Designing for the Future—But Which One?

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Insights

- Futures studies consider HCI along three dimensions: time, reality, and complexity.
- Real-world examples from which we might learn about possible futures include the Steampunk community, preppers, and citizens of less prosperous nations.

IMAGE BY GERMANO POLI

The future seems more important than ever. Rapidly accumulating changes to our environment and culture demand that we look ahead. Technology drives change, and we in human-computer interaction should attend to the future. But which future? The one we want? The one we think is coming? Here, I examine HCI research that asks these questions. I consider work ranging over diverse perspectives in an emerging literature within the discipline. HCI often focuses on short-term results [1], but it maintains a generative fringe that permits transformative work to continually operate on the margins, injecting new ideas into normative terrain that is itself essential for rigor and a disciplinary commons.

Harold Nelson and Erik Stolterman observe that design requires finding "particular representations or aspects of ideal things out of a cloud of possibilities" [2]. It is just this cloud that is especially tricky to apprehend when looking forward. In my analysis of the literature, three attributes of "particular representations" of the future emerged: time, reality, and complexity. They suggest several questions: Do the representations of the future look backward or forward, and how far backward or forward? Are representations shamelessly "unreal"

or are they grounded in reality-based retrospective or projective analysis? Is the individual a meaningful unit of analysis or is systems-level interpretation undertaken? I examine each of the attributes in turn.

BACK TO THE FUTURE OR FORWARD TO THE FUTURE?

In principle, the imaginary of the future is an anything-goes space of invention and experiment where strange, untried possibilities are given scope to flourish. In practice, the future may be populated by the past, which is mined for a deep vein of inspiration and ideas. For example, Tanenbaum et al. describe how Steampunk design practices feed off a fascination with 19th-century craftsmanship and the 20th century's passion for science [3]. As a colorful movement of resistance, Steampunk might seem a curiosity. But the authors show how it is strikingly relevant to HCI, which can learn from Steampunk's concrete practices of reuse and recycling, community building, and "critical reflection on the role of technologies" in society [3]. These concerns resonate with those of work in sustainable HCI [4,5,6,7], providing actualized design techniques and methods that realize the technological values of a community.

The Steampunk future is derived from a past in which people exerted personal control over material culture. Tanenbaum et al. report the words of a Steampunk maker: "[Our] values are: recycling materials, finding other functions to objects, enlarging your horizons, and regaining control over the fabrication of our everyday objects." However extravagant we might find the Victorian surfaces of Steampunk artifacts, as a philosophy, Steampunk makes a sharp critique of contemporary culture, looking to the past for appraisal of the current political economy of mass production, industrialization, and the uniformity of modernist design.

Hamid Ekbia and I [8] argue that HCI should pay special attention to political economy, and Steampunk accomplishes this, producing a novel aesthetic future informed by a broad grasp of the past.

A different temporality shapes Batya Friedman and Lisa Nathan's work on multi-lifespan design. They begin their 2010 CHI paper with the gripping words: "Genocide. HIV/AIDS. Famine. Deforestation. Habitat destruction. Species extinction. Forced exodus" [9]. What could HCI have to say about the future of genocide, species extinction, and the other alarming problems currently without solutions? Friedman and Nathan argue that information infrastructures must underlie future approaches to these multifaceted predicaments. We are not going to solve massive displacements "within a single human lifespan," they advise, so we should prepare flexible infrastructures capable of responding to changing conditions. Friedman and Nathan suggest we might "begin with a 100-year time frame—long enough to move beyond a single human lifespan but somewhat within the human ability to imagine." Rather than situating ideas in past practice, the problems Friedman and Nathan grapple with are of necessity future-facing because they are different in scale from anything humanity has ever known. While Steampunk addresses the design of everyday objects—with which humans have a history going back millions of years—the recent past has given rise to unprecedented global difficulties that we must attempt to manage. The problems demand adaptive rather than prescriptive methodologies; complexities of shifting global dynamics guarantee that the problems will resist rigid, prescriptive technofixes [9].

