values supporting sustainable ways of living can be generated by design. The starting point for the design and development of new economies must be humanity's long-term goals – which are now threatened by outdated orthodox economic ideas, institutions, and structures.

Economic Value and Social Values in Design and Beyond

The nexus of economics and design has increasingly become a focus of attention in design theory. This theoretical work is long overdue. Design historian John Heskett describes “a deep schism of mutual incomprehension” between design and economics.¹³ A recent study found that social design in the UK is mired by weakness in this area. “While design researchers have skills in user observation and other fields that are important here, they have less strengths in the understanding of the macro-environments (e.g. policy, economics) that shape practice and research.”¹⁴ Heskett's posthumous *Design and the Creation of Value* examines “design from the standpoint of economic theory; [and] economic theory from the perspective of design.”¹⁵ In the book's introduction, Clive Dilnot describes the importance of addressing the lack of understanding between design and economics, noting that “until this schism is in some way crossed ... then adequately solving the puzzle and problem of value – and ultimately the project of creating either an adequate design or an adequate economics – remains at best difficult and perhaps impossible.”¹⁶ The book serves to open “design to economics and economic thought, but in the same process to begin to open (even in small ways) economics to the critiques and perspectives, intellectual as well as practical, that design offer[s].”¹⁷ It explores how design responds to what economic structures consider valuable, how notions of value directs the ways institutions are organized and managed, and how knowledge is generated based on “the structure of an institution and the kinds of knowledge it permits, tolerates or encourages.”¹⁸ This analysis of how value influences knowledge production and the production of values by design is of central importance in theories of change on issues of sustainability. Throughout the book, Heskett describes how the values that are reproduced by design are influenced by what is valued by the economy.¹⁹ While other design researchers have explored value creation by design,²⁰ this focus on the relationship between value and values in design is noteworthy.

The intersection of economic value and social values becomes manifest with design practices. Designers make new ways of living – with new artifacts, communication, services, spaces, and systems – according to the priorities of the design industry as it seeks profitable activities. New circumstances created by design proceed to nurture certain types of values. This cycle of cultural production powerfully creates new ways of living with particular sets of social relationships along with their environmental consequences (Figures 1 and 2). The conditions of the Anthropocene mean that designers must be able to identify the social, political, and environmental repercussions of their work – and take responsibility for them. Heskett argues persuasively

“Design must be judged in terms of the benefit it brings to life in all its dimensions. To deny the significance of values in this broader sense is to deny design any role in defining viable solutions to human existential problems, effectively condemning it to a supporting role in pursuit of narrowly defined economic aims measured in profit, in other words, relegating design to a technocratic role of putting into effect the ideas of others without a regard for the consequences. *Attempting to create the future material and information structure*

8 IPCC, “Summary for Policy-makers,” 8.

9 Jackson, *Prosperity without Growth?*, 8; Simon De Sterck, *Dynamics of Energy Systems: A Useful Perspective*, IIASA Interim Report (Laxenberg: IIASA, 2014), available at <http://pure.iiasa.ac.at/id/eprint/11254>.

10 Thomas Piketty, *Capital in the Twenty-First Century*, Kindle ed. (Cambridge, MA: Harvard University Press, 2014), 684–763; OECD, *In It Together: Why Less Inequality Benefits All* (Paris: OECD Publishing, 2015), 275, DOI: <https://doi.org/10.1787/9789264235120-en>; Deborah Hardoon, *An Economy for the 99%: Oxfam Briefing Paper* (Oxford: Oxfam International, 2017), 2, available at <https://www.oxfamamerica.org/static/media/files/bp-economy-for-99-percent-160117-en.pdf>.

11 Kate Raworth, *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist* (London: Random House Business, 2017), 28, 170; NEON, NEF, Frameworks Institute, and the Public Interest Research Centre, *Framing the Economy: How to Win the Case for a Better System* (London, 2018), 10, 14–15, 37, 40–41, 46, available at <https://neweconomics.org/2018/02/framing-the-economy-2>.

12 Tim Jackson, “Welcome” (presentation, Economic Theory of the Anthropocene: Towards Heterodox Understandings of Sustainable Economies, University of Surrey, Guildford, UK, July 3, 2018).

13 John Heskett, *Design and the Creation of Value*, ed. Clive Dilnot and Susan Boztepe (London: Bloomsbury Academic, 2017), 45.

14 Guy Julier et al., “Outcomes: AHRC Proposal for Commissioned Research on Mapping Social Design Research and Practice,” *UK Research and Innovation*, accessed October 28, 2018, <https://gtr.ukri.org/projects?ref=AH%2FL503952%2F1>. The full report is available at <http://eprints.brighton.ac.uk/13364/>.

15 Heskett, *Design and the Creation of Value*, 52.

16 Dilnot, introduction to *Design and the Creation of Value*, 17.

17 Ibid., 3.

Figure 1 The Cycle of Cultural Production. Licensed under CC BY-SA by EcoLabs, 2018.

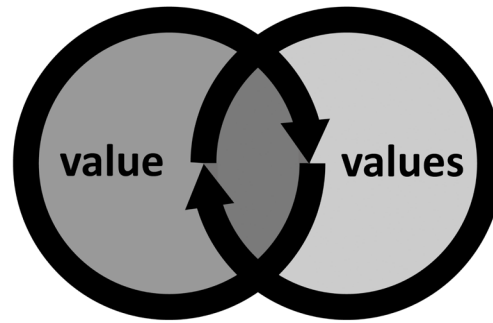
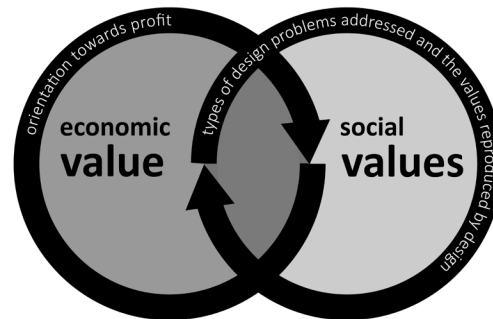


Figure 2 The Cycle of Cultural Production: The Intersection of Economic Value and Social Values in Design. Licensed under CC BY-SA by EcoLabs, 2018.



18 Heskett, *Design and the Creation of Value*, 155.

19 Ibid., 152–62, 196–97.

20 Joyce Yee, Hazel White, and Lindsey Lennon, “Valuing Design in Public and Third Sector Organisations” (paper, presented at The Value of Design Research: 11th International European Academy of Design Conference, Boulogne Billancourt, France, April 22–24, 2015), available at http://valuingdesign.org/Valuing_design_EAD2015_YeeWhiteLennon.pdf.

21 Heskett, *Design and the Creation of Value*, 179–80, italics mine.

22 Rosalind Gill and Andy Pratt, “In the Social Factory? Immaterial Labour, Precariousness and Cultural Work,” *Theory, Culture & Society* 25, no. 7–8 (2008): 17, 20, DOI: <https://doi.org/10.1177/2F0263276408097794>.

23 Mario Tronti, *Operai e capitale* (Turin: Einaudi, 1966).

24 Antonio Negri, *The Politics of Subversion: A Manifesto for the Twenty-first Century* (Cambridge, UK: Polity Press, 1989), 79; in Gill and Pratt, “In the Social Factory?,” 6–7.

25 Gill and Pratt, “In the Social Factory?,” 6–7.

26 Gill and Pratt, “In the Social Factory?,” 3.

27 Ibid., 20.

of our culture in these terms, without any values other than the financial, will be a disaster waiting to happen, like sailing a nuclear submarine by the sun and stars. In short, a task of utmost significance is to reconcile the two poles of value and values that are both necessary and integral components of the tasks facing designers.”²¹

Heskett describes design’s role in creating future ways of living directed by the reductive notions of value in conventional economics as a recipe for disaster. This explicit investigation of the relationship between economic value and social values might be new to design theory, but it has been explored extensively in social theory, cultural studies, anthropology, economic history, and heterodox economics.

The Italian autonomist Marxists describe how values are developed as part of the “social factory”²² in capitalist states that produce and reproduce particular types of social relations. Here the socialized worker is created in economies where “the factory is increasingly disseminated out into society as a whole. Tronti (1966) writes of the ‘social factory’²³ and Negri of ‘firms without factories’ or the ‘factory without walls’. From this perspective labour is deterritorialized, dispersed and decentralized so that ‘the whole society is placed at the disposal of profit’.”²⁴²⁵

As the economy comes to dominate ever increasing parts of human existence, cultural workers contribute creative, cognitive, and affective labor that supports “new subjectivities, new socialities, and new kinds of politics”²⁶ – whether or not they are aware of the political work they do. The autonomist attention to subjectivity and the focus on work as distributed in society and as reproducing social relations through the social factory is a major contribution to social theory.²⁷ The social factory concept suggests that social values are influenced by social practices (such as design) which are driven by economics priorities (in the design industry and elsewhere).

In cultural studies, the debate around value has often focused on policy in the creative industries and “the articulation and measurement of ‘economic value’ at the expense of other forms of value – cultural, social, aesthetic.”²⁸ Communication

theorist Eleonora Belfiore describes how certain groups of people have the ability to bestow cultural value: “the process of value allocation, and consequently that of resource distribution, is not a neutral one, but rather the site of tensions, struggles for power, and the scene of a complex politics of representation, identity, taste, and class.”²⁹ Value has a different meaning in cultural studies than in economic theory – but the political economy is also relevant in cultural spaces. The political economy of cultural production often determines who has cultural resources and cultural capital to create cultural content legitimizing and reproducing their value system. And cultural theorists have demonstrated the ways cultural activity that offers value for one group can at the same time be an instrument of symbolic violence³⁰ for another group through processes of “social subjugation, public humiliation, disempowerment, marginalization, and stigmatization.”³¹ In autonomist terms, the social factory reproduces the values of those with greater access to capital.

