GREY MATTER

The Smartness Mandate: Notes Toward a Critique

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On November 6th, 2008, still in the immediate aftermath of the worldwide economic crisis initiated by the U.S. sub-prime mortgage market collapse, then chairman of IBM Sam Palmisano delivered a speech at the Council on Foreign Relations in New York City. The Council is one of the foremost think tanks in the United States, its membership comprised of senior figures in government, the intelligence community (including the CIA), business leaders, financiers, lawyers, and the media. Yet Palmisano was not there to discuss the fate of the global economy. Rather, he introduced his corporation's vision of the future in a talk entitled "A Smarter Planet." In glowing terms, Palmisano laid out a vision of fiber optic cables, high bandwidth infrastructure, seamless supply chain and logistical capacity, a clean environment, and eternal economic growth, all of which were to be the preconditions for a "smart" planet. IBM, he argued, would lead the globe to the next frontier, a network beyond social networks and mere twitter chats. This future world would come into being through the integration of humans and machines into a seamless "internet of things" that would generate data necessary for organizing production and labor, enhancing marketing, facilitating democracy and prosperity, and—perhaps most importantly— for enabling a mode of automated, and seemingly apolitical, decision-making that would guarantee the survival of the human species in the face of pressing environmental challenges. In Palmisano's talk, "smartness" named the interweaving of dynamic, emergent computational networks with the goal of producing a more resilient human species; that is, a species able to absorb and survive environmental, economic, and security crises by means of perpetually optimizing and adapting technologies.[1]

Palmisano's speech was notable less for its content, which to a degree was an amalgamation of existing claims about increased bandwidth, complexity, and ecological salvation, than for the way in which its economic context and its planetary terminology made explicit a hithereto tacit political promise that has attended the rise of "smart" technologies. Though IBM had capitalized for decades on terms associated with intelligence and thought—its earlier trademarked corporate slogan was "Think"—"smart" was by 2008 an adjective attached to many kinds of computer-mediated technologies and places, including phones, houses, cars, classrooms, bombs, chips, and cities. Palmisano's "smarter planet" tagline drew on aspects of these earlier invocations of smartness, and especially the notion that smartness required an extended infrastructure that produced an environment able to automate many human processes and respond in real time to human choices. His speech also underscored that smartness demanded an on-going penetration of computing into infrastructure to mediate daily perceptions of life. (Smart phones, for example, are part of a discourse in which the world is imagined as networked, interactive, and constantly accessible through technological interfaces, and their touch screen enabled by an infrastructure of satellite networks, server farms, and cellular towers, among many other structures that facilitate the regular accessing of services, goods, and spatial

[1] http://www.cfr.org/technology-and-foreign-policy/smarter-planet-next-leadership-agenda/p17696

location data.) But as Palmisano's speech made clear, these infrastructures now demanded an "infrastructural imaginary"—an orienting telos about what smartness is and does. This imaginary redefined no less than the relationships among technology, human sense perception, and cognition. With this extension of smartness to both the planet and the mind, what had been a corporate tagline became a governing project, able to individuate a citizen, and produce a global polity.

This new vision of smartness is inextricably tied to the language of crisis, whether a financial, ecological, or security event. But where others might see the growing precariousness of human populations as best countered by conscious planning and regulation, advocates of smartness instead see opportunities to decentralize agency and intelligence by distributing it among objects, networks, and life forms. They predict that environmentally extended smartness will take the place of deliberative planning, allowing resilience in a perpetual transforming world. Palmisano proposed "infus[ing] intelligence into decision making" itself.[2] What Palmasino presented in 2008 as the mandate of single corporation is in fact central to design and engineering thinking more generally.

We call these promises about computation, complexity, integration, ecology, and crisis *the smartness mandate*. We use this phrase to mark the fact that the assumptions and goals of "smart" technologies are widely accepted in global polity discussions, and that they have encouraged the creation of novel infrastructures that organize environmental policy, energy policy, supply chains, the distribution of food and medicine, finance, and security policies. The smartness mandate draws on multiple and

[2] http://www.cfr.org/technology-and-foreign-policy/smarter-planet-next-leadership-agenda/p17696

intersecting discourses, including ecology, evolutionary biology, computer science, and economics. Binding and bridging these discourses are technologies, instruments, apparatuses, processes, and architectures. These experimental networks of responsive machines, computer mainframes, political bodies, sensing devices, and spatial zones lend durable and material form to smartness, often allowing for its expansion and innovation with relative autonomy from its designers and champions.

This essay illuminates critically some of the key ways in which the history and logic of the smartness mandate are dynamically embedded in the objects and operations of everyday life—particularly the everyday lives of those living in the wealthier global north, but, for the advocates of smartness, ideally the lives of every inhabitant of the globe. This approach allows us to consider questions such as: What kinds of assumptions link the "predictive" product suggestions made to a global public by retailers such as Amazon or Netflix with the efforts of Korean urban planning firms and Indian economic policymakers to monitor and adapt in real-time to the activities of their urban citizenry? What kinds of ambitions permit the migration of statistically based modeling techniques from relatively banal consumer applications to regional and transnational strategies of governance? How do smart technologies that enable socially networked applications for smartphones—e.g., the Evernote app, for distributed multi-site and multi-user note taking used by its 200 million registered users located primarily in the U.S., Europe, Latin America, and Asia--also cultivate new forms of global labor and governmentality, the unity of which resides in the coordination via smart platforms rather than, for example, geography or class? Each of these examples relies upon the intermediation of networks and technologies that are designated as "smart", yet the impetus for innovation and the agents of this smartness often remain obscure.

We see the brief history of smartness as a decisive moment in histories of reason and rationality. In their helpful account of "Cold War rationality," Paul Erickson and his colleagues have argued that in the years following World War II, American science, politics, and industry witnessed "the expansion of the domain of rationality at the expense of . . . reason," as machinic systems and algorithmic procedures displaced judgment and discretion as ideals of governing rationally.[3] Yet at the dawn of the twenty-first century, Cold War rationality has given way to the tyranny of smartness, an eternally emergent program of real-time, short-term calculation that substitutes "demos" (i.e., provisional models) and simulations for those systems of artificial intelligence and professional expertise and calculation imagined by Cold War rationalists. In place of Cold War warring systems based on "rational" processes that could still fall under the control and surveillance of centralized authorities or states, the smartness mandate embraces the ideal of an infinite range of experimental existences, all based on real-time adaptive exchanges among users, environments, and machines. Neither reason nor rationality are understood as necessary guides for these exchanges, for smartness is presented as a self-regulating

[3] Paul Erickson, Judy L. Klein, Lorraine Daston, Rebecca M. Lemov, Thomas Sturm, and Michael D. Gordin, *How Reason Almost Lost its Mind: The Strange Career of Cold War Rationality* (Chicago: University of Chicago Press, 2015), p. 2. Erickson and his coauthors stress that for Cold War authors and policymakers, the possibility of nuclear war made it imperative that people--or at least military commanders and policy makers--act "rationally," in the sense that tendencies to innovate or depart from programmable rules be prevented; the consequence was that "mechanical rule following . . . become the core of rationality" (31).

process of “optimization” and “resilience” (terms which, as we note below, are themselves moving targets in a recursive system).

