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Insolvent

How to Reorient Computing for Just Sustainability

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CONCLUSION

THIS CHANGES COMPUTING

Climate change—if treated as a true planetary emergency akin to those rising flood waters—could become a galvanizing force for humanity, leaving us all . . . with societies that are safer and fairer in all kinds of other ways as well. . . . It is a vision in which we collectively use the crisis to leap somewhere that seems, frankly, better than where we are right now.

—N. Klein (2014, 14)

Sustainability and justice urge us to change the direction of where computing is headed. This book has argued that the hegemonic orthodox form of computing, expressed in computational thought and rationalist design approaches, is incapable of doing that. It is insolvent: unable to pay the debts owed to the planet and its societies. It is stuck in ill-conceived assumptions about the nature of problems, the workings of the human mind, and the politics of technology. Its mythology evacuates history and politics from design and creates an illusion of neutral technical rationality: a calm cockpit, it appears, from which technology is steered to a better future, one solved problem at a time. But as coherent as it appears, the problemist illusion hides the collateral damage and suffering it produces. In problemism, unreflective solutionism in the unquestioned service of dominant interests reinforces the inequitable status quo, one reified problem at a time.

Understanding where we come from and how we got here helps us decide where to head next. This book spends considerable energy on understanding the myths and their history to demonstrate, step by step, how they shape important tendencies and values in computing research, education, and practice. It describes how these dominant beliefs are misguided and misleading, and it illustrates how they shape and distort what we can talk about when we talk about the role of computing in sustainability and justice. Thus, we progress on Phil Agre's path of critical inquiry, excavating the ground beneath our feet, not to dig us deeper into a hole but to develop an alternative practice of computing.

RESTRUCTURE AND REORIENT: COMPUTING FOR JUST SUSTAINABILITY

The diagnosis of insolvency motivated the *restructuring* performed in part II. By replacing some orthodox assumptions of computing, we gained new perspectives. Aided by computing's critical friends, we are "concerned not with destruction but with reinvention" (Agre 1997a, 24).

Setting the myth of value-neutral technology aside and recognizing the value-loaded nature of systems design makes room to reason about the values that shape it—explicitly and implicitly. Once we stop assuming that technology is neutral and accept that it bears values, we can shift the question from how to avoid misuse to the more meaningful questions. How does this system shift power to the powerless? How does this system help to end oppression? How does this system bring more justice to the world? On what timescale? If we accept that design and development turn values into facts, we are free to ask: Which values do we want to become facts? We become a lot freer to articulate our values and let them shape the designs we are working on. The critical friends of computing offer historical lessons, orienting principles, and concrete design techniques to do that. It should be liberating to see this return of a political understanding of design happen on a broader scale.

Setting the myth of rational decisions aside and recognizing the importance of situated, embodied decision-making in design opens up a space for better understanding the facets and effects of psychological distance in systems design. Once we stop thinking of people as flawed computers,

our thinking about design is liberated. Instead of focusing on nudging users through manipulative framings or minimizing their ability to commit errors, we may begin by considering how our system can expand their horizon of experience; how it can amplify their wisdom and judgment; how it can empower their reasoning. This profoundly changes how we understand and counteract short-sighted or narrow-minded design decisions and support just and sustainable decisions.

Setting the myth of objective problems aside and recognizing the politics of problem framing opens a space for pluriversal design in which contrasting views can meet. Once we refuse to accept the first problem framing thrown our way, we are free to consider the rich perspectives inherent in any problematic situation, to facilitate systemic conversations, and to think more broadly about social responsibility and collective action. The critical friends bring principles, methods, and design tools to help facilitate these conversations.

Each shift changes how we can approach questions of sustainability and justice in computing. Together, these shifts help us overcome problemism. The result can be described as a paradigm shift in research, practice, and education towards what I describe as just sustainability design.

To *reorient* systems design practice and research on this newly leveled playing field, I focused on facilitating and instigating systemic change in engineering-oriented fields to shift their perspectives from within. After all, we have good reasons to believe that ideas can indeed shape our future. As you will have noticed, these chapters describe early paths of just sustainability design rather than a comprehensive roadmap. I have focused on attempts to apply leverage within engineering-focused fields and perspectives, despite the obvious fact that these attempts have not concluded yet and that I have little proof of their global impact on the direction of IT. I focused on requirements practice and decision-making research for two reasons: First, requirements hold a key leverage in systems design for shifting tangible outcomes. In the space of reconciling the social and the technical lies an excellent vantage point for making this shift happen. Second, I identified a gap in our understanding of how those involved in design, in the broadest sense, make their way across the psychological distance involved in just sustainability, and how and why they often fail to go far enough. If we want designers to take more responsible,

sustainable, and just decisions, we certainly can't treat them as operating systems on which we have to install a new design program. Instead, we have to understand how they make those decisions in the first place, how contextual factors influence them, and how this influence shapes the outcomes of design.