Anthropologists describe the economy not only as structures but also as an imaginary that powerfully produces particular ways of living where values serve to guide the ways we “organize our lives, feelings, and desires.”³² In his article “It Is Value that Brings Universes into Being,” anthropologist David Graeber discusses the relationship between value and values:

“The entire field of anthropological value theory since the 1980s has been founded on a single intuition: the fact that we use the same word to describe the benefits and virtues of a commodity for sale on the market (the ‘value’ of a haircut or a curtain rod) and our ideas about what is ultimately important in life (‘values’ such as truth, beauty, justice), is not a coincidence.”³³

Ecological economist Giorgos Kallis refers to this quote in his explanation of why the value/values relationship matters for economic theory. “Precisely because beauty, truth, and freedom cannot be exchanged or reduced to their market ‘value,’” he notes, “we designate them as ‘values.’ Values demarcate that which cannot and should not be converted into money.”³⁴ These domains (beauty, truth, and freedom) are the domains where meaning, wellbeing, and desire is cultivated – and are of central concern for all designers who need to make their work appealing to users. Understanding the significance of the value/values interface is an interdisciplinary endeavor.

“Ecological economics, anthropology, and Marxist theory lets us see the difference between value and values, they help us understand that how value in a capitalist framework is created from work – human and non-human, paid and unpaid – and how capital propels the inexorable colonization of values by value in the form of money: a colonization that can be resisted or revered by purposeful collective action.”³⁵

The colonizing of values by value – also known as economism³⁶ (defined as the expansion of the logic of market to ever-increasing spheres of life) – is a threat to all values that are antithetical to primacy of profit. Economism diminishes the value of the social and the ecological domains – the orders that create the context of human existence. These domains are increasingly subject to governance by market mechanisms, and it is increasingly apparent that the logic of the market has been tremendously socially and ecologically corrosive. According to ecological economics, to avoid the current trajectory of climate catastrophe, current conceptions of value in economics must be decentered to reassert the primacy of social and environmental values.

Meanwhile, the history of economic thought has a variety of theories of value other than the one that the current economic system employs. Where neoclassical

28 Eleonora Belfiore, “Whose Cultural Value? Representation, Power and Creative Industries,” *International Journal of Cultural Policy* (August 22, 2018): 1, DOI: <https://doi.org/10.1080/10286632.2018.1495713>.

29 Ibid., 12.

30 Pierre Bourdieu, *Masculine Domination*, trans. Richard Nice (London: Polity, 2001), 1–4, 8–9, 22, 33–42.

31 Belfiore, “Whose Cultural Value?,” 12.

32 David Graeber, “It Is Value that Brings Universes into Being,” *AHU: Journal of Ethnographic Theory* 3, no. 2 (2013): 219, DOI: <https://doi.org/10.14318/hau3.2.012>.

33 Ibid., 224.

34 Giacomo D’Alisa, Federico Demaria, and Giorgos Kallis, eds., *Degrowth: A Vocabulary for a New Era* (New York: Routledge, 2018), 46, citing Graeber, “It Is Value,” 224.

35 D’Alisa et al., *Degrowth*, 58.

36 Ibid., 70.

37 See Howard T. Odum and Elisabeth C. Odum, *A Prosperous Way Down: Principles and Policies* (Boulder: University of Colorado Press, 2008), 67.

38 Stern, *Stern Review*, 55–92.

39 Mariana Mazzucato, *The Value of Everything: Making and Taking in the Global Economy* (London: Allen Lane, 2018), 270.

40 Mazzucato's economic analysis is heterodox but insufficiently ecologically engaged and therefore not aligned with Anthropocene economics as presented in this paper. In my opinion, her analysis is also insufficiently engaged with the problem of the concentration of power and its corrupting influence in institutions, economics, and politics.

41 Heskett, *Design and the Creation of Value*, 82–85.

42 Guy Julier, *Economies of Design* (London: Sage Publications Ltd., 2017), 12.

43 Pierre Dardot and Christian Laval, *The Way of the World: On Neoliberal Society* (London: Verso Books, 2009), 254–58.

44 William Davies, *The Limits of Neoliberalism: Authority, Sovereignty and The Logic of Competition* (London: Sage Publications Ltd., 2014), 6.

45 Jamie Peck, *Constructions of Neoliberal Reason* (Oxford: Oxford University Press, 2013), 23.

46 William E. Connolly, *The Fragility of Things: Self-Organizing Processes, Neoliberal Fantasies, and Democratic Activism* (London: Duke University Press, 2013), 59.

47 “Governmentality” is a hybrid term coined and explored by Michel Foucault, combining government and rationality. See Graham Burchell, Colin Gordon, and Peter Miller, eds., *The Foucault Effect: Studies in Governmentality* (Chicago: The University of Chicago Press, 1991).

48 Other blindspots, identified by Sharon Helmer Poggenpohl in her review published in this journal, are not as relevant to the argument in this paper and will not be discussed. Sharon Helmer Poggenpohl, “Blindspots

economists rely on a theory of value based on utility and Marxist economists use a theory based on work, ecological economists often base their theories on the embodied energy in commodities³⁷ – the energy that has been used to make a product or service – as a way of establishing value. The current economic system functions to facilitate profit making. This privileging of profit for those with capital over all other values has serious consequences – as described in detail in *The Stern Review*.³⁸ The critique of the extractive dynamics of capitalism is growing even in places with established institutional power such as the Institute for Innovation and Public Purpose at University College London (UCL). Mariana Mazzucato, UCL Professor of the Economics of Innovation and Public Value and author of *The Value of Everything: Making and Taking in the Global Economy*, interrogates notions of value and the processes through which economic value is created. She argues that the current economic system rewards value-extraction more highly than value creation³⁹ – in essence, those who exploit workers and the environment are more highly rewarded than those who do socially and environmentally beneficial work. While Mazzucato⁴⁰ aims to reform capitalism and others aim to replace it, all heterodox economists argue that the economy can be redesigned to encourage different priorities. This is a significant political challenge considering the most immediate interests of those currently holding economic, financial, and political power, exacerbated by extreme polarizations of wealth. Again, climate change makes this work an urgent imperative.

Regrettably, Heskett's text is narrow in scope of its engagement with different types of economic theory and almost entirely neglects of the problems of power in society and the environmental contexts which enable economic processes. Even while reviewing the father of neoliberalism Friedrich A. Hayek's economic thought, Heskett is either unaware or unconcerned about the undemocratic, authoritarian, and socio-ecologically corrosive tendencies of neoliberal modes of governance.⁴¹ A sharper critique of neoliberal economics can be found in Guy Julier's *Design Economies*, which describes its key characteristics with examples in everyday life and in design.⁴²

Neoliberalism permeates design economies. It directs designers to participate in developing new work enabling new types of activities, supporting certain types of social relations that, in turn, encourage particular types of subjectivities.⁴³ The ideas Hayek endorsed have become structures and practices embedded into culture at all levels. Over the past four decades, neoliberal policies based on these theories have eroded democratic structures and transformed society. As a mode of governance characterized by the elevation of market-based principles to norms⁴⁴ that organize social relations at all levels, neoliberal governments roll back responsibilities of the state, while simultaneously rolling out other types of state functions, creating an “explosion of ‘market conforming’ regulatory incursion”⁴⁵ and huge bureaucracies. As market mechanisms and metrics come to regulate ever more aspects of human existence, “neoliberalism must become an ideological machine embedded deeply into life to produce the submission and self-constraints its punitive success demands.”⁴⁶ Designers facilitate these changes with new products, spaces, and communications that create new ways of living driven by those economic priorities and governmentalities.⁴⁷

Despite these theoretical blind spots,⁴⁸ Heskett's *Design and the Creation of Value* provokes a much-needed reflection on the priorities of the economic system and their direction of the design industry. The combination of Heskett's inquiry on value with Dilnot's radical provocations raises vital questions.

“Is economics the study of the economy (as economists like to insist, the study of the only possible form the economy can successfully take?) or is economics as a field really only engaged in modeling (and justifying) the fact that this is a capitalist economy? The question is difficult, and particularly from an operational

point of view. It has an urgency in the light of the continuing cycle of economic crises and in the view of the need to rethink what the ‘economy’ is, and how it should be conceived in the light of the necessity to create a sustainable global post-carbon economy, an economy that, while it will, by necessity, use markets, cannot, structurally, also be capitalist, at least in the essentially mercantile (and massively exploitative) forms that we are now experiencing.”⁴⁹

Dilnot calls on designers to respond, stating “It remains for others to take up the challenge he [Heskett] has issued.”⁵⁰ Likewise, Julier notes a role for design to “show what is there, in articulating the systems that are at work in economics.”⁵¹ Figures 1 and 2 display the intersection of value and values in cultural production. The figures display economic value – with its orientation towards the creation of profit – as influencing which social values are reproduced by design. As design theorists respond to interdisciplinary work demonstrating how the current economic system prioritizes particular sets of values, the various ways that design economies function to reproduce these values become apparent. Design strategies can be used to model and map design economies to identify leverage points and spaces for intervention. Communication design, service design, transition design, systems-oriented design, and design activism are all practices well placed to both reveal these dynamics and to make new design resources, services, tools, and so on that can help to disrupt, shift, and potentially transform economies on various scales.