Where Cold War rationality was highly suspicious of innovation, this latter is part of the essence of smartness. In place of the self-stabilizing systems and homeostasis that were the orienting ideal of Cold War theorists, smartness assumes perpetual growth and unlimited turmoil; destruction, crisis, and the absence of architectonic order or rationality are the conditions of possibility for smart growth and optimization. Equally important, whereas Cold War rationality emanated primarily from the conceptual publications of a handful of well-funded think tanks, which tended to understand national populations and everyday culture as masses that need to be guided, smartness pervades cell phones, delivery trucks, and health care systems, and relies intrinsically on the interactions among, and the individual idiosyncrasies of, millions or even billions of individuals around the planet. Moreover, whereas Cold War rationality was dominated by the thought of the doppelgänger? rival (e.g., the U.S. vs. the USSR; the East vs. the West), smartness is not limited to binaries.[4] Rather, it understands threats as emerging from an environment, which, because it is always more complex than the systems it encompasses, can never be captured in the simple schemas of rivalry or game theory. This, in turn, allows smartness to take on an ecological dimension: the key crisis is no longer simply that emerging from rival political powers or nuclear disaster but any unforeseeable events that can emerge from an always too-complex environment.

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[4] Though the image of Cold War rationality developed by Erikson et al. is especially useful for our purposes here, we also want to acknowledge alternative histories of temporality and control, many emerging from cybernetics, within the history of Cold War computing. See, e.g., Orit Halpern, “Cybernetic Rationality,” *Distinktion: Scandinavian Journal of Social Theory* 15, no. 2 (2014).

If smartness is what follows after Cold War understandings of reason and rationality, the smartness mandate is the political imperative that smartness be extended to all areas of life. In this sense, the smart mandate is what comes next after "the shock doctrine," powerfully described by Naomi Klein and others.[5] As Klein notes in her book of the same name, the shock doctrine was a set of neoliberal assumptions and techniques that taught policy makers in the 1970s to take advantage of crises to downsize government and deregulate in order to extend the "rationality" of the free market to as many areas of life as possible. The smart mandate, we suggest, is the current instantiation of a new technical logic with equally transformative effects on conceptions and practices of governance, markets, democracy, and even life itself. Yet where the shock doctrine imagined a cadre of experts and advisors deployed to various national polities to liberate markets and free up resources at moments of crisis, the smartness mandate both understands crisis as a normal human condition and extends itself by means of a field of plural agents—environments, machines, populations, data sets—that interact in complex manner and without recourse to what was earlier understood as reason or intelligence. If the shock doctrine promoted the idea that systems had to be "fixed" so that natural economic relationships could express themselves, the smartness mandate deploys ideas of resilience and practices management without ideals of futurity or clear measures of

[5] Naomi Klein, *The Shock Doctrine: The Rise of Disaster Capitalism* (New York: Metropolitan Books/Henry Holt, 2007). Klein's book is part of an extensive bibliography of recent critical work on neoliberalism that also includes David Harvey, *A Brief History of Neoliberalism* (New York: Oxford University Press, 2005), Philip Mirowski and Dieter Plehwe, eds., *The Road from Mont Pèlerin: The Making of the Neoliberal Thought Collective*. Cambridge, MA: Harvard University Press, 2009), Jamie Peck, *Constructions of Neoliberal Reason* (New York: Oxford University Press, 2010), and Philip Mirowski, *Never Let a Serious Crisis Go to Waste: How Neoliberalism Survived the Financial Meltdown* (New York, Verso, 2014).

"success" or "failure." We describe this imperative to develop and instantiate smartness everywhere as a *mandate* in order to capture both its political implications—though smartness is presented by its advocates as politically agnostic, it is more accurate to see it as reconfiguring completely the realm of the political—and the premise that smartness is only possible by drawing upon the "collective intelligence" of large populations from below.

We seek to sketch the deep logic of smartness and its mandate in four sections, each focused on a different aspect. These sections take up the following questions: (1) where does smartness happen; i.e., what kind of *space* does smartness require? (2) what is the *agent* of smartness; i.e., what, precisely, enacts or possesses smartness? (3) what is the key operation of smartness; i.e., what does smartness do? (4) what is the purported result of smartness; i.e., at what does it aim? Our answers to these four questions are the following:

1) The territory of smartness is *the zone*:
2) The (quasi-)agent of smartness is *populations*;
3) The key operation of smartness is *optimization;*
4) Smartness produces *resilience*.

Focusing on how the logics and practices of zones, populations, optimization, and resilience are coupled enables us to illuminate not simply particular instantiations of smartness—e.g., smart cities, grids, or phones—but smartness more generally, and its mandate ("every process must become smart!").

Our analysis draws inspiration from Michel Foucault's concepts of governmentality and biopolitics, Gilles Deleuze's brief account of "the control society," and critical work on immaterial labor. We describe smartness genealogically, that is, as a concept and practices that emerged from the coupling of logics and techniques from multiple fields (ecology, computer science, policy, etc.). We also link smartness to the central object of biopolitics, populations, and see smartness as bound up with the key goal of biopolitics, governmentality. And we emphasize the importance of a mode of control based on what Deleuze describes as open-ended modulation, rather than the permanent molding of discipline; we also underscore the centrality of data drawn from the everyday activities of large numbers of people. Yet insofar as smartness positions the global environment as the fundamental orienting point for all governance—i.e., as the realm of governance that demands that all other problems be seen from the perspective of zones, populations, resilience, and optimization—the tools offered by existing concepts of biopolitics, the control society, and immaterial labor take us only part of the way in our account.[6]

1) Zones

[6] See especially Michel Foucault *The History of Sexuality Vol. I: An Introduction* (New York: Pantheon Books, 1978), *Society Must Be Defended: Lectures at the Collège de France, 1975-76*, trans. D. Macey (New York: Picador, 2003), *Security, Territory, Population: Lectures at the College de France, 1977-78*, trans. G. Burchell, ed. M. Senellart (New York: Palgrave Macmillan, 2007), and *The Birth of Biopolitics: Lectures at the College de France, 1978-79*, trans. G. Burchell, ed. M. Senellart (New York: Palgrave Macmillan, 2008); Gilles Deleuze's "Postscript on the Societies of Control," *October* 59 (1992): 3-7; and reflections on immaterial labor in Maurizio Lazzarato, "Immaterial Labour," *Radical Thought in Italy*, ed. Paolo Virno and Michael Hardt (Minneapolis: University of Minnesota Press, 1996)**:** 132-146, and Michael Hardt and Antonio Negri, *Empire* (Cambridge, MA: Harvard University Press, 2000), 290-94.