Just as Steampunk arises from a critique of industrial society, Friedman and Nathan establish a critical agenda urging the research community toward projects made necessary by the adverse effects of human activity. They argue that our approach to the future should be to buckle down and address "real-world problems," setting ourselves the task, daunting though it is, of generating knowledge about the design of multi-lifespan information systems—because we are going to need them [9].

Another critical approach looking radically forward is that of speculative design. Here we encounter a whole different imaginative space—of whimsy, play, surreality, even the freakish. The favored instrument of Anthony Dunne and Fiona Raby's practice of speculative design is not the counterfactual, which casts its gaze backward to the past to ask how things might have been different, but the forward-facing what-if scenario [10]. Dunne and Raby explain that what-if scenarios grew out of the texts of science fiction, film, and television, and can play a role in the design of physical objects. Speculative design takes what-if scenarios beyond the empirically based scenarios of conventional HCI design [11], allowing more latitude for designers' creativity.

The objects of speculative design are neither practical nor usable. They are "discursive objects—crafted interventions to create discussions" [12]. Such objects are dreamed up to be shown in museums and exhibitions, furnishing these special set-apart spaces of reflection and conversation. Wakkary et al. designed a different kind of speculative object that functions through real usage in a deliberative practice of "material speculation" [12]. For example, they created a camera that must be destroyed to obtain the photos inside, explaining, "In our contemporary world of constant availability and connectedness, these . . . cameras project a critical stance on 'functionality'—one based on inhibiting, restricting, or removing common or expected features of a technology" [12]. Material speculation tends to look back, favoring contemplation through counterfactuals that rouse us to reflect on past experiences and assumptions as we use objects designed to run counter to our expectations.

Yet another approach to the future lies in collapse informatics—a new subdiscipline, and one with the broadest temporal sweep of futures

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work in HCI. Collapse informatics looks both backward and forward [13,14]. Scoped over thousands of years of human history, a recent collapse informatics paper begins, "History documents the rise and fall of many complex societies. Large human civilizations form over long periods of expansion, sometimes lasting centuries; however, most civilizations that have ever existed have collapsed (Tainter 1990; Diamond 2004)" [14]. Indeed the patron saint of collapse informatics might be archaeologist Joseph Tainter, whose work meticulously documents the processes by which a whole raft of ancient civilizations eventually collapsed. Where Steampunk journeys to the Victorian era, collapse informatics is set, conceptually at least, in an expanse of history all the way back to such cultures as those of Mesopotamia, the Minoans, and the ancient Maya.

Tomlinson et al. argue that the dynamic of collapse inherent in our own civilization is the non-negotiable demand for economic growth—an unsustainable trajectory in a finite world. However, the authors also suggest that looking forward, and possessed of superior science, technology, and history, we are not the Maya or the Romans—we have the opportunity to intervene in our dynamic. Tomlinson et al. contend that "it is time to consider how the CHI community can help civilization react to and plan for this possibility [of collapse]." Although our current growth-based system is unsustainable, and the future will be less abundant, we can prepare for such a future [14].

Collapse informatics proposes that we build a bridge to the future in three ways. The first is to expand the time horizon of our studies, strategically opening up the temporal scope of research. Practical efforts do not always have to go as far into the future as Freidman and Nathan propose, but we should be thinking in decades. If we extrapolate from the very recent past instead of considering the longer pathways of current trends, we will miss the mark [6]. The second bridge to the future is comparative work that can produce an array of possibilities, avoiding the tunnel vision of singular case studies, consistent with Friedman and Nathan's notion of flexible, adaptive infrastructures [14]. A third bridge is to