In his essay “The Political Economy of Design in a Hotter Time,” sustainability theorist David Orr argues that “all design exists in a larger framework of political economy by which costs and benefits are distributed within society and across generations.”⁵² Economic structures encourage certain types of values, practices, design outcomes, and ways of living with social and environmental consequences. For this reason, sustainability is a problem that

“is not in the particular techniques of design, which have become very sophisticated, but in the haphazard structures – economic, political, social – in which design occurs, which slows the effort to take ecological design to the necessary scale. The rules of the system permit change only at the margins, which is to say only slight adjustments in the coefficients of change but none at the level of social structures and system design.... To really improve the human prospect the precepts of ecological design must inform politics, governance, law, and economics.”⁵³

Economic structures limit or enable sustainable and socially responsive design. Where designers can help to “design social systems that work for, not against, natural processes”⁵⁴ this work is dependent not only on design practice informed by ecological knowledge but on the economic priorities of the system that determines what is designed.⁵⁵ Orr is a pioneer of sustainable education who coined the concept of ecological literacy in 1992.⁵⁶ Sustainability theorists and educators have developed the notion of ecological literacy as a way of knowing that addresses and responds to the long-standing dismissal of environmental concerns in knowledge systems.⁵⁷ It implies a radical transformation of education across disciplines and is especially important in the fields involved with the development of sustainability transitions – including all design disciplines. Orr’s work has often emphasized the importance of design in sustainable transitions. With this new essay, Orr stresses the role of the political economy: “the practice of ecological design must be applied to the larger systems of politics, law, and economics.”⁵⁸ These sustainable transitions are dependent on ecologically literate practitioners – designers, economists, and policymakers who have the ecological knowledge necessary to enable informed decision-making on issues that have environmental consequences.

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49 Dilnot, introduction to *Design and the Creation of Value*, 13–14.

50 Ibid., 20.

51 Julier, *Economies of Design*, 177.

52 Orr, “The Political Economy of Design,” 4.

53 Ibid., 8.

54 Ibid.

55 Boehnert, “Design vs. the Design Industry,” 120.

56 David W. Orr, *Ecological Literacy: Education and the Transition to a Postmodern World* (Albany: State of New York Press, 1992), 85–88.

57 Ibid.; Fritjof Capra, *The Hidden Connections: A Science for Sustainable Living* (London: Flamingo, 2003), 194, 200–203, 209–15, 225–27, 251; Richard Kahn, *Critical Pedagogy, Ecological Literacy, and Planetary Crisis: The Ecopedagogy Movement* (New York: Peter Lang, 2010), 19, 23, 26, 59; Joanna Boehnert, “Ecological Literacy in Design Education—A Theoretical Introduction,” *Form Akademisk—Research Journal of Design and Design Education* 8, no. 1 (2015): 1–11, DOI: <https://doi.org/10.7577/formakademisk.1405>; Joanna Boehnert, “Ecological Theory in Design: Participant Designers in an Age of Entanglement,” in *Routledge Handbook of Sustainable Design*, ed. Rachel Beth Egenhoefer (London: Routledge, 2018), 92–93; Boehnert, *Design, Ecology, Politics*, 74–88.

58 Orr, “The Political Economy of Design,” 8.

59 Piketty, *Capital in the Twenty-First Century*, 684–763; OECD, *In It Together*, 275.

60 Jason Hickel, *The Divide: A Brief Guide to Global Inequality and Its Solutions* (London: William Heinemann, 2017), 55.

61 “FAO: Food and Agriculture Organization of the United Nations,” United Nations Food and Agriculture Organization (FAO), accessed October 28, 2018, <http://www.un.org/youthenvoy/2013/09/fao-food-and-agriculture-organization-of-the-united-nations>; “Zero Hunger,” World Food Program, accessed October 28, 2018, <http://www1.wfp.org/zero-hunger>.

62 Eric Holt-Giménez et al., “We Already Grow Enough Food for 10 Billion People... and Still Can’t End Hunger,” *Journal of Sustainable Agriculture* 36, no. 6 (2012): 595–98, DOI: <https://doi.org/10.1080/10440046.2012.695331>.

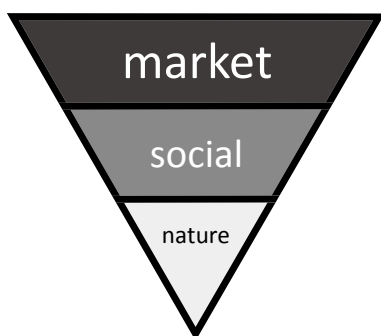
63 Boehnert, “Design vs. the Design Industry,” 123.

64 NEON, NEF, Frameworks Institute and PIRC, *Framing the Economy*, 19.

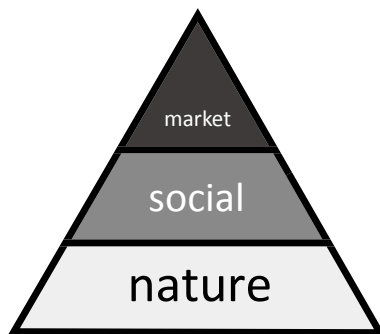
Alternative Economic Theory and Models

The field of economics itself is under fierce contestation by groups such as New Economy Coalition, Rethinking Economics, New Economics Foundation, Institute for Innovation and Public Purpose, Unlearning Economics, Promoting Economic Pluralism (PEP), Economy (ecomy.org), and New Economy Organisers Network (NEON), and a swelling international “degrowth” movement. Heterodox economic theorists – including Herman Daly, Robert Costanza, Mariana Mazzucato, Ha-Joon Chang, Lorenzo Fioramonti, Ann Pettifor, Molly Scott Cato, Steve Keen, Andrew Simms, Giorgos Kallis, and Kate Raworth – have described how current economic practices, institutions, and structures cause irreparable ecological harm, drive greater wealth inequality, and are increasingly vulnerable to cycles of financial crisis. While there are some differences in the work of the organizations and individuals listed above, they are united in their critique of orthodox economics and their economic proposals prioritizing social and environmental factors. In the United Kingdom, after the financial crisis of 2008, government bank bailouts (the transfer of public funds to private banks) were followed by harsh austerity measures with deep cuts in social services, health care, education, public employee wages, and pensions. Meanwhile, both the UK and the United States of America have seen dramatic increases in wealth inequality.⁵⁹ Globally, the gap between rich and poor countries has tripled over four decades⁶⁰ while economic structures have become even more oriented towards the redistribution of wealth upwards – with processes such as privatizations, financialization, rent-seeking policies, tax havens, and more. These statistics are challenged by individuals and groups with positive narratives of progress. While this vigorous debate on the various ways of measuring social progress is ongoing, it is clear that environmental problems remain a severe threat to our collective futures and grave social injustices persist. Meanwhile, the most authoritative international organizations have demonstrated that there are more than enough resources⁶¹ to provide for everyone on the planet’s basic needs, nutritionally⁶² and otherwise – but we fail to distribute resources in just ways. Heterodox economics responds to these problems.

Ecological economists, feminist economists, and Marxist economists – who focus on exploited environments, women, and workers – have provided some of the strongest theoretical models for understanding the current system, especially on issues of power and privilege. They argue that current economic system structures systemically de-prioritize the interests of the environment, women, and other groups of people. The economy has been constructed based on political philosophy that was prevalent when industrial capitalism was developed, and the ideas that have circulated in corridors of power ever since. Structures reinforcing political power and privilege have been designed into economic systems and are now propelling cascading social and environmental crises on multiple scales. Clearly capitalism was not “designed” – it is rather an emergent system created by the activities of millions of people and the institutions that direct their activities.⁶³ Heterodox economists argue that the ideas and system structures in neoclassical and neoliberal economics consistently dismiss environmental concerns and the interests of women, people of color, and all those who have historically been denied equitable access to capital. Orthodox economics has generated neoliberal modes of governance, power inequalities, rentierism, and extractivism which has created unequal, insecure and unsustainable societies.⁶⁴ Climate change is one of the many negative socio-ecological consequences of an economic system that must be radically re-designed to become fit for purpose.



The unstable constellations of three domains
Unsustainable economic system



The stable constellations of three domains
Sustainable hierarchy of domains

Figure 3 The Stable/Unstable Constellations of the Three Domains, drawn after a model first published by Vandana Shiva. Licensed under CC BY-SA by EcoLabs, 2018.

Ecological Economics

Ecological economists describe the environmentally destructive ways that current economic systems are organized and outline alternative policies, structures, and practices. Conventional neoclassical economics sees the environment as a source of resources, and is, according the ecological economists, based on a denial of biophysical reality. Ecological economists break with the reductive characterizations of the environment by neoclassical, neoliberal, and environmental economics and theorize the environment as the context of human existence – rather than merely an ensemble of economic “resources” or “externalities” to be factored into economic modeling (as is the case in environmental economics). Where mainstream macroeconomics treats the economy as an isolated system, ecological economics describes the relationships between the economic, the social, and the environmental as *embedded*.⁶⁵ The concept of an embedded economy was first posited by Karl Polanyi (1886–1964) in *The Great Transformation* (1944). This nested order is not reflected by orthodox economic theory.