COMPUTING AFTER INSOLVENCY

In part III, I thus illustrated how critical friendships between technical computing disciplines and critical social theory can help us to *reinject politics* into design theory and practice: by recognizing the role of values in shaping technological artifacts, the range of reasoning capabilities exhibited in systems design practice, the politics of problem framing, and the power of collective action. The tangible impacts of this reorientation may not be too impressive yet. Undoubtedly, I have failed to mention many actions and ideas of others that are perhaps more inspiring than the story I have told. But I hope that the principles of just sustainability design and the shifts in worldviews articulated here, as incomplete as they are, can serve as a stepping stone for others, perhaps in a form akin to what Paolo Freire (2000) called *conscientização* (conscientiousness)—“learning to perceive social, political, and economic contradictions, and to take action against the oppressive elements of reality” (35). You need to find your own ways to amplify the systemic impact of these shifts toward a sustainable and just role of IT. As Bonnie Nardi (2019) writes,

We cannot return to any particular past, but nothing is stopping us from finding new ways to apply the wisdom of organizing human activity around community, simplicity, equality, and care, and directing design efforts toward these desiderata. It is time to stop designing stuff and high time to use design wisdom and techniques to address the massive problems before us. Each of us has a different path to follow according to our talents, interests, and skills, but there is a path if we choose it. (14)

The critical friends help us locate ourselves at a historical juncture and choose a path. They critique because they care, and so do I: “critique as care means subjecting our ideas, assumptions, and commitments about the world to constant scrutiny . . . it means making us more open to others and less certain of ourselves” (Fernando 2019, 15). It may make

us uncomfortable. This is important: “By making us uncomfortable, critique contains within itself a transformative orientation” (Bargetz and Sanos 2020, 511). It is important to make those involved in systems design “uncomfortable” by opening up the discussion at every stage of design and product development to ideas they are not used to, paths they have not taken, and thoughts that have not occurred to them yet. Many more critical friendships exist beyond those discussed here, and others are just waiting to be formed. Healthy discomfort is often a central intent of art and the humanities. By “defamiliarizing” us from what we thought we knew, good art reveals to us new meanings around us, beyond those which we already know and take for granted. We rely on such critical friends to experience the “otherness” of situations we can’t otherwise ever expect to inhabit.

The grim diagnosis of insolvency is then softened by the realization that many tech workers are already at work restructuring the conceptual foundations and everyday practices of systems design to reorient computing. Working together with computing’s critical friends, they are not just avoiding the traps set by the old myths of computing but reinventing and building a different computing. They know that IT is never neutral, that the human mind is so much more than an information processor, that any problem framing is not only debatable but *must be* debated. They organize to propose and implement collective actions to reorient the trajectory of IT so that it follows a more sustainable and just path. They teach differently, they design differently, and they research differently from the rationalist mainstream. And their work has the potential to reorient computing so that it becomes a genuine force for just sustainability. But they cannot reorient computing without your help. The task is too urgent, the stakes too high, the gravity wells too deep, and the playing fields too tilted.

SYSTEM GOALS AND PARADIGMS: COMPUTING AFTER GROWTH

If just sustainability design and related efforts change computing from inside, other changes are afoot on the outside. As we reorient computing for just sustainability through collective action, we must align with and learn from these broader shifts.

Most centrally, the harrowing influence of the growth-addicted economic development paradigms of the twentieth century resurfaced throughout

this book. As introduced in chapter 1 and discussed in chapter 8, sustainable development is still considered a central compass for sustainability-oriented work in computing (e.g., Hansson, Cerratto Pargman, and Pargman 2021). But there is a genuine conflict between the hegemonic “sustainable development” approach and the need of our planet and our societies. “Sustainable development and its more recent reincarnation ‘green growth’ depoliticize genuine political antagonisms between alternative visions for the future. They render environmental problems technical, promising win-win solutions and the impossible goal of perpetuating economic growth without harming the environment” (Kallis 2015). That the latest SDGs still postulate economic growth targets renders them oxymoronic. And in fact, not a single “developed” country can claim to have developed sustainably (Fanning et al. 2022). If “what is to be sustained with sustainable development, more than the environment or nature, is a particular capitalistic model of the economy” (Escobar 2018, 43), then sustainable development cannot be the guiding frame of reference for just sustainability design. Finding a new compass has become an urgent question:

The dilemma, once recognised, looms so dangerously over our future that we are desperate to believe in miracles. Technology will save us. Capitalism is good at technology. So let’s just keep the show on the road and hope for the best. This delusional strategy has reached its limits. Simplistic assumptions that capitalism’s propensity for efficiency will stabilise the climate and solve the problem of resource scarcity are almost literally bankrupt. We now stand in urgent need of a clearer vision, braver policy making, something more robust in the way of a strategy with which to confront the dilemma of growth. (T. Jackson 2009, 188)

The alternatives to this bankrupt paradigm of cancerous growth are already here. They are not speaking with one voice but many. That may appear as a weakness, but it is also a strength. There is significant alignment between the globally diverse alternatives to “development” and the arguments of the primarily European degrowth movement (Demaria, Kallis, and D’Alisa 2015). These alternatives constitute a kind of discordant pluralism that, significantly, includes knowledges of the Global South:

Our project of deconstructing development opens into a matrix of alternatives, from universe to pluriverse. Some visions and practices are already well-known in activist and academic circles. For instance, *buena vida*, “a culture of life” with various names throughout South America; *ubuntu*, emphasizing the southern African value of human mutuality; *swaraj* from India, centered on self-reliance and

self-governance . . . there are thousands of such transformative initiatives around the world . . . [w]hile many terms have a long history, they reappear in the narrative of movements for well-being, and . . . co-exist comfortably with contemporary concepts such as degrowth and ecofeminism. (Kothari et al. 2019, xxviii)

Together, all these shifts paint “a vision in which we collectively use the crisis to leap somewhere that seems, frankly, better than where we are right now” (N. Klein 2014, 14). And it is important to understand that a shift away from the growth paradigm does not end innovation in computing. Innovation does not need endless growth. Innovation means to do things differently, not to do more every year. Growth and innovation are rather different then, and it is entirely possible to innovate without expanding economic activity. But doing so widely requires forms of organization different from the dominant institutions that today control *how* computing innovates. “Post-growth-oriented organization” for innovation involves a shift in nine dimensions, including shifts from profit to social justice, from competition to cooperation, from commodification of common resources to democratic control over commons, from intellectual property as artificially scarce resource to open-sourced knowledge sharing, and from massively scalable to widely replicated technology (Pansera and Fressoli 2021, 392). These shifts are already taking place in computing work too. As one example of many, the *eReuse* platform for digital device commons (Franquesa and Navarro 2018) embodies each of these organizational innovation shifts. It is part of a trend of *post-growth computing* emerging above all in the LIMITS community. Work in this space already defines its goals not in terms of sustainable development but contributing to human flourishing within ecological boundaries (Nardi et al. 2018; Knowles, Bates, and Håkansson 2018; Nardi 2019; Kaczmarek et al. 2020; Mann, Bates, and Maher 2018). While most are growth-agnostic rather than tackling growth actively, these initiatives and designs demonstrate that there is plenty of space for imagination, creativity, and innovation.

Collapse informatics (Tomlinson et al. 2013) asks us to design in a present of abundance for a future of involuntary scarcity following collapse and rapid contraction of economic activity. But “a degrowth transition is not a sustained trajectory of descent, but a transition to convivial societies living simply and in common” (DeMaria and Latouche 2019, 148). The authors write,

degrowth . . . calls for a democratically led redistributive downscaling of production and consumption in industrialized countries as a means to achieve environmental sustainability, social justice, and well-being . . . the emphasis should not only be on less, but also on different. In a degrowth society everything will be different: activities, forms and uses of energy, relations, gender roles, allocations of time between paid and non-paid work, relations with the non-human world. (148)

So a *degrowth informatics* would need to ask: what is the role of informatics in a voluntary degrowth transition? How can we design to make degrowth a reality? What informatics would a degrown society need? Existing work guided by concepts such as care, commons, cooperatives, community, and conviviality can point the way. We can expect that everything may be organized in subtly different ways: design activities, energy use, system lifecycles, system use and sharing, divisions of labor in design, the priorities of different aspects of system quality, the form of tradeoff analysis between competing features, the business models and reporting requirements, and how we understand our relationships to other teams working on similar issues.