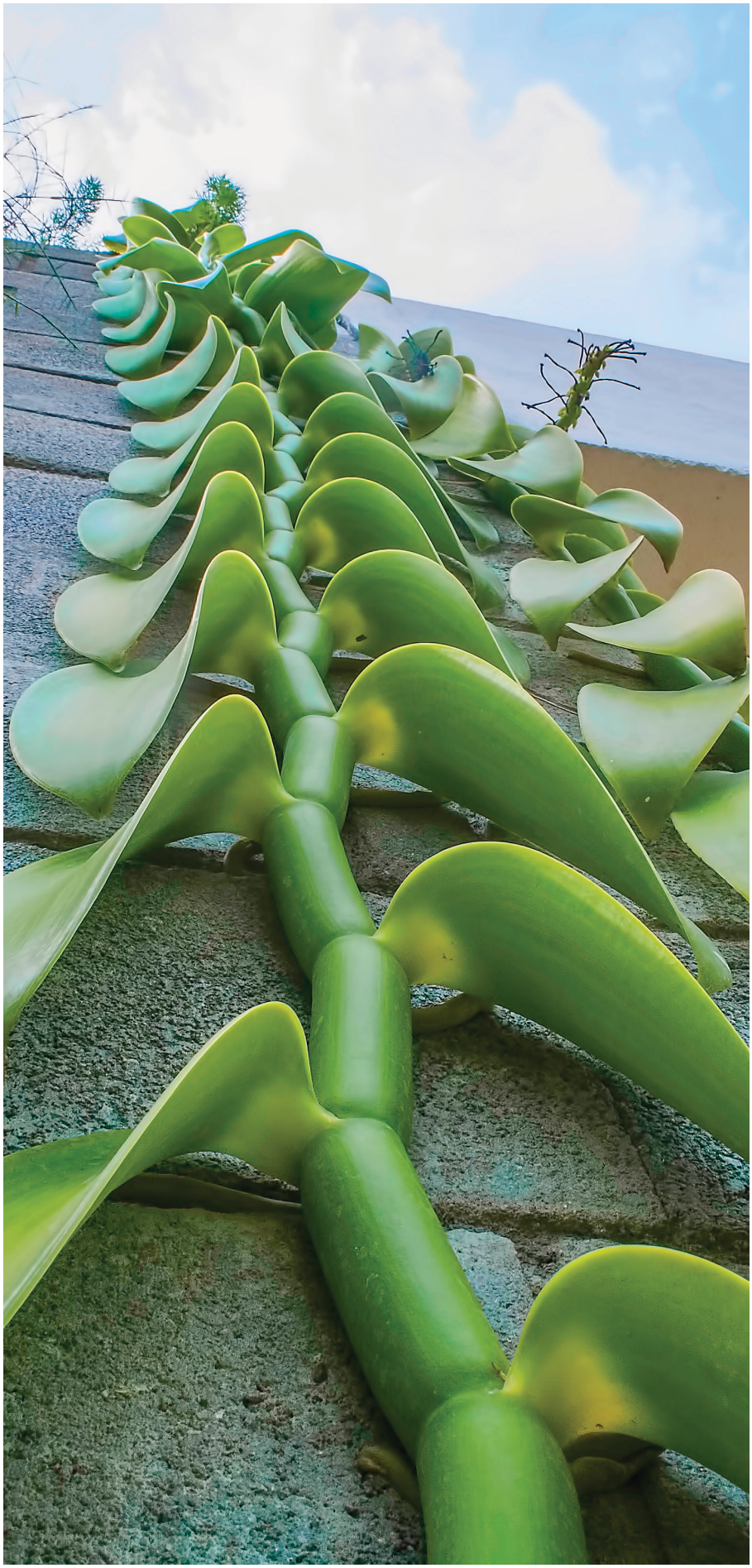

IMAGE BY CARLOS J RIVERA M

checkpoint changes and adjust designs to account for emerging conditions. This approach takes a cue from longitudinal study but is constantly in touch with the future and not just the present [14].

Steampunk and material speculation look backward. Multi-lifespan design and speculative design look forward. Collapse informatics looks backward and forward. All share a common impulse to envision better futures, to offer vital, hands-on programs of thought and action. These approaches inspire us in their very nerviness—let's solve HIV/AIDS, let's develop a way forward toward beauty and durability! One thing we can say in favor of the future is that is it capable of motivating some world-class thinking.