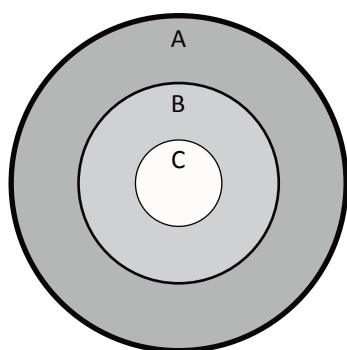
Economies based on this denial of the biophysical and ecological context are both unstable and unsustainable – a fact that we are currently coming to terms with. This instability is illustrated by the upside-down triangle model in Figure 3 (drawn after a model first published by Vandana Shiva⁶⁶). The nested relationship between the three spheres – economic, social, and ecological – is displayed in Figures 4 and 5. These diagrams display the economic system as embedded within

65 Karl Polanyi, *The Great Transformation: The Political and Economic Origins of Our Time* (Boston: Beacon Press, 2001), 74.

66 Vandana Shiva, *Earth Democracy: Justice, Sustainability and Peace* (London: Zed Books, 2005), 52.

A Hierarchy of Systems

A. ecological B. social C. economic



A is the context for B and C.

A existed before and will exist after both B and C.

B and C must regulate activities according to A's patterns & processes.

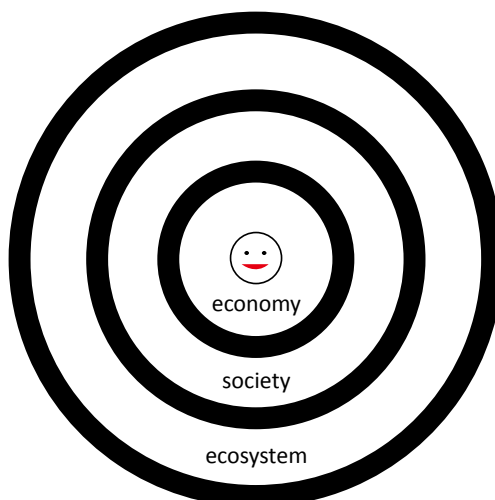
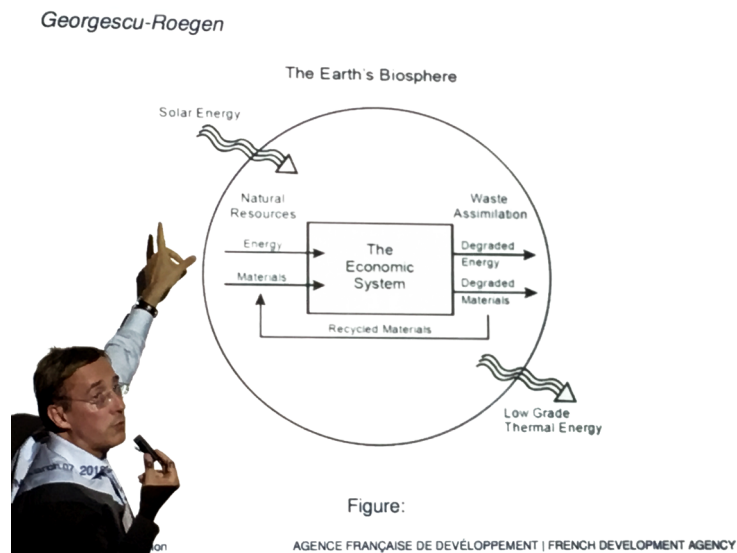


Figure 4 (Left) Conceptions of Human–Natural Relations: Hierarchy of Systems. Licensed under CC BY-SA by EcoLabs, 2014.

Figure 5 (Right) The Embedded Economy. Licensed under CC BY-SA by EcoLabs, 2015.

Figure 6 Gael Giraud at the Economic Theory of the Anthropocene workshop, University of Surrey, July 3–4, 2018. Photo by Joanna Boehnert, Licensed under CC BY-SA by Joanna Boehnert, 2018.



67 D'Alisa et al., *Degrowth*, 58.

68 Herman Daly, "Life in a Land without Growth," *The New Scientist* 200, no. 2678 (2008): 52–53, available at <https://www.newscientist.com/article/mg20026786-900-special-report-life-in-a-land-without-growth/>.

69 Elke Pirgmaier, "The Neoclassical Trojan Horse of Steady-State Economics," *Ecological Economics* 133 (2017): 52, DOI: <https://doi.org/10.1016/j.ecolecon.2016.11.010>.

70 D'Alisa et al., *Degrowth*, 1.

71 Thomas O. Wiedmann et al., "The Material Footprint of Nations," *PNAS* 112, no. 20 (2015): 6271–76, DOI: <https://doi.org/10.1073/pnas.1220362110>.

72 Jackson, *Prosperity without Growth?*, 8.

and dependent on the social and the ecological systems. While it is true that the social and the ecological systems are both impacted by the economic system, the social order will continue to exist (in some form) as long as humankind does not become extinct – and the environment will exist with or without the social or the economic orders. Clearly the environment is the context in which all other systems functions – despite the fact that it is routinely dismissed as a source of value in theory and practice in mainstream economics.

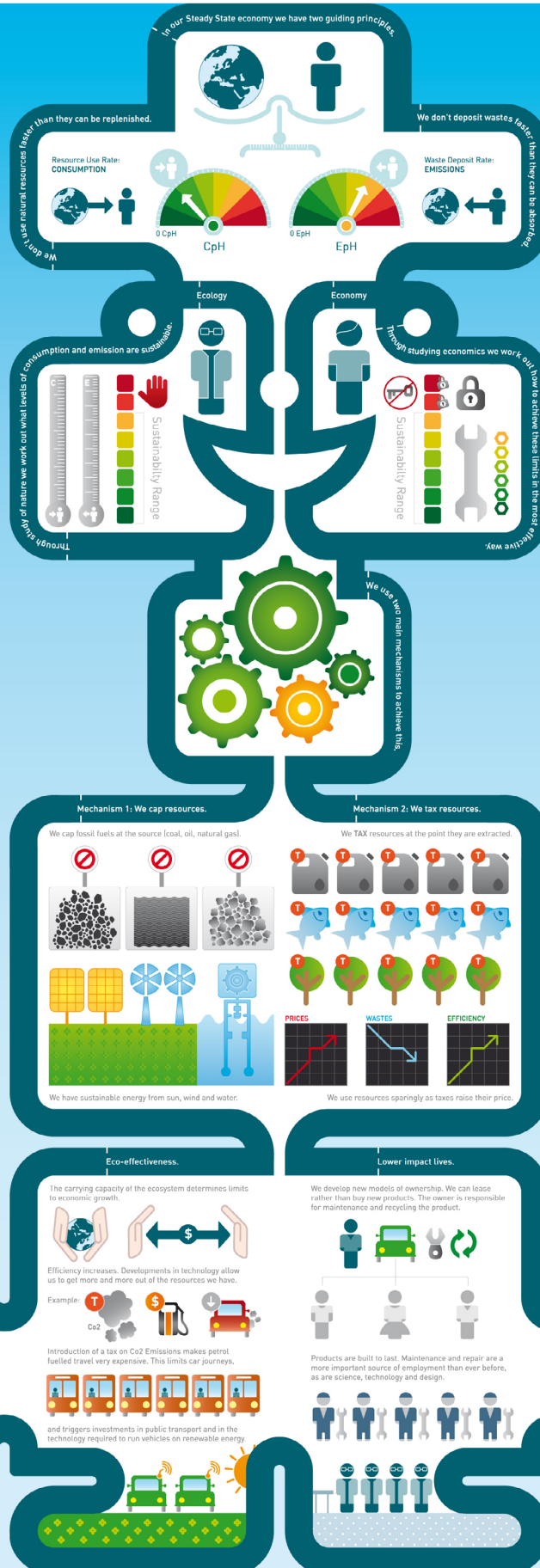
Ecological economics describes the economy as "material, as governed by the law of entropy and driven by work."⁶⁷ Economist Nicholas Georgescu-Roegen's (1906–1994) work on entropy and thermodynamics in economic processes demonstrates how natural resources are degraded by economic activity. This work is foundational to ecological economics and was used by Gael Giraud, Chief Economist of the French Development Agency, in a slide displaying the Earth's biosphere and the economic system as a thermodynamic model at the CUSP symposium (see Figure 6). Early ecological economist and former senior economist at the World Bank Herman Daly (1938–) studied under Georgescu-Roegen. Daly later developed the concept of the steady state economy (Figure 7) with two guiding principles: 1) the economy must not use natural resources faster than they can be replenished by the planet, and 2) the economy must not deposit wastes faster than they can be absorbed.⁶⁸ Ecological economics is now a diverse field with a variety of viewpoints, including positions that see steady-state economics as "an attempt to squeeze neoclassical economics into a biophysical and ethical corset. As a result, many fundamental flaws and criticisms of neoclassical economics remain."⁶⁹ The common ground is a commitment to address the ecologically devastating consequences of current economics processes. As such, ecological economics is a basis for societal responses to climate change and other environmental threats on a scale that can make a difference.

The contemporary degrowth movement is the radical embodiment of Georgescu-Roegen's intellectual legacy. The degrowth position holds that growth is a structural imperative of the current economic system to the detriment of the ecological context on which we depend; that growth is no longer desirable; and that growth has always been based on exploitation.⁷⁰ Evidence suggests that decoupling resource throughput from economic growth is not happening on scale⁷¹ and is unlikely to happen under the current model of development.⁷² Economic growth creates an intensification of the pace of life – competition, pressure, anxiety – while

Figure 7 (Next page) The Steady State Economy. Licensed under CC BY-SA by Angela Morelli and EcoLabs, 2009.