Fig.1: Songdo, South Korea. (Photo: Orit Halpern, 09/04/2014.)

Smartness has to happen somewhere. However, advocates of smartness generally imply or note explicitly that its space is not that of the national territory. Palmisano's invocation of a smarter planet, for example, emphasizes the extra-territorial space that smartness requires: precisely because smartness aims in part at ecological salvation, its operations cannot be restricted to the limited laws, territory, or populations of a given national polity. So too designers of "smart homes" imagine a domestic space freed by intelligent networks from the physical constraints of the home, while the fitness app on a smart phone conditions the training of a single user's body through iterative calculations correlated with thousands or millions of other users spread across multiple continents.[7]

[7] On the smart home, see Lynn Spigel, "Designing the Smart House: Posthuman Domesticity and

These activities all occur in space, but the nation-state is neither their obvious nor necessary container, nor is the human body and its related psychological subject their primary focus, target, or even paradigm (e.g., smartness often employs entities such as "swarms" that are never intended to cohere in the manner of a rational or liberal subject). At the same time, though, smartness also depends on complicated and often delicate infrastructures--fiber optic cable networks and communication systems capable of accessing satellite data; server farms that must be maintained at precise temperatures; safe shipping routes; etc.—that are invariably located at least in part within national territories, and often subsidized by federal governments. Smartness thus also requires the support of legal systems and policing that protect and maintain these infrastructures, and most of these latter are provided by national states (even if only in the form of sub-contracted private security services).[8]

This paradoxical relationship of smartness to national territories is best captured as a mutation of the contemporary form of space known as "zones." Related to histories of urban planning and development, where zoning has long been an instrument in organizing space, contemporary zones have new properties married to the financial and

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Conscipuous Production," in *Public Worlds: Electronic Elsewheres: Media, Technology, and the Experience of Social Space*, ed. Chris Berry, Soyoung Kim and Lynn Spigel (Minneapolis, MN, University of Minnesota Press, 2009)**:** 55-92.

[8] There is considerable work--some very critical and some very utopian--on the "smart" city, smart city projects, and "smart" or big data infrastructures. For a sampling see: Rob Kitchin, *The Data Revolution: Big Data, Open Data, Data Infrastructures and Their Consequences* (London: Sage Publications, 2014); Anthony M. Townsend, *Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia* (New York: W.W. Norton and Company, 2014); Carlo Ratti and Matthew Claudel, *The City of Tomorrow: Sensors, Networks, Hackers, and the Future of Urban Life* (New Haven: Yale University Press, 2016); Adam Greenfield, *Against the Smart City (the City Is Here for You to Use)* (New York: Do projects, 2013); Shannon Mattern, *Deep Mapping the Media City* (Minneapolis: University of Minnesota, 2015); and Richard Sennett, "The Stupefying Smart City," paper presented at the Urban Age Electric City Conference, London, 2012.

logistical practices that underpin their global proliferation. In the past two decades, numerous urban historians and media theorists have redefined the zone in terms of its connection to computation, and described the zone as the dominant territorial configuration of the present. As architectural theorist Keller Easterling notes, the zone should be understood as a method of "extra-statecraft" intended to serve as a platform for the operation of a new "software" for governing human activity. Brett Nielsen and Ned Rossiter invoke the figure of the "logistical city" or zone to make the same point about governmentality and computation.[9]

Zones do not denote the demise of the state, but rather the production of new forms of territory, the ideal of which is a space of exception to national and often international law. A key example is the so-called "free trade zone." Free trade zones are a growing phenomenon, stretching from Pudong District in Shanghai to the Cayman Islands, and even the business districts and port facilities of New York State, and are promoted as conduits for the smooth transfer of capital, labor, and technology globally (with smooth defined as a minimum of delay as national borders are crossed). Free trade zones are in one sense discrete physical spaces, but they also require new networked infrastructures linked through the algorithms that underwrite geographic information systems (GIS) and global positioning systems (GPS) and computerized supply chain management systems, as well as the standardization of container and shipping architecture and regulatory legal exceptions (to mention just some of the protocols that

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[9] See Keller Easterling, *Extrastatecraft: The Power of Infrastructure Space* (New York: Verso, 2014) and Ned Rossiter, *Software, Infrastructure, Labor: A Media Theory of Logistical Nightmares* (New York: Routledge, 2016).

produce these spaces). Equally important, zones are understood as outside the legal structure of a national territory, even if they technically lie within its space[10].

In using the term zone to describe the space of smartness, our point is not that smartness happens in places such as free trade zones, but rather that smartness aims to globalize the zonal logic, or mode, of space. This logic of geographic abstraction, detachment, and exemption is exemplified even in a mundane consumer item such as activity monitors—e.g., the Fitbit--that links data about the physical activities of a user in one jurisdiction with the data of users in other jurisdictions. This logic of abstraction is more fully exemplified by the emergence of so-called “smart” cities. An organizing principle of the smart city is that civic governance and public taxation will be driven, and perhaps replaced, by automated and ubiquitous data collection. This ideal of a “sensorial” city that serves as a conduit for data gathering and circulation is a primary fantasy enabling smart cities, grids, and networks. Consider, for example, a prototype “greenfield” (i.e., from scratch) smart city development, such as Songdo in South Korea (Fig. 1). This smart city is designed with a massive sensor infrastructure for collecting traffic, environmental, and closed-circuit television (CCTV) data, and includes individual smart homes (apartments) with multiple monitors and touch screens for temperature control, entertainment, lighting, and cooking functions. The city’s developers also hope

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10 For more on the “logistical” city and free trade zones, see Brett Nielsen and Ned Rossiter, “The Logistical City,” In: *Transit Labour: Circuits, Regions, Borders* (Sydney: University of Western Sydney, 2011): 2-5; Aiwha Ong and Ananya Roy, ed. *Worlding Cities, or the Art of Being Global* (London: Routledge, 2011); Saskia Sassen, *Expulsions: Brutality and Complexity in the Global Economy* (Cambridge: Harvard University Press, 2014); Manuel Castells, *The Rise of the Network Society* (New York: Wiley-Blackwell, 2000); Deborah Cowen, *The Deadly Life of Logistics: Mapping Violence in Global Trade* (Minneapolis: University of Minnesota, 2014); and David Harvey, *Spaces of Capital* (London: Routledge, 2012).

that these living spaces will eventually monitor multiple health conditions through home testing. Implementing this business plan, however, will require either significant changes to, or exemptions from, South Korean laws about transferring health information outside of hospitals. Lobbying efforts for this juridical change have been promoted by Cisco Systems (a U.S.-based network infrastructure provider), the Incheon Free Economic Zone (the governing local authority), and Posco (a Korean chaebol involved in construction and steel refining), the three most dominant forces behind Songdo.