REAL OR UNREAL?

Friedman and Nathan ground their research program in "real-world problems." Speculative design, on the other hand, finds reality a bit tedious, and seeks to untether design from reality's constraints. Dunne and Raby offer a "map of unreality" in which capitalist market pressures are abandoned in favor of emancipatory design practices with scope to consider matters such as alternatives to capitalism [10]. "We are more interested in designing for how things could be," the authors declare. The products of speculative design are found in museums, installations, and events—not stores. Dunne and Raby tartly remark that "the idea that something is not 'real' when real means available in shops, is not good." They believe we are so immersed in the representations that markets want us to see, that we do not dream our own bigger dreams. Design needs to "decouple itself from industry" in order to create better futures [10].

Other research programs attempt to make peace with reality, accepting that markets are not going away anytime soon. These efforts propose that market-based activity be infused with values beyond profitability, utilizing reality-based principles of sociotechnical design. Value-sensitive design has long promoted this approach [15]. In recent work that incorporates concerns of political economy and extends traditional issues of value-sensitive design, Blyth et al. suggest an ethical framework that seeks to interpose a wider set of values into the design of autonomous passenger cars and trucks, including, for example, their potential impacts on different social classes [16].

The authors of this paper observe that there are over a billion vehicles in the world, and transportation systems will not suddenly cease to be based on them. While at some point today's intensive use of vehicles will decrease as we approach peak oil [17], before that happens we will likely see the development and widespread implementation of autonomous vehicles [18]. Blyth et al. therefore suggest an orientation to the future that requires a profound shift in design practice: "Instead of focusing on SDVs [self-driving vehicles] as primarily technical objects . . . an improved approach would require engineers and others *to look into the future they are creating* through the object of their design . . . imagining a range of possible and desired futures while considering a range of values" [16, emphasis added]. A challenge is to adjust design practice so that it more expansively encounters the future, lifting its gaze from the designed object to the complex realities of the world in which the object will be used.

Sociotechnical analysis of the future suggests how questions initially centered on technology can rapidly advance to broader concerns of political economy, sometimes accompanied by a cold slap of reality [8,16]. Blyth et al. note, for example, that, "Safety technology choices are often determined by financial flows and lobbying practices . . . [A]n example [is] the early airbags on U.S. cars being used despite scientific evidence that their design increased deaths in accidents" [16]. The authors suggest we develop ethics to intervene in such decision-making processes and not repeat

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tragedies of the past as we move forward into the future.

Futures perspectives such as speculative design "celebrate unreality" [10], championing freedom for unfettered exercises in imaginative design. Sociotechnical perspectives deal with sober realities through analysis of observable trends. Reality-based approaches are predictive in assessing current trends and considering interventions in the futures the trends portend. But these are conservative predictions—can anyone doubt that autonomous vehicles are coming? We know they are—what we don't know is exactly what form they will take, or the infrastructures that will support them, or their impacts on society. It is in such future spaces that certain practical design interventions are possible. Speculative design serves a different purpose, liberating us to imagine ideal forms, however unreal they might be.

SIMPLE OR NOT SIMPLE?

Some futures work centers on the individual as an agent of change, working within boundaries where a single person can be the unit of analysis. Other approaches assume a pre-analytic vision grounded in the complexity of larger systems of collective activity. The global world system has even snuck into HCI in streams of research such as ICTD and sustainable HCI. Complex global problems like poverty, inequality, resource depletion, and pollution ground these efforts. Jay Chen, for example, explained that "ICTD attempts to confront some of the socio-economic inequities in developing regions through the design and deployment of information and communication technologies. ICTD . . . is defined by the socio-economic condition of poverty, which generally corresponds to some combination of low infrastructure, meager education, deficient healthcare, unreliable food supply, weak or corrupt government . . . [T]he socio-economic, geo-political, and physical environment [are at stake]" [19].