THE STEADY STATE ECONOMY A Totem of Real Happiness

We are a decade into a huge experiment in which we are trying to convert our planet into a Steady State economy. We have two guiding principles: we don't use natural resources faster than they can be replenished by the planet, and we don't deposit wastes faster than they can be absorbed. Ten years down the line, the sacrifices we have made have been less onerous than we feared they might be. We have escaped the doomed model of economic growth, and no one is worse off. It is even possible that we have all become a little bit happier, and it is good to know that now our grandchildren have a chance of a better life too.



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73 Barbara Muraca, "From Capitalist Accumulation to a Solidarity Economy" (presentation, degrowth Conference Budapest 2016, Budapest, Hungary, September 1, 2016), <https://www.degrowth.info/en/catalogue-entry/from-capitalist-accumulation-to-a-solidarity-economy/>.

74 Peter A. Victor, *Managing without Growth: Slower by Design, Not Disaster* (Cheltenham: Edward Elgar Publishing, 2008); quoted by D'Alisa et al., *Degrowth*, 11.

75 D'Alisa et al., *Degrowth*, 9.

76 Aaron Vansintjan (email conversation) quoted in D'Alisa et al., *Degrowth*, 11.

77 Gaziulusoy and Houtbeckers, "Convergences," 9.

78 J. K. Gibson-Graham, *A Postcapitalist Politics* (Minneapolis: University of Minnesota Press, 2006), 70.

79 Ibid.

80 Bianca Elzenbaumer, "Precarity Pilot: Exceeding Precarious Models of Design Practice" (presentation, Annual American Geographers Meeting: Making Other Worlds Possible V—The Role of Disruptive Innovation and New Political Imaginaries, Chicago, IL, April 21, 2015), slide 10, available at <https://www.slideshare.net/bravenewalps/precarity-pilot-exceeding-precary-models-of-design-practice>; Gibson-Graham, *A Postcapitalist Politics*, 70.

81 Gibson-Graham, *Postcapitalist Politics*, 56.

82 Julia Udall and Anna Holder, "The 'Diverse Economies' of Participation," *Footprint* 7, no. 13 (2013): 67, DOI: <https://doi.org/10.7480/footprint.7.2.770>.

83 Arturo Escobar, *Designs for the Pluriverse: Radical Interdependence, Autonomy, and the Making of Worlds* (Durham: Duke University Press, 2018), 210.

84 Gibson-Graham, *Postcapitalist Politics*, 40.

85 Bianca Elzenbaumer, "Designing Economic Cultures: Cultivating Socially and Politically Engaged Design Practices against Procedures of Precarisation" (PhD dissertation, Goldsmiths University of London,

increasing debt and increasing commodification in ways that do not reduce poverty and inequity but instead constantly produces them in multidimensional ways.⁷³ Due to the extreme stress placed on Earth systems by environmental factors such as climate change, economic degrowth will happen whether we like it or not. The opportunity to make the economy "slower by design, not disaster"⁷⁴ is potentially still possible, but this will not always be the case. Giorgos Kallis succinctly describes the particular vision developed by the degrowth community:

"To be clear: *degrowth is not negative growth*. The role of degrowth is not to make GDP growth negative. There is a name for that: 'recession,' or, when prolonged, 'depression.' In economic terms, degrowth refers to a trajectory where the 'throughput' (energy, materials, and waste flows) of an economy decreases, while welfare or well-being improves.... The difference is subtle, but crucial: I do not claim the economy or GDP should shrink. I argue that it will inevitably do so if throughput declines. This is a diagnosis, not a prognosis. GDP is a bad measure of welfare. It counts costs as benefits (building a prison or cleaning a contaminated river increases GDP) and does not estimate unpaid work or unpaid damages (if you clean your own house, GDP stays the same; if you pay a cleaner to do it, it increases). But whatever it measures, this correlates strongly with environmental damage.... Degrowth is when social and environmental conditions improve, and GDP inevitably declines as a result."⁷⁵

Degrowth is a project of social transformation that proposes a leaner economy, diverse economic forms (many outside the money economy), surpluses expended in leisure, and an emphasis on conviviality and a caring society.⁷⁶ It will be brought into being through a plethora of projects and strategies. Design theorists Idil Gaziulusoy and Eeva Houtbeckers have explored how design can contribute to the degrowth agenda with theories, practical tools, and spaces for speculation – while degrowth can help designers with its radical imaginaries, which "diverge from 'business-as-usual' proposals."⁷⁷ Degrowth reconceptualizes growth with a shift from reductive quantitative metrics to qualitative wellbeing in ways that can be a rich source of inspiration for design.

Feminist Economics

Feminist economists theorize wealth creation as a collective endeavor in which women's participation is historically and currently undervalued. Feminist economics focuses on how economic structures enable and reproduce patriarchy by privileging the interests of men over those of women. One of the primary sites of attention is the labor that is traditionally performed by women, which is often uncompensated or poorly paid within capitalism. In *A Postcapitalist Politics*, J. K. Gibson-Graham describe community economies as enlarged fields of economic processes "marshaling the many ways that social wealth is produced, transacted, and distributed other than those traditionally associated with capitalism."⁷⁸ The Iceberg Model used in Gibson-Graham's text (created by the Community Economies Collective)⁷⁹ and in subsequent feminist economic literature (Figure 8⁸⁰) depicts a diverse economy framework where non-market activities – including the unpaid and underpaid labor that buttress capitalist economics – are made explicit. This often feminized labor is a foundation for wealth creation, but one that is often taken for granted and uncompensated within conventional economics. The entire economy is dependent on this labor and yet capitalist economic structures – with their focus on profit-making labor – systematically undervalue this work, resulting in structural and gendered inequalities and injustices. The iceberg model dislocates the hegemony of capitalist assumptions by emphasizing economic diversity.⁸¹ This

work demonstrates how economic structures and policies negatively impact women and others in the informal economy, and also the environment.

“The policies of austerity are revealed as being possible only by relying on hidden work and the value that this creates in terms of the needs of society. The powerful implication of Gibson-Graham’s alternative ‘iceberg’ representation of economies is that the market economy is ‘kept afloat’ by many other forms of economy: black market, emotional work, slave labor, care, childbirth, photosynthesis, volunteerism, and gifts.”⁸²

Anthropologist and design theorist Arturo Escobar describes Gibson-Graham’s analysis as deconstructing “the modern centrism of most social theory ... to reconstruct our understanding of the social.”⁸³ Gibson-Graham explains how this theory helps to de-center capitalism, saying “capitalism becomes just one particular set of economic relations situated in a vast sea of economic activity.”⁸⁴ The diverse economies model displays a range of economic activity uncompensated in capitalism in ways that reveal spaces for potential design interventions. An example of how this work is put into practice is in Bianca Elzenbaumer’s design-led civic participation and feminist economic research in the creation of community economies toolkits for Alpine Community Economies Lab (ACElab). Intersectional feminist economics highlights not only inequitable wages, but also the impoverished material circumstances experienced by women due to the systemic undervaluing of their work, and the ways these injustices are multiplied for people who face additional or other discriminations.

Marxist Economics

Marxist economic theory present dynamic alternatives to the static mass in the Iceberg Model. Illustrations of Marxist economic theory emphasize the flow of capital, power, resources, waste, and other currents through the economy. Design theorist Bianca Elzenbaumer’s work on precarity in the design industry references Marxist economist David Harvey’s work on the domains through which capital revolves in search of profit. Following Harvey, Elzenbaumer’s dynamic model *Capital Evolves* (Figure 9) illustrates “7 distinctive but inter-related ‘activity spheres’ through which capital revolves in search of profit,”⁸⁵ because “capital is a process, not a thing.”⁸⁶ The model depicts the movement of capital through the capitalist political economy as relational and dynamic. In Elzenbaumer’s model, the seven spheres in Harvey’s model – including education, health care, culture, and information – are currently “being commodified in order to fuel processes of accumulation, even if this very often means precarizing people’s lives and enhancing the divide between those with and those without money.”⁸⁷ In a similar vein, Marxist ecological economist Elke Pirgmaier describes capital as “value in motion.”⁸⁸ Her model *The Circuit of Capital and its Dominant Tendencies* (Figure 10) displays the flow of capital between a sphere of production and a sphere of consumption producing nine dominant systemic tendencies: overproduction, technological dynamism, appropriation, commodification, overconsumption, acceleration, alienation, concentration,

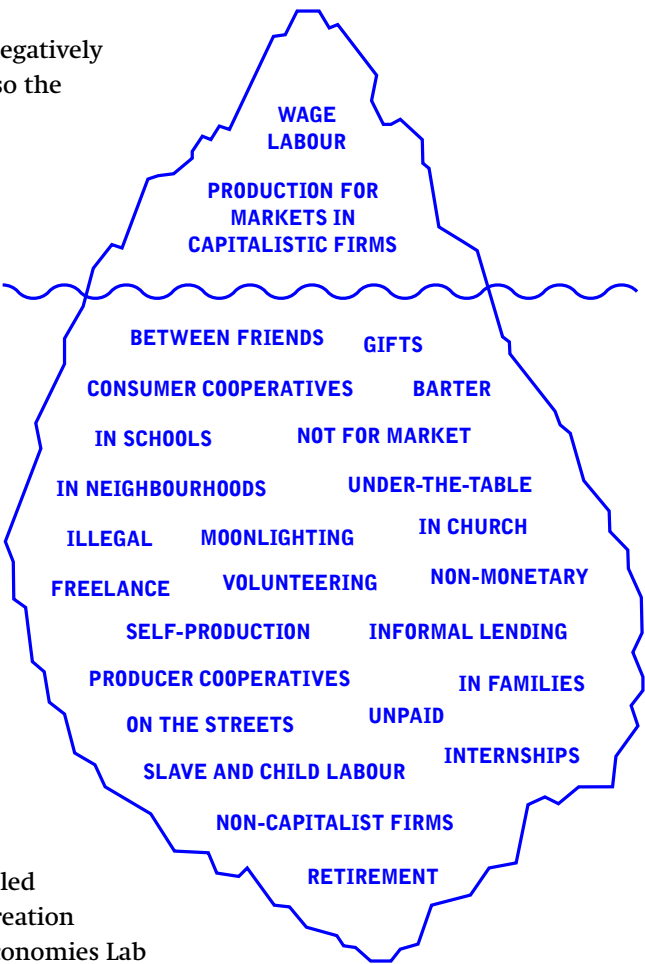


Figure 8 The Iceberg Model. Redrawn by Bianca Elzenbaumer / Brave New Alps. Licensed under CC BA-SA by Brave New Alps, 2018.