What makes smart territories unique in a world of zonal territories is the specific mode by which smartness colonizes space through the management of time (and this mode also helps explain why smartness is so successful in promulgating itself globally). As demonstrated by our opening example of Palmisano's inaugural address, smartness is predicated on an imaginary of "crisis" that is to be managed through a massive increase in sensing devices, which in turn purportedly enables self-organization and constant self-modulating and self-updating system. Smart platforms link zones to crisis via two key operations: 1) a temporal operation, by means of which uncertainty about the future is managed through constant redescription of the present as a "version," "demo," or "prototype" of the future, and 2) an operation of self-organization, through which earlier discourses about structures and the social are replaced by concerns about infrastructure, a focus on sensor systems, and a fetish for big data and analytics, which purportedly can direct "development" in the absence of clear cut ends or goals.

In this sense, the development of so-called smart cities such as Songdo follows a logic of software development. Every present state of the smart city is understood as a demo or prototype of a future smart city; every operation in the smart city is understood in terms of testing and updating. Engineers interviewed at the site openly spoke of it as an "experiment" and as a "test," admitting that the system did not work, but stressing that problems could be fixed in the next instantiation elsewhere in the world.[11] As a consequence, there is never a finished product, but rather infinitely replicable yet always preliminary, never to be completed versions of these cities around the globe.

This temporal operation is then linked to an ideal of self-organization. Smartness largely refers to computationally and digitally managed systems, from electrical grids to building management systems, that can learn and, in theory, adapt by analyzing data about themselves. Self-organization is thus linked to the operation of optimization (which we describe in more detail below). Systems correct themselves automatically in relationship to their own operations. This organization is imagined as being immanent to the physical and informational system at hand; that is, optimized by computationally collected data rather than by "external" political or social actors. At the heart of the smartness mandate is thus a logic of immanence, by means of which sensor instrumentation adjoined to emerging and often automated methods for the analysis of large data sets allow a dynamic system to detect and direct its continued growth.[12]

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[11] Orit Halpern, Jesse LeCavalier, and Nerea Calvillo. "Test-Bed Urbanism," *Public Culture* 26, no. March (2013): 272-306: 274.

[12] Smartness thus partakes in what Shannon Mattern calls methodolatry, a constant obsession with methods and measurement to assess prototypes that are never completed, and hence, assessment of results without any clear final metric or endpoint. See Shannon Mattern, "Methodolatry and the Art of Measure", *Places*, November 2013: https://placesjournal.org/article/methodolatry-and-the-art-of-measure/ Accessed January 21, 2015.

One of the key, and troubling, consequences of demo-ing and self-organization as the two zonal operations of smartness is that the overarching concept of "crisis" comes to obscure differences in kinds of catastrophes. While every crisis event—for example, the 2008 sub-prime mortgage collapse or the Tohoku earthquake of 2011—is different, within the demo-logic that underwrites the production of smart and resilient cities, these differences can be subsumed under the general concept of crisis, and addressed through the same methods (the implications of which must never be fully engaged, because we are always "demoing" or "testing" solutions, never actually solving the problem). Whether threatened by terrorism, sub-prime mortgages, energy shortages, or hurricanes, smartness always respond in essentially the same way; the demo is a form of temporal management that through its practices and discourses evacuates historical and contextual specificity of particular catastrophes and evades ever having to assess or represent the impact of these infrastructures, because no project is ever "finished." It is this evacuation of differences, temporalities, and societal structures that most concerns us in confronting the extraordinary rise of ubiquitous computing and high-tech infrastructures as solutions to political, social, environmental and historical problems confronting urban design and planning, and engines for producing new forms of territory and governance.

2) Populations

If zones are the places in which smartness takes place, *populations* are the agents—or more accurately, the "enabling medium"—of smartness. Smartness is located neither in the source (producer) nor the destination (consumer) of a good or information such as a smart phone, but is rather the outcome of the algorithmic manipulation of billions of traces left by thousands, millions, or even billions of individual users. Smartness requires these large populations, for they are the medium of what we will call "partial perceptions" within which smartness emerges. Though, as we discuss below, these populations should be understood as fundamentally biopolitical in nature, it is more helpful first to recognize the extent to which smartness relies on an understanding of population drawn from twentieth-century biological sciences such as evolutionary biology and ecology.

Biologists and ecologists often use the term population to describe large collections of individuals with the following characteristics: (a) each member of the population differs at least slightly from one another; (b) these differences allow some individuals to be more "successful" vis-à-vis their environment than other individuals; (c) there is a form of memory that enables differences that are successful to appear again in subsequent generations and so, as a consequence, (d) the distribution of differences across the population tends to change over time.[13] This emphasis on the importance of individual difference for long-term fitness thus distinguishes this use of the term

[13] For a key early reflection on biological "population thinking," see Ernst Mayr, "Darwin and the Evolutionary Theory in Biology," in *Evolution and Anthropology: A Centennial Appraisal*, ed. B. J. Meggers (Washington, D.C.: Anthropological Society of Washington, 1959), 1-10. For a helpful reflection on key aspects of biological concepts of population, see Peter Godfrey-Smith, *Darwinian Populations and Natural Selection* (Oxford: Oxford University Press, 2009).

population from more common political uses of the term to describe the individuals who live within a political territory.[14]

Smartness takes up a biologically oriented concept of population but repurposes it for non-biological contexts. Smartness presumes that each individual is distinct not only biologically, but also in terms of habits, knowledge, consumer preferences, etc., and that information about these individual differences can usefully be grouped together, so that algorithms can locate subgroupings of this data that thrive or falter in the face of specific changes. Though the populations of data drawn from individuals may map onto traditional biological or political divisions, more generally groupings and subgroupings revolve around consumer preferences, and are drawn from individuals in widely separated geographical regions and polities. (For example, Netflix's populations of movie preferences are currently created from users distributed throughout 190 countries.[15]) Moreover, though these data populations are (generally) drawn from humans, they are best understood as distinct from the human populations from which they were emerge: these are simply data populations of, for example, preferences, reactions, or abilities. This is true even in the case of information drawn from human bodies located in the same physical space. In the case of the smart city, the information streaming from fitbits, smart phones, credit cards, and transport cards are generated by human bodies in close physical proximity to one another, but individual data populations are then agglomerated at

[14] On complicated and shifting relationships between natural and social scientific approaches to population in the twentieth century, see Edmund Ramsden, "Eugenics from the New Deal to the Great Society: genetics, demography and population quality," *Studies in History and Philosophy of Biological and Biomedical Sciences* 9 (2008): 391–406.
[15] See http://techblog.netflix.com/2016/02/recommending-for-world.html. Accessed October 27, 2016.

different temporalities and scales, depending on the problem being considered (transportation routing, energy use, consumer preferences, etc.). These discrete data populations enable processes to be optimized (i.e., enable “fitness” to be determined), which in turn produces new populations of data, and hence a new series of potentialities for what a population is, and what potentials these populations can generate.