Chen discussed these matters at a recent workshop, "Computing within LIMITS" [20], whose objective was to consider the complexities of designing for the future of limits predicted by current, measurable trends in degradation of the environment, social inequality, and other global disruptions. Kentaro Toyama commented on the recursive nature of the problems of computing within limits: "[S]ome inclinations of the technology industry—its faddishness, consumption orientation, hunger for electrical power and rare natural resources, and rapid innovation-obsolescence cycle—might not only fail to lead to sustainability, but accelerate collapse" [21]. Even as computing attempts to deal with difficult futures, its own behaviors are highly consequential in the world system. Christian Remy and Elaine Huang spoke of how HCI research on the environmental outcomes of planned obsolescence run counter to the goals of industry and marketing: "The . . . goal in any attempt to address obsolescence is to get consumers to keep and use their devices longer, which results in a decrease in sales" [22]. Such contradictions are thorny problems indeed, requiring action at multiple scales, including the world system.

In a NordiCHI paper, Daniel Pargman and Barath Raghavan discussed the future of sustainability research, commenting that "the frameworks and definitions we have presented are grounded in [the complexities of] ecological reality, which we believe must be the starting point of any real effort in sustainability research" [6]. These frameworks require complex analyses such as taking into account a global ecological footprint, that is, an "average productive capacity (bioproductivity) of land and sea areas on Earth in a given year" [6]. We must remind ourselves that this text comes from an HCI paper, not an article in an ecology journal! Such research demonstrates that futures work may follow a path of considerably more complexity, as well as unfamiliar intellectual turf, than we might have expected or feel prepared for.

Some researchers argue that choosing this path is necessary. Blyth et al. say: "[T]he first step in dealing with . . . complexity in technology design [is] accepting that complexity exists. By looking away or shrugging at this complexity, engineers and designers avoid the responsibility for the distribution of benefits and burdens that . . . technology will have on current and future generations" [16]. Choosing not to look away may feel like more than one bargained for. Bran Knowles and Elina Ericksson observe that "the enormity of the predicaments we are facing" provokes considerable anxiety. They point out that if we ignore complexity, or design around it, "it is difficult to imagine how we are going to make a meaningful contribution" [23].

Simpler paths to the future include approaches such as Dunne and Raby's version of speculative design, which professes that "change starts with the individual." As "free agents," we can "make up our own minds" [10]. However, Dunne and Raby also state, somewhat contradictorily, that if the individual is to count, we must move to "speculative everything—generating a multitude of worldviews, ideologies, and possibilities." This stance is beginning to sound more like the complexity "limits" researchers struggle with, and it implies a social process in which we would come together to sort out all those worldviews and possibilities. Mostly, though, Dunne and Raby find inspiration in the elegant simplicity of the heroic individual, the free agent making up his or her own mind. They propose, for example, the notion of individual utopias—possibly seven billion of them! [10]. In these "micro-utopias," individuals "tinker with their own desires," creating, for example, "one-off environments . . . to aid sexual fantasies" or to engage with unusual political views (though it's not clear how

Dunne and Raby offer a "map of unreality" in which capitalist market pressures are abandoned in favor of emancipatory design practices.

to engage politically by oneself). Dunne and Raby take a strong stand against the market, but their micro-utopias recollect the neoliberal fantasy of each individual possessing the capacity to be responsible for his or her well-being. The authors are aware of the contradictions of postulating this type of ideal self and comment that "poor education and other factors" may preclude free agents from acting freely.

The material speculation approach encourages individuals to experience interactive moments that perturb and alter their views of reality. Deployment of the designs, however, often occurs in more complex social units such as families, avoiding the strong program of individual free agency and personal utopias put forward in speculative design.

