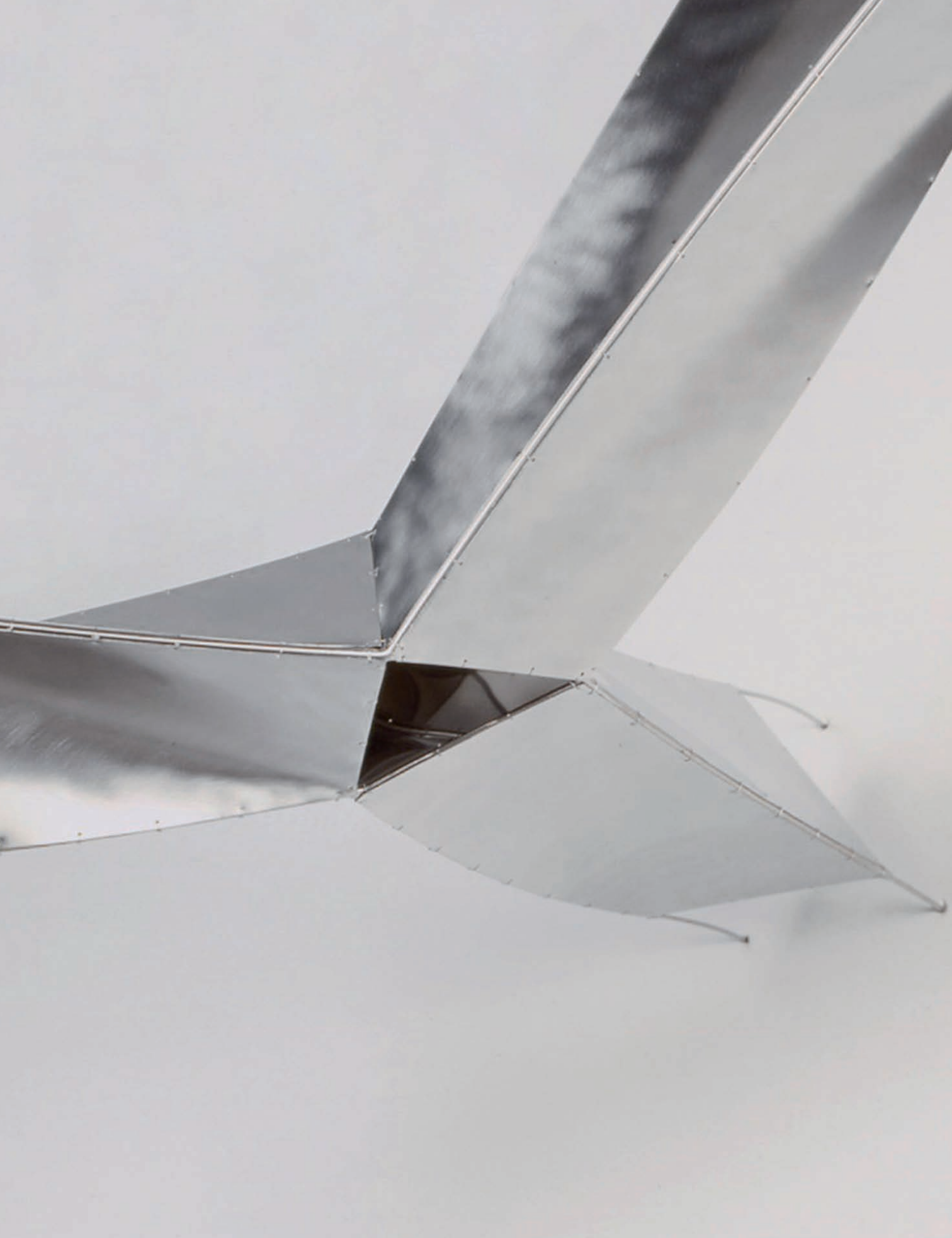

Rethinking Urban Landscapes. Self-Supported Infrastructure, Technology and Territory

Mitchell Joachim and Melanie Fessel

URBANEERING UTOPIA, A NEW PROFESSION FOR THE DESIGN OF CITIES

Who is the primary authority in the making of Utopia or any extraordinary future city? Urbaneering is a burgeoning discipline based on urban design that can negotiate the complex mix of technology, theory and practice that embraces the re-invention of the city to exceed the needs of the planet. Today, this nascent interdisciplinary field is in a state of radical development.

Sparks of utopian reflection throughout human history have been indispensable in evolved societies (More 1516). Utopias, for the most part, are a necessary paradigm. Utopias display maximal solutions to existing real world problems. They tackle upheaval with orderly retribution. In nearly all variations, Utopias are deliberately excessive. They overshoot the answer to a crisis to accentuate the problem.