A key premise of smartness is that while each member of a population is unique, it is also “dumb”—that is, limited in its “perception”—and that smartness emerges as a property of the population as a whole only when these limited perspectives are linked via environment-like infrastructures. Returning to the example of the smart phone operating in a smart city, the phone becomes a mechanism for creating data populations that operate without the cognition or even direct command of the subject. (The smart phone, for example, automatically transmits its location, as can also transmit other aspects of about how it has been used.) If, in the biological domain, populations enable long-term species survival, then in the cultural domain, populations enable smartness, provided that populations are networked together with smart infrastructures. Populations are the perceptual substrate that enable modulating interactions among agents within a system that sustains particular activities. The infrastructures ensure, for example, that “given enough eyeballs, all bugs are shallow” (Linus’s Law); that problems can be “crowdsourced”; that there can be “collective intelligence”; and so on.[16] The concept of

[16] As these examples suggest, we see the concept of population as more useful for an analysis and critique of smartness than contemporary alternative terms such as crowds, swarms, and collectives. While each of these terms admittedly stress different aspects--population emphasizes long-term biological adaptability and persistence, crowds and swarms emphasize speed of change and decentralized control, and collective is a more clearly political term—the concept of population underscores the evolutionary logic of smartness, as

population also allows us to understand better why the zone is the necessary place of smartness, for there is often no reason that national borders would necessarily parse population differences (in abilities, interests, preferences, or biology) in any way that is meaningful for the key operation of smartness.

This creation and analysis of data populations is clearly biopolitical in the sense initially outlined by Michel Foucault, but it is also key to recognize smartness as a significant mutation in the operation of biopolitics. As Foucault stressed, the concept of population was central to the emergence of biopolitics in the late eighteenth century, for it denoted a "collective body" that had its own internal dynamics (of births, deaths, illness, etc.), which were quasi-autonomous in the sense that they could not be commanded or completely prevented by legal structures, but could nevertheless be subtly altered through biopolitical regulatory techniques and technologies (e.g., required inoculations; free market mechanisms; etc.).[17] On the one hand, smartness is biopolitical in this same sense, for the members of its populations—populations of movie watchers, cell phone users, health care purchasers and users, etc.—are assumed to have their own internal dynamics and regularities, and the goal of gathering information about these dynamics is not to discipline individuals into specific behaviors, but rather to find points

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well as the underlining meanings of optimization and resilience central to its operation. The concept of "multitude" employed (in different ways) by Paolo Virno and by Hardt and Negri is more helpful in drawing off aspects of smartness from their embeddedness within naturalistic and neo-liberal assumptions, yet it is not clear to us that these authors successfully engage the ecological dimension of smartness, which is absolutely essential to its current appeal. See Paolo Virno, *A Grammar of the Multitude: For an Analysis of Contemporary Forms of Life* (New York: Semiotext(s) Foreign Agents Series, 2004); Hardt and Negri, *Empire*, as well as *Multitude: War and Democracy in the Age of Empire* (New York, Penguin Press, 2004), and *Commonwealth* (Cambridge, MA, Belknap Press of Harvard University Press, 2009).

[17] See especially Foucault, *The History of Sexuality Vol. I*, 25-26, 139-47; *Society Must Be Defended*, 239-64; and *Security, Territory, Population,* 38-44, 62-79.

of leverage within these regularities that can produce more subtle and widespread changes.

On the other hand, the biopolitical dimension of smartness cannot be understood as simply "more of the same," for four reasons. First, and in keeping with Deleuze's reflections on the control society, the institutions that gather data about populations are now more likely to be corporations, rather than the state.[18] Second (and as a consequence of the first point), smartness's data populations often concern not those clearly biological events on which Foucault focused, but rather variables such as attention, consumer choices, transportation choices, etc. Third, though the data populations that are the medium of smartness are drawn from populations of humans, this data relates differently to individuals than in the case of Foucault's more health-oriented examples. Data populations themselves often do not need to be (and cannot be) mapped directly back onto discrete human populations: one is often less interested in discrete events that happen infrequently along the individual biographies of a polity (e.g., smallpox infections) than in frequent events that may happened across widely dispersed groups of people (e.g., movie preferences). The analysis of these data populations is then used to create, via smart technologies, an individual and customized "information-environment" around each individual, which does not aim at disciplining individuals, in Foucault's sense, but rather aims to extend ever deeper and further the quasi-autonomous dynamics of populations. Fourth, in the case of systems such as high-speed financial trading and derivatives, and in the logistical management of automated supply chains, entire data

[18] Deleuze, "Postscript on the Control Society."

populations are produced and acted upon directly through entirely machine-to-machine data gathering, communication, analytics, and action.[19] These new forms of automation and of producing populations mark transformations in both the scale and intensity of the interweaving of algorithmic calculation and life.

3) Optimization

Smartness emerges when zones link the increasingly fine-grained, quasi-autonomous dynamics of populations for the sake of *optimization*. It is this pursuit of "the best"—the fastest route between two points; the most reliable prediction of a product a consumer will like; the least expenditure of energy in a home; the lowest risk and highest return in a financial portfolio; etc.—that justifies the term smartness. Contemporary optimization is a fundamentally quantitative, but also calculation-intensive, operation: it is a matter of finding, given specified constraints, maxima or minima. Locating these limits in population data often requires millions or billions of algorithmic mathematical calculations. Hence the role of computers (which run complex algorithms at speeds effectively "real-time" for humans), globally distributed sensors (which enable constant global updating of distributed information), and global communications networks (which connect those sensors with that computing power).

Though optimization has a history, including techniques of industrial production and sciences of efficiency and fatigue pioneered in the late nineteenth and early twentieth

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[19] On financialization and computation, see Michael Lewis, *Flash Boys: A Wall Street Revolt* (New York: W. W. Norton & Company, 2014) and Donald A. MacKenzie, *An Engine, Not a Camera How Financial Models Shape Markets* (Cambridge, MA: MIT Press, 2006).

century by Fredrick Winslow Taylor and Frank Gilbreth, its most current instantiations radically differ from its past.[20] The term "optimization" appears to only have emerged into common usage in English in the 1950's following World War II.[21] Related to emerging techniques such as game theoretical tools and computers, optimization is a particular form of efficiency measure. To optimize is to find the best relationship between minima and maxima performances of a system. It is not a normative or absolute measure of performance, but an internally referential and relative one. Optimization thus mirrors the temporality of the test-bed, the version, and the prototype endemic to "smart" cities and zones.

Optimization is the technique by which smartness promulgates the belief that everything—every kind of relationship among humans, their technologies, and the environments in which they live—can and should be algorithmically managed. Shopping, dating, exercising, the practice of science, the distribution of resources for public schools, the fight against terrorism, the calculation of carbon offsets and credits: all of these processes can—and must!—be optimized. Optimization fever propels the demand for

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[20] Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernit*y (Berkeley, CA : University of California Press, 1992).