2013), 263, <http://research.gold.ac.uk/9920/>.

86 Ibid., 133.

87 Ibid., 83.

88 Elke Pirgmaier, personal correspondence, August 18, 2018.

Figure 9 Capital Evolves.
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 Bianca Elzenbaumer / Brave
 New Alps, 2013.

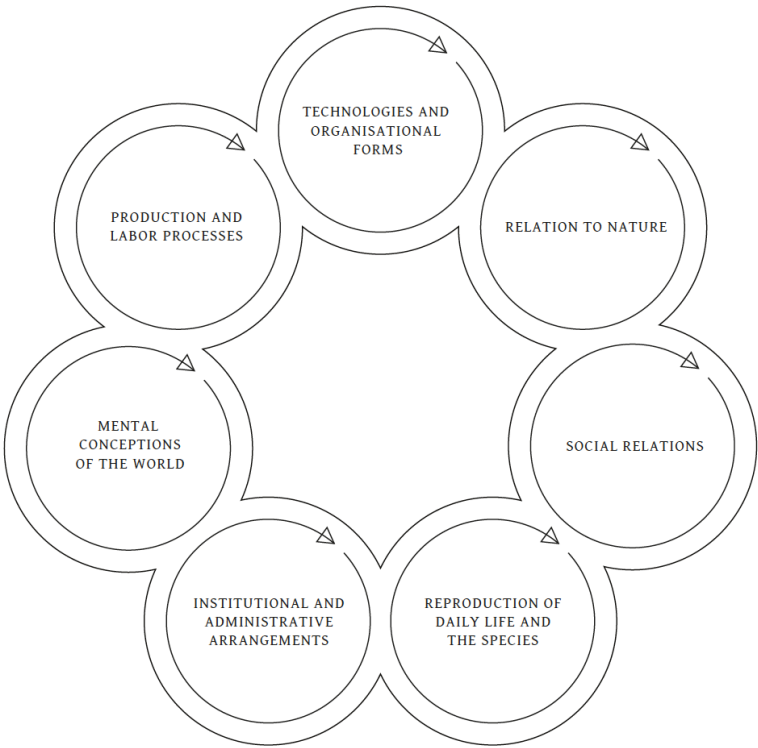
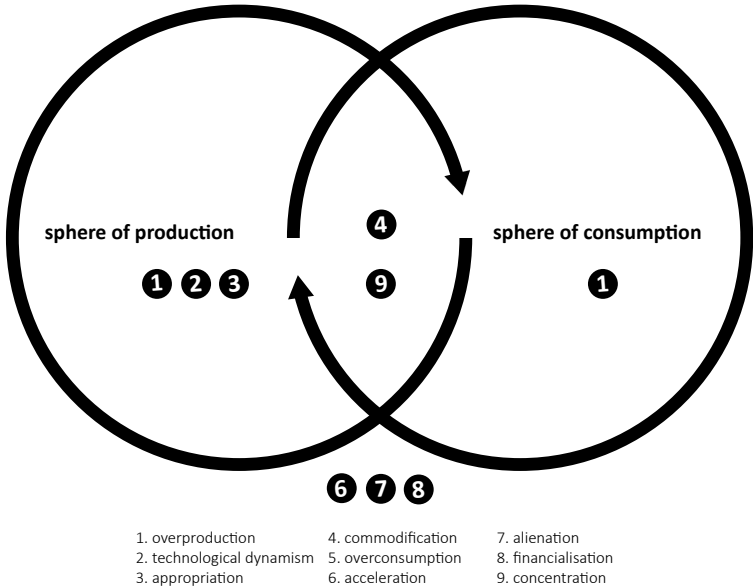
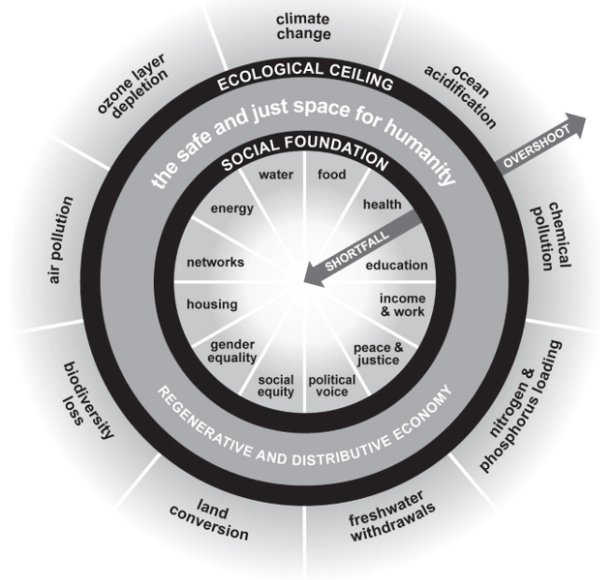
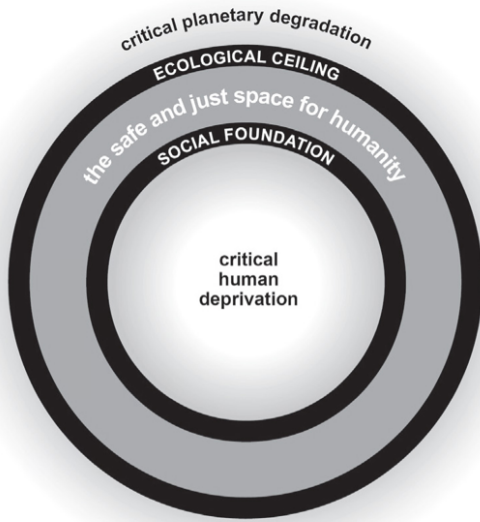


Figure 10 The Circuit of Capital and its Dominant Tendencies. Licensed under CC BY-SA by Elke Pirgmaier and EcoLabs, 2018.



89 Elke Pirgmaier, “Capital: Understanding Social Ecological Dynamics” (presentation, Economic Theory of the Anthropocene: Towards Heterodox Understandings of Sustainable Economies, University of Surrey, Guildford, UK,

and financialization.⁸⁹ Both models present capitalism as a dynamic system where capital moves across domains in processes of resource extraction, labor, and capital accumulation. Both models emphasize economic dynamics as a means of revealing the ways power flows in society. The Marxist political economy gives us a language to describe the economic processes that we recognize as exploitation and the conflict that emerges⁹⁰ from these systemic processes.



Eco-Social Economics as Doughnut Economics

Doughnut economics is Kate Raworth's iconic model of an economy that respects both social needs and the ecological boundaries of the planet. Her best seller *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist* (2017) brings ecological and feminist economics to new audiences, including communities traditionally skeptical of ecological and other heterodox economic ideas (the book was named one of the "best books of 2017" in the *Financial Times*).⁹¹ Raworth's doughnut is a visual metaphor for eco-social economics. The Doughnut models (Figures 11 and 12) represent "a social foundation of well-being that no one should fall below and an ecological ceiling of planetary pressure that we should not go beyond. Between the two lies a safe and just space for all."⁹² Raworth outlines strategies for re-designing economic processes and structures to create distributed and regenerative economies. Here again, ecologically engaged design knowledge is foundational. With ecological principles, the economy can be organized to work with its ecological context (rather than against it) through distributive and regenerative processes.

"An economy that is distributive by design is one whose dynamics tend to disperse and circulate value as it is created, rather than concentrating it in ever-fewer hands. An economy that is regenerative by design is one in which people become full participants in regenerating Earth's life-giving cycles so that we thrive within planetary boundaries."⁹³

Raworth's ecologically embedded economy calls for the design and development of economic policies that prioritize values other than the accumulation of profit⁹⁴ – values aligned with ecological principles.⁹⁵ Building on the doughnut metaphor, the *Embedded Economy* (Figure 13) diagram is a dynamic model which "nests the economy within society and within the living world, while recognizing the diverse ways in which it can meet people's needs and wants."⁹⁶ This diagram makes the social and ecological context explicit; divides the economy into four domains (market, household, state, and commons); and depicts dynamics between the various spheres and domains. This focus of attention on 1) the economy as socially and ecologically embedded, and 2) the economy as comprised of three other domains beyond what we call "the market" is a vision of ecologically engaged, Anthropocene

Figure 11 (Above left) The essence of the Doughnut. Diagram by Christian Guthier. Copyright © 2017 Kate Raworth.