CONCLUSION

A big problem with designing for the future is that it's hard! All the approaches I have discussed acknowledge this. Dunne and Raby observe how easily speculative design devolves to parody, pastiche, and cliché [10]. Those who take on the complexities of phenomena such as autonomous vehicles or global poverty accept problems of unsettling magnitude. One answer to the difficulty of futures design lies in the practice of what activity theory calls *ascending to the concrete*—a move by which we slice into the opaqueness of abstraction by grounding analysis in the study of concrete activity, *while at the same time* not forgetting about the abstraction to which the analysis answers [24]. Pastiche and such troubles occur when there is no "ascension" from the foundation of a clear abstraction.

To ascend to the concrete in a study of collapse informatics, Donald Patterson traveled to Haiti, a country whose present might bear some resemblance to futures that lie ahead as we come to grips with declining energy reserves and the intensifying effects of climate change. These phenomena already affect Haiti, offering a concrete instance of conditions likely to affect wider areas. Patterson observed that "from [Haiti's] existing position of collapse, we can extrapolate to what kind of infrastructure changes we can expect to see in other parts of the world" [25]. He reported the intermittency of energy availability led end users to take more control of infrastructure than we are accustomed to, requiring new inputs of time and labor [25]. Rhythms of daily life were interrupted by breakdowns in the grid, and families and friends gathered in their homes to socialize when the electricity was off, although outside commitments were disrupted.

Xinning Gui and I similarly visited the future in a study of the social movement Transition Town, a global network of towns with residents who believe that peak oil and climate change pose dangers for which we must prepare now [26]. In the U.K. Transition Town we studied, residents banded together to learn about gardening, food preservation, beekeeping, collecting food such as rose hips, techniques of catching water, and ways to work with local government [26]. To our surprise, rather than facing a future of economic descent as a depressing project of grim necessity, Transition Town residents were joyfully animated by the development of neighborliness, mutual aid, and the fun of learning old-fashioned skills such as raising chickens and repairing bicycles. They even shared "skills" such as "laughing for no reason"—a tongue in cheek means of fostering collective well-being [26].

These excursions to the future do not predict a particular future in any detail, but they foreground patterns of activity, such as end users interpolating themselves in energy management and neighbors organizing to help one another, that provide food for design thought. Future circumstances will not be exactly like those in Haiti or Transition Towns, or any concrete instance we might investigate, but the broad responses observed are useful for reasoning about the future for purposes of design.

Through careful production of concrete texts and objects, speculative design, design fiction, and material speculation constitute textbook cases of ascending to the concrete, generating what philosopher Marx Wartofsky called "possible-worlds

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artifacts." Wartofsky discussed the importance of objects positioned somewhat outside ordinary life that we use to "transcend the more immediate necessities of productive praxis" to imagine "possible worlds" in order to continually develop culture [27,28]. We find bold exemplars of projects "transcending immediate necessities of productive praxis" in the speculative approaches.

Of course, even in ascending to the concrete, there is still no one answer to the question of "which future" we should orient to in our research. We may be able to invent our way into the future as the autonomous vehicle researchers are attempting, or creatively address potential collapse as some sustainability researchers hope, or perhaps we must simply look forward to the consolations of micro-utopias, given the difficulties of systems-level change. As a possible anchor for design practice, I return to the Steampunk devotees, who, while superficially marginal, are not really so kooky after all—they have pointed the way to at least one future in their concrete success at building a strong community and designing an aesthetic that learns from the past but pushes to the future. Their program articulates representations drawn from values of creativity, artistry, thrift, and rejection of the harms of industrial society. Other communities that might teach us about aspects of the future include "preppers," whose extreme self-reliance is turned toward honing practical skills in preparation for the day when they believe they will make their own way as society descends into disorder; countries such as Greece that are near economic collapse; and impoverished nations like the Democratic Republic of the Congo at the very bottom of the socioeconomic barrel. DRC scores dead last in most of the U.N.'s indices of well-being, yet its citizenry continues to develop vibrant traditions of music and art.

There is something important to be taken from varied, concrete engagements with the future, whether the most delicately designed technocentric experiments of material speculation, or broadly informed analyses of the vast complexities of history and political economy. The more deeply we investigate all of the possibilities, the more prepared we will be to design for whichever futures come along.

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