[21] The term was used in the mid-19th century, but, according to Google Ngram, did not enter common parlance until the 1950's. Google, Ngram viewer, "optimization": https://books.google.com/ngrams/graph?content=optimization&year_start=1800&year_end=2000&corpus=15&smoothing=3&share=&direct_url=t1%3B%2Coptimization%3B%2Cc0, accessed November 4, 2016. There is not, to our knowledge, any critical history of optimization, and existing historical sketches written by mathematicians and economists tend to position optimization as a biological drive or natural force that received proper mathematical formulation in the eighteenth century, and was more fully developed in the post WWII period. (See, e.g., the entry on "History of Optimization" in the Encyclopedia of Optimization, ed. Christodoulos A. Floudas [New York: Springer, 2008]). However, for a useful account of optimization theory in economics, see Phillip Mirowski, *More Heat than Light: Economics as Social Physics; Physics as Nature's Economics* (Cambridge, Cambridge University Press, 1989) and *Machine Dreams: Economics Becomes a Cyborg Science* (Cambridge, Cambridge University Press, 2002), and for optimization in logistics, see Jesse LeCavallier, T*he Rule of Logistics: Walmart and the Architecture of Fulfillment* (Minneapolis: University of Minnesota, 2016).

ever more sensors—more sites of data collection, whether via mobile device apps, hospital clinic databases, tracking of website clicks, etc.—so that optimization's realm can perpetually be expanded, and optimization itself further optimized. Smart optimization also demands ever-increasing evacuation of private interiority on the part of individuals, for such privacy is now often implicitly understood as an indefensible withholding of information that could be used for optimizing human relations.[22]

Smart optimization also presumes a new, fundamentally practical, epistemology, for smartness is not focused on determining absolutely correct (i.e., "true") solutions to optimization problems. The development of calculus in the eighteenth century encouraged the hope that, if one could simply find an equation for a curve that described a system, it would then always be possible in principle to locate absolute, rather than simply local, maxima and minima for a system. However, the problems engaged by smartness—e.g., travel mapping, healthcare outcomes, risk portfolios—often have so many variables and dimensions that it would be, even in principle, impossible to solve an equation completely. As Dan Simon notes, even a problem as apparently simple as determining the most optimal route for a salesperson who needs to visit 50 cities would be impossible were one to try to calculate all possible solutions. There are 49! (= 6.1 x 10^{62}) possible solutions to this problem, which is

[22] This evacuation of interiority and exteriority is arguably a key reason for the recent turn to "anonymity" as a form of political and technical action, and the rise of "dark" pools, and other "dark" infrastructures, to facilitate on-going privatization and wealth accumulation by the select few. On anonymity, see Gabriella Coleman, *Hacker, Hoaxer, Whistleblower, Spy: The Many Faces of Anonymous* (New York: Verso, 2015); on dark pools, see Scott Patterson, *Dark Pools: High-speed traders, AI bandits, and the Threat to the Global Financial System* (New York, Crown Business, 2012).

> beyond the capability of contemporary computing: even if one had a trillion computers, each capable of calculating a trillion solutions per second, and these computers had been calculating since the universe began—a total computation time of 15 billion years—they would not yet have come close to calculating all possible routes.[23]

In the face of the impossibility of determining absolute maxima or minima for these systems by so-called "brute force" (i.e., calculating and comparing all possible solutions), contemporary optimization instead involves finding good-enough solutions: maxima and minima which may or may not be absolute, but are more likely than other solutions to be close to absolute maxima or minima. The optimizing engineer selects among different algorithmic methods that each produce, in different ways and with different results, good-enough solutions.

In the absence of any way to calculate absolute maxima and minima, the belief that smartness nevertheless locates "best" solutions is supported both technically and analogically. This belief is supported technically in that different optimization algorithms are run on "benchmark" problems—that is, problems that contain numerous local maxima and minima, but for which the absolute maximum or minimum *is* known—in order to determine how well a particular algorithm performs on a given kind of problem; if the algorithm runs well on a benchmark problem, then it is presumed to be more likely to run well on similar real world problems.

[23] Dan Simon, *Evolutionary Optimization Algorithms* (Somerset, NJ, USA: John Wiley & Sons, 2013), pp. 20-1.

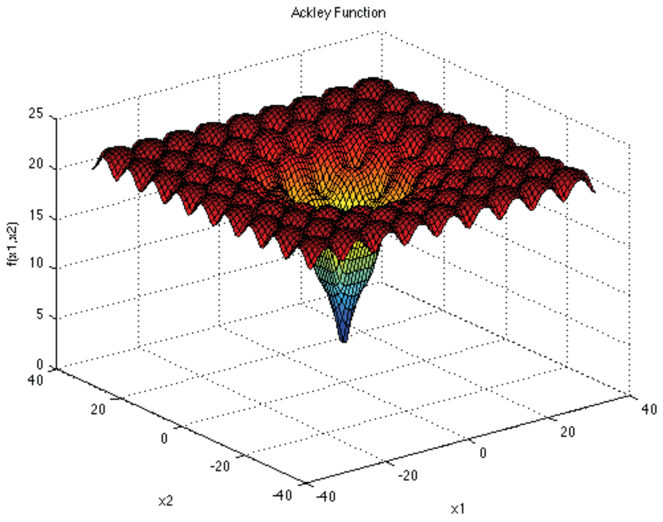

Fig 2. The Ackley function [f(x,y) = -20 exp (-0.2$\sqrt{0.5\ x^2 + y^2}$)); -exp (0.5(cos(2πx) + cos(2πy))) + e + 20)]: the absolute minimum of this function is zero, but since it contains many closely clustered local minima, evolutionary optimization algorithms find it difficult to locate the absolute minimum. Different evolutionary optimization algorithms can thus be tested on this function to determine how close each can come to the absolute minimum.

The belief that smartness finds the best solutions is also often supported by the claim that many contemporary optimization algorithms mimic natural processes, especially computational ideals of biological evolution.[24] Evolutionary optimization algorithms

[24] Our phrase "computational ideals of biological evolution" is intended to underscore that what is coded as "genetics" and "evolutionary accounts" was itself often originally predicated on assumptions emerging from fields such as economics, game theory, and computer science. On the impact of computation on ethology, ecology, environmentalism, and the life sciences, particularly in respect to resilience and optimization, is widely researched, see Adam Curtis, A*ll Watched Over By Machines of Loving Grace*, Episode 2, BBC 2, 2011, and Jennifer Gabrys, *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet* (Minneapolis: University of Minnesota Press, 2016).

begin with the premise that natural biological evolution automatically solves optimization problems by means natural populations. It then seeks to simulate that process by creating populations of candidate solutions, which are mixed with one another (elements of one candidate solution are combined with elements of other candidate solutions), and culled through successive generations to produce increasingly good solutions. David B. Fogel, a consultant for the informatics firm *Natural Selection, Inc.*, which applies computational models to the streamlining of commercial activities, captures this sense of optimization as simply a continuation of nature's work:

> [n]atural evolution is a population-based optimization process. Simulating this process on a computer results in stochastic optimization techniques that can often outperform classical methods of optimization when applied to difficult real-world problems.[25]

Optimization research implements these features (reproduction, mutation, competition and selection) in computers in an effort to find "natural" laws that can govern the organization of industrial or other processes which, when implemented on a broad scale, become the conditions of life itself.