Figure 12 (Above right) The Doughnut. Diagram by Christian Guthier. Copyright © 2017 Kate Raworth.

July 4, 2018), abstract available at http://www.ias.surrey.ac.uk/workshops/heterodox/papers/Anthropocene_Abstracts.pdf.

90 D'Alisa et al., *Degrowth*, 58.

91 Martin Wolf, "Best Books of 2017: Economics," *Financial Times*, December 1, 2017, accessed October 27, 2018, <https://www.ft.com/content/838ecc26-d62c-11e7-8c9a-d9c0a5c8d5c9>.

92 Raworth, *Doughnut Economics*, 17.

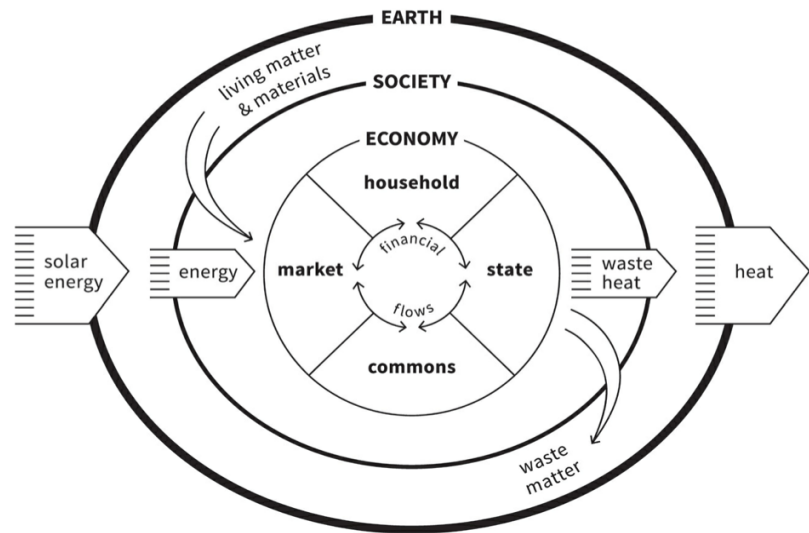
93 Ibid., 128–29.

94 Ibid., 18.

95 Ibid., 62.

96 Ibid., 60.

Figure 13 Embedded Economy.
Diagram by Marcia Mihotich.
Copyright © 2017 Kate Raworth.



97 Raworth, *Doughnut Economics*, 24.

98 Ibid., 56.

99 Heather Kathryn Ross, "The 4 Books Tim Brown Can't Put Down," IDEO, February 8, 2018, accessed October 28, 2018, <https://www.ideo.com/blog/the-4-books-tim-brown-cant-put-down>.

100 Raworth, *Doughnut Economics*, 170.

101 Ibid., 28.

102 Dilnot, introduction to *Design and the Creation of Value*, 204.

103 Stephen McGrail, A. Idil Gaziulusoy, and Paul Twomey, "Framing Processes in the Envisioning of Low-Carbon, Resilient Cities: Results from Two Visioning Exercises," *Sustainability* 5, no. 7 (2015): 8650–51, 8678–79, DOI: <https://doi.org/10.3390/su7078649>.

economics. The donut is a playful and accessible image that has helped move eco-social economics beyond the margins – while also suggesting a definitive break with capitalist economic priorities and structures.

Imaging Economic Thought

The rhetorical power of images to communicate economic ideas is a central theme in Raworth's book. She demonstrates how diagrams have worked historically to establish orthodox economic assumptions with examples such as Paul Samuelson's 1948 *Circular Flow diagram* (Figure 14). This image depicts "income flowing through the economy as if it were water flowing through plumbed pipes"⁹⁷ – illustrating flows in the economy as mechanical processes. But the economy is not based on natural laws – it is based on political decisions that are then presented, either through ignorance or duplicity, as the natural order. The abstracted version of the *Circular Flow diagram* (Figure 15) illustrates flows in the economic systems. From an ecological economics perspective, this model – "the defining depiction of the macroeconomy"⁹⁸ for over 70 years – functions in obscuring ways. These two images facilitate ideological obfuscations by naturalizing, normalizing, and depoliticizing economic processes. The socio-political structures based on the economic models illustrated here are potent systems of social control that determine who will live in poverty and who will live in luxury – as well as what will happen to the climate system. While no one image can capture all the relevant dynamics in a system as complex as the economy, the explanatory power these diagrams have is apparent.

These images obscure powerful dynamics in economic systems. The visual metaphors and models used to communicate economic concepts have rhetorical and ideological power that needs to be interrogated. Images can facilitate conceptual and political obfuscations, so it is worth investigating what not only what is revealed in pictures that support ideological propositions in economics – but what is hidden.

The value of design and visual methods is a theme throughout *Doughnut Economics*, and designers have taken note. The book is described on the IDEO website as one of "the four books Tim Brown can't put down" with a quote by Brown describing it as "a book about economics that makes sense to designers."⁹⁹ Raworth makes bold claims for the use of design as a lever for change. Economics, according to Raworth, "is not a matter of discovering laws: it is essentially a question of

design.”¹⁰⁰ Social and environmental harms generated by economic processes are a result of how economic systems are designed – “inequality, it turns out, is not an economic necessity: it is a design failure.”¹⁰¹ While Raworth is using the concept of design here in a general sense, designers can be helpful allies for the project of enacting economic transitions with specific design practices, skills, capacities, thinking and approaches to knowledge and practice. Raworth is a convincing advocate for visual methods and the power of visual framing. Her book starts and ends with comments about drawing as a practice that helps people conceptualize complex systems and enables new ideas to take form. Her deft use of framing, metaphor, and imagery betray a design sensibility that almost certainly contributes to the book’s popular appeal.

Design Contributions to Economic Transitions

Economic problems are complex and sometimes paradoxical but also open to interpretation. The idea that design can facilitate helpful interpretations of economic ideas, models, and systems as a prelude to the development of design interventions has been explored by design theorists. Clive Dilnot has written about design processes supporting economic conceptualizations and reconfigurations for sustainability and design-led innovation

“that occurs not because of or through a technological development but wholly or almost wholly from the reconfiguration and reconceptualization of an existing model or norm ... there is clearly a phenomenon here that has not been adequately caught out in economics and, indeed, is not even well thought or understood within design. Yet one might reasonably predict that the economics of reconfiguration will be crucial to this century – not least to the economics of sustainment; indeed, it is hard to imagine how a ‘sustainable’ economy, built out of that which is unsustainable, could be other than an economy whose productive principle is reconfiguration.”¹⁰²

This reconfiguration can be understood as an emergent property arising from design approaches that bring ideas and practices from diverse actors together. The heated framing contests¹⁰³ that are challenging the core assumptions of conventional economics transform the possibilities for potential solutions and suggest new opportunities for design-led economic interventions. Two design strategies that can facilitate reconfiguration processes are mapping and frame creation.

Economies are complex systems that can be modeled and mapped as a means to illustrate and understand their basic structure and dynamics while also bringing diverse types of information together to create space for the emergence of new ideas. Fifteen diagrams in this paper illustrate assorted aspects of economic thought to encourage particular ways of conceptualizing the economy. More complex visualizations can be produced with systems oriented design mapping strategies. Mapping is a means to both understand and re-vision existing conditions

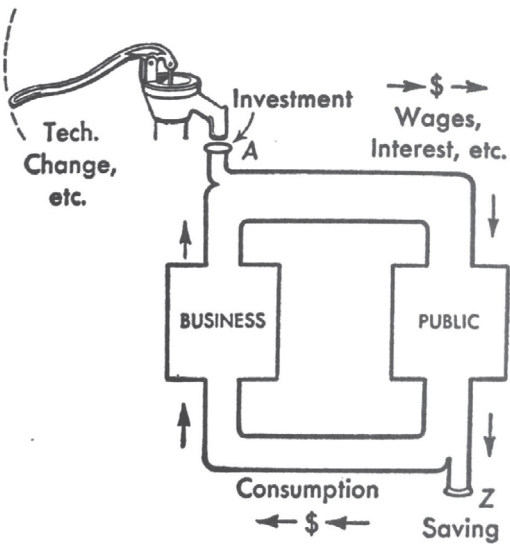


Figure 14 1948 Circular Flow diagram. Copyright © 2017 by Paul Samuelson.

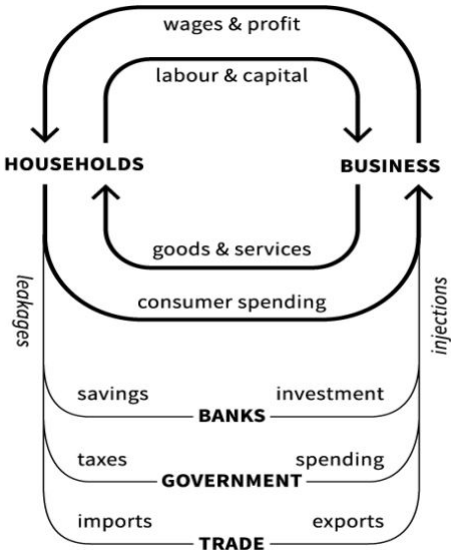


Figure 15 The Circular Flow. Diagram by Marcia Mihotich. Copyright © 2017 Kate Raworth.