Society needs a psychological frame of reference (Lasswell 1930). It's helpful to depict Utopia like a personal membership to a health club. What is the perfect picture of a physique? Why do we need to exercise? Aspirations to appear like a certain idyllic athlete or supermodel sustain our work-out objectives. Many of us understand we cannot be converted into the unattainable airbrushed automatons that decorate voguish magazines. Yet these portrayals provide a common measurement to reflect on our inadequacy. And in some instances, this false imagery makes us admire the precious imperfections and confines of reality.

Blanca Muñoz, *Voladizo* (detail), 2004

Instead of aims to be grandiose and ideal, the goal shifts to be earnest and good (Collins 2001).

One catalyst to reimage the good city is based on the establishment of a patently new field that trumps the outmoded agenda of urban design. Kevin Lynch (1960) originally conceived urban design as "City Design" in the late 1950s at MIT. It has not been significantly upgraded to meet contemporary insights. Lynch couldn't have ever imagined more recent factors of change: Google, social networks, ubiquitous smart phones, climate dynamism, energy addictions, global economic calamities, etc.

Throughout the developed world, urban design is at an impasse, unable to mend the rift between theory and practice, and stuck in cryptic arguments, such as the one between "Landscape Urbanism" and "New Urbanism." Landscape Urbanists deploy concepts that favor the landscape over architecture in order to plan a city (Waldheim et al. 1997). On the contrary, New Urbanist schemes promote historical pedestrian-centered neighborhood developments (Calthorpe et al. 1993). The dissimilarity between the two approaches is of interest to almost no public body beyond architects, planners and their ilk. Think of the neo-traditionalist town extension of Poundbury near Dorchester endorsed by New Urbanist Prince Charles, versus the high-tech interactive open space zone of Schouwburgplein in Rotterdam of the Landscape Urbanists: West 8. Both of these urban fractions have their merits yet fail to coalesce on a holistic idea of the future city. Moreover the public — everyday citizens who occupy theses spaces — invests precious little time in understanding the minutiae. For them, it's an archaic clash between tradition and newness. Urbaneering embraces both and more.

Urbaneering undertakes a diverse range of projects as a prescription for maximal design. It practices totalized schemes that rethink all scales of involvement from the doorknob to democracy. Its projects can range from new materials, transportation systems and open spaces, to buildings, cities, and surrounding regions. Currently, a few Urbaneers have shaped phytoremediation ponds, living woody plant structures, rooftop farms, soft cars/buses, urban junkspace, and city-wide action plans. To inspire interdisciplinary innovation, Urbaneers encourage people to switch roles; architects must design cars, automotive engineers must devise eco-systems, and ecologists must draw up buildings.

At the core of Urbaneering is a variety of utopian agitation that dispels the defunct myths of modernism with equitable objectives. An Urbaneer replaces implausible rules and master planning with suggestive memes and polemical models. It is hard to argue with amorphous memes like "city beautiful," "garden city," or "smart growth" (Burnham and Bennett 1909, Calthorpe and Kelbaugh 1989). The public can rally themselves around these open-ended symbolic gestures and phrases. Since the meme is not fully explicit, the concept leaves room for broad cultural interpretations. It's almost exactly what communities yearn for: the freedom to define their own urban spaces.

The Urbaneers' aim is to support people to become part of an advanced intellectual initiative framed on the recalibration of the city. Projects such as Canary Wharf, Potsdamer Platz, NYC Highline, Masdar UAE, and Tianjin China already demand fresh directives. The new profession of Urbaneering provides them in astonishing collaborative ways.

In the past, urban design has mostly been interdisciplinary, but it has not been revamped since its formal inception. Urbaneering involves city design in a huge range of new ideas, including crowd-sourcing, DIY projects, localized energy, shared transport, e-government, high-throughput computation, biotechnology, and ecology. Urbaneers focus as much on cities' ecosystems and infrastructure — areas ripe for improvement — as well as on more conventional subjects such as buildings and parks.

What does Urbaneering look like? Form follows anything as long as no shape is unmotivated. Diagrams that combine ecology and urbanity called "Ecograms" serve to prioritize design directives. Light and air are one of many causal factors that respond to context in these Ecograms. Equally, encapsulation of program is correctly orchestrated via any low-energy embodied volumes or dense generic loft spaces. Highly malleable, these spaces support growth, with elaboration and magnification of character at its limits. These are Ecograms of rampant plurality in which lifestyle is elective and fluid. Depending on the nerve with which the Ecogram pressures, the reinvention and re-privatization of consequences could prove to be illimitable.

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Beyond utilizing the Ecogram, Urbaneers have a set of proficiencies that merge previously disparate occupations. The discipline is home to almost any recombined professional activities, as long as they meet the constantly changing needs of urbanization. An excellent historical example of someone who now would be an Urbaneer is Frederick Law Olmsted (1822–1903), the nineteenth-century activist who combined journalism, social action and landscape architecture to a single political end (Beveridge and Rocheleau 1998).