One of the branches of degrowth informatics may be *doughnut informatics*: the use of informatics to help societies flourish within what economist Kate Raworth (2017) calls the doughnut: a “safe and just space for humanity” visualized like the baked good, in which humanity meets basic social life support needs (the inner circle, measured by indicators such as housing, water, food, education, and gender equality) while respecting ecological boundaries (the outer circle of nine planetary boundaries discussed in chapter 1). One of the challenges of doughnut informatics will be to reconcile in its models the involved scales of activity. Doughnut economics scales the macro-level framework of planetary boundaries down from a global level (Persson et al. 2022) to a national (Hickel et al. 2022) and regional level (Boffey 2020). We will need to situate smaller-scale interventions via systems design in such models, drawing on the frameworks discussed early in this book and the lessons of systemic sustainability analysis discussed in chapter 8. The multi-scalar evaluation frameworks that are necessary to evaluate systemic effects of technology design will require the reintegration of hard systems approaches within critically systemic participatory frameworks highlighted there.

In other words, we will need to innovate. And innovative, reinventive change in computing is already underfoot. The concepts above—from

buen vivir to swaraj, from conviviality to ubuntu, from cooperatives to autonomy—already motivate and invigorate some work in computing. The challenge is to amplify and replicate these shifts. But this is not a challenge that computing should address on its own. As Naomi Klein (2014) writes in *This Changes Everything*, “any attempt to rise to the climate challenge will be fruitless unless it is understood as part of a much broader battle of worldviews, a process of rebuilding and reinventing the very idea of the collective, the communal, the commons, the civil, and the civic” (460).

COMPUTING OTHERWISE

Those who work in the emerging paradigm of “computing after growth” often speak in a very different tone than the problemists. For example, Nardi (2019) makes clear that technology is not the savior in this paradigm but one role in many: “Technology can play a critical role in better futures, but not as an exogenous factor. Well-designed technology must enter as an element of a reasoned program of economic transformation with non-negotiable goals of promoting human and non-human well-being” (7). In other words, even if it is a computing team who gets the funding, it may be best to hand the lead to a critical friend.

Where to start? I am wary of telling others who I don’t know well what to do. Deciding what to do begins with understanding who you are, where you are, and when. I hope this book offers many starting points for action, from sustainability evaluation frameworks to pathways for critical reflective practice and from collective action in the workplace to each person’s role in defunding big tech.

The stakes could not be higher. One million species are on track to being extinguished by one: us (Díaz et al. 2019). One of many devastating findings in the 2022 Intergovernmental Panel on Climate Change (IPCC) report on climate change *Impacts, Adaptation and Vulnerability* is that up to 700 million people in Africa—half the continent’s population—are on track to being displaced by water stress *by 2030* (IPCC 2022). At the same time, microplastics, petrochemical products heavily promoted by the fossil fuel industry (Brigham 2022), are now found in human blood (Carrington 2022). There is a good chance they are in yours too. Their health implications are the stuff of nightmares. And yet we are supposed to believe that the most important thing is to grow the economy?

The rude awakening comes when we finally realize that no one else is going to come and fix this for us. This is on us all. And that raises uncomfortable questions. We cannot avoid them a day longer. We need to be prepared to speak up, to ask them, and to realign what we do with the consequences of the responses. The more privilege we have, the more responsibility we have to take risks and act.

Like many, I want a computing that supports me in living my life, connecting with others, and staying alive and well *without* sacrificing the planet or my bodily autonomy for it. Like many, I want a computing that works for all, not just for me, and is driven not by excessive growth imperatives and extractivist logics but by the goals of helping all human and nonhuman nature to flourish. This is not too much to ask. It is not even a radical ask, is it? And the ask is not for a stagnant computing, simply that innovation be organized as ecologically sound and socially beneficial. To think about computing *otherwise* is “to move away from binaries of tech or not (though we may sometimes need to make that judgement), in favour of how we could make tech differently, in the service of our collective and sustainable well being” (TechOtherwise Collective 2021). There is so much to do for computing research, practice, and reality to achieve these lofty goals. What just sustainability design asks us to do is not *less* computing, even if some computing has to stop; and it is certainly not a *lesser* computing. It is a richer, ecologized computing. “Ecologizing society . . . is not about implementing an alternative, better, or greener development. It is about imagining and enacting alternative visions to modern growth-based development” (Kallis 2015). Imagining and enacting these alternative visions certainly requires some subverting of conventions, and “the next act of subversion is . . . to embrace a journey toward regeneration and greater equity” (Light 2022, 37).

How will all this change computing? It is up to you.

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