¹⁰⁴ Katy Börner and David E. Polley, *Visual Insights: A Practical Guide to Making Sense of Data* (Cambridge: MIT Press, 2014), 6.

¹⁰⁵ James Corner, "The Agency of Mapping: Speculation, Critique and Invention," in *Mappings*, ed. Denis Cosgrove (London: Reaction Books, 1999), 251.

¹⁰⁶ Joanna Boehnert, "Ecological Perception: Seeing Systems," in *Proceedings of DRS 2014: Design's Big Debate*, ed. Youn-kyung Lim et al. (Umeå: Umeå Institute of Design, Umeå University, 2014), 425–38, available at <http://www.drs2014.org/en/publications/>.

¹⁰⁷ Birger Sevaldson, "A Library of Systemic Relations," *Systems Oriented Design*, last modified October 12, 2012, <http://www.systemsorienteddesign.net/index.php/tools/types-of-systemic-relations>.

¹⁰⁸ Arthur H. Robinson and Barbara B. Petchenik, *The Nature of Maps: Essays Toward Understanding Maps and Mapping* (Chicago: The University of Chicago Press, 1976), 74.

¹⁰⁹ Birger Sevaldson, "Systems Oriented Design: The Emergence and Development of a Designerly Approach to Address Complexity," in *Design Learning for Tomorrow: Design Education from Kindergarten to PhD—Proceedings of the 2nd International Conference for Design Education Researchers*, vol. 4, ed. Janne B. Reitan et al. (Oslo: DRS/Cumulus, 2013), 1771–73, available at <https://www.hioa.no/eng/About-HiOA/Faculty-of-Technology-Art-and-Design/DRS-CUMULUS-Oslo-2013/DRS-CUMULUS-Oslo-2013-Proceedings>.

¹¹⁰ Corner, "The Agency of Mapping," 225.

¹¹¹ Dan Lockton and Stuart Candy, "A Vocabulary for Visions in Designing for Transitions," in *Proceedings of DRS 2018: Catalyst*, vol. 3, ed. Christiano Storni et al. (London: Design Research Society, 2018), 910, available at <http://www.drs2018limerick.org/participation/proceedings>.

¹¹² NEON, NEF, Frameworks Institute and PIRC, *Framing the Economy*, 6.

¹¹³ *Ibid.*, 10, 14–15, 37, 40–41, 46.

by visualizing relationships between spaces, actors, and ideas. Mapping allows designers and collaborators to explore and reveal relationships in intersecting economic, social, and ecological systems across various scales and domains.

Knowledge mapping, or knowledge visualization, facilitates collaborations and learning on complex, multi-dimensional and often controversial problems. It bridges disciplinary silos and sectors to address communication and learning challenges because it displays information of different types (temporal, geospatial, topical, statistical, network) on different scales (micro, meso, macro).¹⁰⁴ By bringing distinct types of information together on one map, mapping supports "relational reasoning that intelligently unfolds new realities out of existing constraints, quantities, facts, and conditions."¹⁰⁵ These relational ways of knowing support an awareness of the connections between actors, things, spaces, and fields.¹⁰⁶ Birger Sevaldson has categorized types of relationships that can be captured in mapping processes including structural, hierarchical, semantic, thematic, spatial, temporal, and so on.¹⁰⁷ Knowledge maps support relational ways of understanding that enable more effective navigation of complexity and create a fertile space for emergent ideas to take form. Mapping in this tradition serves as a method to search for meaningful design¹⁰⁸ as it helps designers and collaborators identify tensions and clarify system-level threats and opportunities.¹⁰⁹ Designers use stylized representations of data, space, time, and ideas to make "visible what is otherwise hidden and inaccessible, maps provide a working table for identifying and reworking polyvalent conditions" – they function as "sites for the imagining and projecting of alternative worlds."¹¹⁰ When combining factual conditions with speculative visions, mapping can make new ideas accessible and "real enough to be addressable, to be considered and critiqued and reflected on."¹¹¹ Knowledge maps are a means of engaging with the complexity presented by economic, social, and environmental problems.

Heterodox economic campaigners have identified framing as a lever for transition.¹¹² A consortium of UK based economic justice organizations advocate using the frame of the economy "as designed"¹¹³ to support the understanding that there are alternative ways of organizing economic systems. Donald A. Schön's and Martin Rein's conceptualization of a diagnostic-prescriptive¹¹⁴ frame – where the diagnosis of an issue (the frame) is central to the prescription (design) of a set of solutions – illuminates the potential at the intersection of economics and design. The ways we frame economic problems lay a foundation for the development of particular solutions. Framing navigates the underlying structure of beliefs and social norms to enable new ideas, practices, and design outcomes. Frame creation is an area in which design has traditionally excelled, and it is often a critical part of the creative process.

Framing enables new ways of thinking about the issues underlying a design problem. Designers use framing to enable sense-making on complex phenomenon and as a problem-solving practice in its own right.¹¹⁵ In his work about frame creation in design, Kees Dorst recommends "starting from the only 'known' in the equation, the value that needs to be created, and then adopt or develop up a frame. This initial framing activity is actually a form of induction, reasoning back from consequences."¹¹⁶ Framing and value creation are linked to visioning desired futures as a prelude to the design and development of preferred scenarios. Value is created by making a frame that encourages helpful ways of thinking about current conditions ultimately supporting behavior, attitudes, and values that will, in turn, enable social, technological and even political change.

Since the ways we frame current conditions affect how we respond to problems, the framing of the current epoch – the Anthropocene – also a site for debate. Critical theorists, science and technology studies scholars, and environmental

historians have described the value of the Capitalocene as an alternative frame that directs attention towards the economic dynamics propelling unprecedented Earth system change.¹¹⁷ The generative Ecocene concept¹¹⁸ is a frame proposed by design theorists including the author of this paper. It stresses the importance of ecologically engaged design knowledge in the development of sustainable futures. The Ecocene concept proposes that ecologically engaged, redirected design¹¹⁹ and transition design¹²⁰ responses to the analysis of heterodox economics proposed here holds potential that previous framings lack. With transition facilitating design practices informed by heterodox economics, design can work on a scale appropriate to humanity's current challenges. I must emphasize that none of the design strategies described in this section will work to enable sustainable transitions on a scale that could meet contemporary environmental challenges *without* the analysis provided by ecologically engaged heterodox economics.

Conclusion

Heterodox economics responds to global challenges with theory and practical proposals that can be activated with design methods. It reveals the limitations of neoclassical and neoliberal economics and develops a basis for redirected, distributive, regenerative economies. The version of Anthropocene economics described in this paper draws on ecological, feminist, and Marxist economics with their explorations of diverse economies in the commons, the household, and the state. These alternative economies open space for incorporating and valuing currently undervalued work, including provisioning ecosystem services and the labor of marginalized majority populations. Economists, design theorists, anthropologists, and others investigating the intersection of economic value and social values have exposed the ways that economic processes and structures colonize social and environmental values, systemically de-prioritizing environmental imperatives. Economic processes are driven by what institutional structures are designed to value, and these system structures then strongly influence social values and even affect human subjectivity. I have argued that ecologically viable and socially just futures depend on redirecting the systems that determine what is designed. Design must help build economies that will work with, rather than against, ecological circumstances. Sustainable futures depends on a redirection of design practice, design economies, and broader economic systems. It should be evident that redesigning economic processes and structures is a social and political problem – not a technocratic one. Design – a social practice accustomed to inciting human desire and negotiating subjectivities – is poised to enable redirected, regenerative, and distributive economies on a variety of scales in an infinite number of ways. Considering evidence provided by climate and other environmental scientists on the trajectory of our current economic system, its transformation is a generational imperative that must not be shirked.

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114 Donald A. Schön and Martin Rein, *Frame Reflection: Towards the Resolution of Intractable Policy Controversies* (New York: Basic Books, 1994), 26, 44–45.

115 Kees Dorst, "The Core of 'Design Thinking' and Its Application," *Design Studies* 32, no. 6 (2011): 528, DOI: <https://doi.org/10.1016/j.destud.2011.07.006>.

116 Ibid., 525.

117 Jason W. Moore, *Capitalism and the Web of Life: Ecology and the Accumulation of Capital* (London: Verso Books, 2015), 25–28; Donna Haraway, "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin," *Environmental Humanities* 6, no. 1 (2015): 159–65, DOI: <https://doi.org/10.1215/22011919-3615934>; Bruno Latour, "Anthropology at the Time of the Anthropocene: A Personal View of What Is to Be Studied," in *The Anthropology of Sustainability: Beyond Development and Progress*, ed. Marc Brightman and Jerome Lewis (New York: Palgrave Macmillan, 2017), 35–49, DOI: https://doi.org/10.1057/978-1-137-56636-2_2.

118 Boehnert, *Design, Ecology, Politics*, 11, 184; Joanna Boehnert, "Ecocene Economics and Design" (paper to be presented at Running with Scissors: 13th International Conference of the European Academy of Design, University of Dundee, Dundee, Scotland, April 2019).

119 Fry, *Design Futuring*, 12, 7.

120 Terry Irwin, Gideon Kossoff, Cameron Tonkinwise, and Peter Scupelli, *Transition Design 2015* (Pittsburgh: Carnegie Mellon University, 2015), available at https://design.cmu.edu/sites/default/files/Transition_Design_Monograph_final.pdf.

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