This vision of optimization serves to justify the extension and intensification of the zonal logic of smartness. In order to optimize all aspects of existence, smartness must be able to locate its relevant populations (of preferences, events, etc.) wherever they occur. However, this is only possible when every potential data point (i.e., partial

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[25] David B. Fogel, "An Introduction to Simulated Evolutionary Optimization," *IEEE Transactions of Neural Networks* 5:1 (1994): 3. The volume of *IEEE Transactions of Neural Networks* in which this essay appears, entitled "Evolutionary Computing: The Fossil Record," establishes the importance of Mayr's evolutionary population thinking for this approach to computing (e.g., pp. xi, 1, 11, etc.).

perception) on the globe can be directly linked to every other potential data point without interference from specific geographic jurisdictional regimes. As we noted above, this does not mean the withering of geographically based security apparatuses; on the contrary, optimization often requires strengthening these latter in order to protect the concrete infrastructures that enable smart networks and in order to implement optimization protocols. Yet like the weather or global warming, optimization is not to be restricted to, or fundamentally parsed by, the territories that fund and provide these security apparatuses, but must be allowed to operate as a sort of external environmental force.

4) Resilience

If smartness happens through zones; if its operations require populations; and if it aims most fundamentally at optimization, what is the *telos* of smartness itself—that is, at what does smartness aim, and why is smartness understood as a virtue? The answer is that smartness enables *resilience*; this is its goal and *raison d'être*. The logic of resilience is peculiar, in that it aims not precisely at a future that is "better" in any absolute sense, but rather at a smart infrastructure that can absorb constant shocks while maintaining functionality and organization. Following the work of Bruce Braun and Stephanie Wakefield, we describe resilience as a state of permanent management that does without guiding ideals of progress, change, or improvement.[26]

[26] Stephanie Wakefield and Bruce Braun, "Living Infrastructure, Government, and Destituent Power" (unpublished paper), Anthropology of the Anthropocene, Concordia University, October 23, 2015:7.

The term resilience plays important, though differing, roles in multiple fields. These include engineering and material sciences—since the nineteenth century, the "modulus of resilience" has measured the capacity of materials such as woods and metals to return to their original shape after impact—as well as ecology, psychology, sociology, geography, business, and public policy, in which resilience names ways in which ecosystems, individuals, communities, corporations, and states, respectively, respond to stress, adversity, and rapid change.[27] However, the understanding of resilience most crucial to smartness and the smartness doctrine was first forged in ecology in the 1970s, especially in the work of C.S. Holling, who established a key distinction between "stability" and "resilience." Working from a systems perspective, and interested in the question of how humans could best manage elements of ecosystems of commercial interest (e.g., salmon, wood, etc.), Holling developed the concept of resilience to contest the premise that ecosystems were most healthy when they returned quickly to an equilibrium state after being disturbed (and in this sense his paper critiqued then-current industry practices).

Holling defined "stability" as the ability of a system that had been perturbed to return to a state of equilibrium, but argued that stable systems were often unable to compensate for significant, swift environmental changes. As Holling put it, the "stability view [of ecosystem management] emphasizes the equilibrium, the maintenance of a predictable world, and the harvesting of nature's excess production with as little

[27] D. E. Alexander, "Resilience and disaster risk reduction: an etymological journey," *Natural Hazards and Earth System Sciences* 13 (2013): 2707-2716. See also Jeremy Walker and Melinda Cooper, "Genealogies of Resilience: From systems ecology to the political economy of crisis adaptation," *Security Dialogue* 2 (2001):143-160.

fluctuation as possible," yet this approach that "assures a stable maximum sustained yield of a renewable resources might so change [the conditions of that system] . . . that a chance and rare event that previously could be absorbed can trigger a sudden dramatic change and loss of structural integrity of the system."[28] Resilience, by contrast, denoted for Holling the capacity of a system *to change* in periods of intense external perturbation, and thus persist over long time periods. The concept of resilience encourages a management approach to ecosystems that "would emphasize the need to keep options open, the need to view events in a regional rather than a local context, and the need to emphasize heterogeneity." Resilience is thus linked to concepts of crisis and states of exception; i.e., is a virtue when the latter are assumed to be either quasi-constant or the most relevant states. Holling also underscored that the movement from stability to resilience depended upon an epistemological shift: "Flowing from this would be not the presumption of sufficient knowledge, but the recognition of our ignorance: not the assumption that future events are expected, but that they will be unexpected" (21).

Smartness abstracts the concept of resilience from a systems approach to ecology and turns it into all-purpose epistemology and value, positing resilience as a more general strategy for managing perpetual uncertainty, and encouraging the premise that the world is indeed so complex that unexpected events are the norm. Smartness enables this generalization of resilience in part because it abstracts the concept of populations from the specifically biological sense employed by Holling: smartness sees populations of

[28] C. S. Holling, "Resilience and Stability of Ecological Systems," *Annual Review of Ecological Systems* 4 (1973): 21.

preferences, traits, and algorithmic solutions, as well as populations of individual organisms. Resilience also functions in the discourse of smartness to collapse the distinction between *emergence* (something new) and *emergency* (something new that threatens), and does so to produce a world where any change can be technically managed and assimilated, while maintaining the ongoing survival of the system, rather than individuals, or even particular groups. The focus of smartness is thus the management of the *relationships between* different populations of data, some of which can be culled and sacrificed for systemic maintenance.[29] Planned obsolescence and preemptive destruction combine here to encourage the introduction of more computation into the environment, and emphasize as well that resilience of the species may necessitate sacrifices of "suboptimal" populations.

The discourse of resilience effectively erases the differences among past, present, and future. Time is not understood through an historical or progressive schema, but rather through the schemas of repetition and recursion (the same shocks, and the same methods, are repeated again and again), even as these repetitions and recursions produce constantly differing territories. This is a self-referential difference, only measured or understood in relation to the many other versions of smartness (e.g., earlier smart cities), which all tend to be built by the same corporate and national assemblages.

[29] Resilience is not equivalent to robustness. As Alexander R. Galloway notes in *Protocol: How Control Exists after Decentralization* (Cambridge, MA: MIT Press, 2004), "robustness" is a defining feature of the technical concept of protocol, which is central to the computational dimension of smart infrastructures (43-46). However, insofar as robustness refers to the ability of a system to retain its original configuration despite confusing input, it is analogous to what Holling called "stability," rather than resilience. Robustness is thus just one of many technical means for enabling resilient systems.

The collapse of emergence into emergency also links resilience to financialization through derivation, as the highly leveraged complex of Songdo already demonstrated.[30] The links that resilience establishes among emergency, financialization, and derivatives is also exemplified by New York City, which, after the devastation of Hurricane Sandy in 2012, adopted the slogan of "Fix and Fortify." This slogan underscores an acceptance of future shock as a necessary reality of urban existence, while at the same time leaving the precise nature of these shocks unspecified (though they are often implied to include terrorism as well as environmental devastation). The naturalization of this state is vividly demonstrated by the irony that the real destruction of New York had earlier been imagined as an opportunity for innovation, design thinking, and real-estate speculation. In 2010, shortly before a real hurricane hit New York, Museum of Modern Art and P.S. 1 ran a design competition and exhibition titled "Rising Currents," which challenged the city's premier architecture and urban design firms to design for a city ravaged by sea-level rise as a result of global warming:

> MoMA and P.S.1 Contemporary Art Center joined forces to address one of the most urgent challenges facing the nation's largest city: sea-level rise resulting from global climate change. Though the national debate on infrastructure is currently focused on "shovel-ready" projects that will *stimulate the economy*, we now have an important *opportunity* to foster *new research and fresh thinking* about the use of New York City's harbor and coastline. As in past economic

[30] For literature on resilience in finance and on economic and development policies see Melinda Cooper, "Turbulent Worlds: Financial Markets and Environmental Crisis," *Theory, Culture & Society* 27, no. 2-3 (2010): 167-90 and Stephanie Wakefield and Bruce Braun, "Governing the Resilient City," *Environment and Planning D: Society and Space*, no. 32 (2014): 4-11.

> recessions, construction has slowed dramatically in New York, and much of the city's *remarkable pool of architectural talent is available* to focus on innovation.[31]

It is difficult to imagine a clearer statement about the relationship of urban planners to crisis: planning must simply assume and assimilate future, unknowable shocks, and these shocks may come in any form. This rather stunning statement turns economic tragedy, the unemployment of most architects, and the imagined coming environmental apocalypse into an opportunity for speculation—technically, aesthetically, and economically. This is a quite literal transformation of emergency into emergence, and for creating a model for managing perceived and real risks to the population and infrastructure of the territory not by "solving" the problem, but through absorbing shocks and modulating the way environment is managed. New York in the present becomes a mere demo for the post-catastrophe New York, and the differential between these two New Yorks is the site of financial, engineering, and architectural interest and speculation.

This relationship of resilience to the logic of demos and derivatives is illuminated by the distinction between risk and uncertainty first laid out in the 1920's by the economist Frank Knight. According to Knight, uncertainty, unlike risk, has no clearly defined endpoints or values.[32] It offers no clear-cut terminal events. If the Cold War was about nuclear testing and simulation as a means to avoid an unthinkable but nonetheless predictable event—nuclear war—the formula has now been changed; we live in a world

[31] Barry Bergdoll (curator), "Introductory statement", https://www.moma.org/explore/inside_out/rising-currents?x-iframe=true#description, accessed November 3, 2016. Italics ours.
[32] Frank Knight, *Risk, Uncertainty, Profit* (Boston: Schaffner and Marx Houghton Mifflin, co., 1921).

of fundamental uncertainty, which can only ever be partially and provisionally captured through discrete risks. When uncertainty, rather than risk, is understood as the fundamental context, "tests" can no longer be understood primarily as a simulation of life; rather, the test-bed makes human life itself an experiment for technological futures. Uncertainty thus embeds itself in our technologies, both those of architecture and finance. In financial markets, for example, risks that are never fully accounted for are continually "swapped," "derived" and "leveraged," in the hope that circulation will defer any need to actually represent risk, and in infrastructure, engineering, and computing, we do the same.[33]

As future risk is transformed into uncertainty, smart and ubiquitous computing infrastructures become the language *and* practice by which to imagine and to create our future. Instead of looking for utopian answers to our questions regarding the future, we focus on quantitative and algorithmic methods and on logistics; on how to move things, rather than questions of where they *should* end up. Resilience as the goal of smart infrastructures of ubiquitous computing and logistics becomes the dominant method for engaging with possible urban collapse and crisis (as well as the collapse of other kinds of infrastructure, such as those of transport, energy, and finance). Smartness thus becomes the organizing concept for an emerging form of technical rationality whose major goal is management of an uncertain future through a constant deferral of future results; for

[33] As Joseph Vogl notes in "Taming Time: Media of Financialization," *Grey Room* 46 (2012): 72-83, this seems unlikely to be a successful long-term strategy. Yet the logic of the demo fundamental to resilience ensures that even a massive and widespread financial failure, such as the one that began in 2008, can be treated as simply useful material for subsequent versions of the demo; see Mirowski, *Never Let a Serious Crisis Go to Waste*.

perpetual and unending evaluation through a continuous mode of self-referential data collection; and for the construction of forms of financial instrumentation and accounting that no longer engage, or even need to engage with, alienate, or translate, what capital extracts from history, geology, or life.

Smartness and Critique

As we hope is clear from our account of the smartness mandate above, smartness is both a reality and an imaginary, and it is this comingling that underwrites both its logic and the magic of its popularity. As a consequence, the critique of smartness cannot be simply a matter of revealing the inequities produced by its current instantiations. Critique is itself already central to smartness, in the sense that perpetual optimization requires perpetual dissatisfaction with the present and the premise that things can always be better; as a consequence, the advocates of smartness can always plausibly claim (and likely also believe) that the *next* demo will be more inclusive, equitable, and just. The critique of smartness thus needs to confront directly the terrible, but necessary, complexity of thinking and acting within earthly-scale--and even extra-planetary-scale--technical systems.

This means in part stressing, as we have done here, that the smartness mandate transforms conditions of environmental degradation, inequality and injustice, mass extinctions, wars, and other forms of violence by means of the demand to understand the present as a demo oriented toward the future, and by necessitating a single form of response--increased penetration of computation into the environment--for all crises. On the other hand, though, it is impossible to deny not only the agency and transformative capacities of the smart technical systems, but also the deep appeal of this approach to managing an extraordinarily complex and ecologically fragile world. None of us is eager to abandon our cell phones or computers. Moreover, the epistemology of partial truths, incomplete perspectives and uncertainty with which C.S. Holling sought to critique capitalist understandings of environments and ecologies still holds a weak messianic potential for revising older modern forms of knowledge, and for building new forms of affiliation, agency and politics grounded in uncertainty, rather than objectivity and surety, and in this way keeping us open to plural forms of life and thought. However, insofar as smartness separates critique from conscious, collective human reflection—that is, insofar as smartness seeks to steer communities algorithmically, in registers operating below consciousness and human discourse—critiquing smartness is in part a matter of excavating and rethinking each of its central concepts and practices (zones, populations, optimization, and resilience), and the temporal logic that emerges from the particular way in which smartness combines these concepts and practices.