The next city needs a new breed of communicator. A person skilled in the art of cities beyond the typical utopists, planners, civil engineers, and architects in the present day. These fields need a multifaceted filter of reason to incorporate a profound knowledge of place. An Urbaneer posits the solutions to municipal problems that normally take multiple disciplines to

solve. Urbaneers look to merge the edification and expertise needed to reform the city of today for the Utopia of tomorrow.

BROOKLYN URBANEERING

What is the key objective for ecological cities? A primary assertion for the next city is that all necessities are provided inside its accessible physical borders. In this intensified version, all vital needs are supplied for its population. In this city, food, water, air quality, energy, waste, mobility, and shelter are radically restructured to support life in every form. Infrastructure is celebrated as the new center.

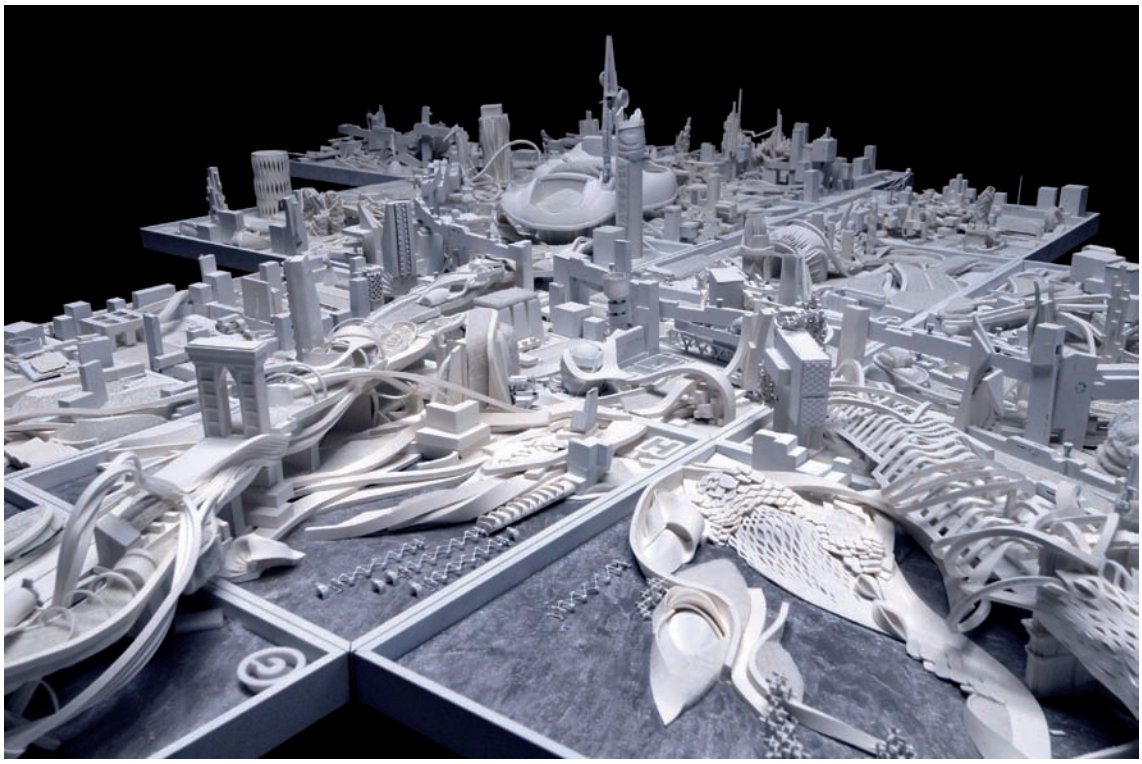
The strategy includes the replacement of dilapidated structures with vertical agriculture and housing merged with road networks. Former streets become snaking arteries of livable spaces embedded with renewable energy sources, soft cushion-based vehicles for moving, and productive green rooms. The plan uses the former street grid as the foundation for up-to-the-minute networks. By reengineering the obsolete streets, we can install radically robust and ecologically active smart pathways. These operations are not just about a comprehensive model of tomorrow's city, but an initial platform for discourse. Urbaneers expect the future will necessitate marvelous dwellings coupled with a massive cyclical resource net.

RAPID RE(F)USE, 3-D FABRICATED POSITIVE WASTE ECOLOGIES

Imagine our colossal municipal landfills as sensible resource sheds to build our future urban and peri-urban spaces. What kind of effort is required to reuse their bountiful contents? Now that the bulk of humanity has chosen to settle in urbanized areas, waste management needs a radical revision.

For hundreds of years we designed cities to generate waste. Now it is time that we begin to design waste to regenerate our cities. What are the possibilities for urban environments after our aged infrastructure is recalibrated? How might urban intensification and waste mix? Terreform ONE's supposition is to reallocate resource streams to flow in a positive direction (Mitchell et al. 2012). In this case, waste is not faintly recycled through infrastructural mechanisms but instead up-cycled in perpetuity.

America is the lead creator of waste on the earth, making approximately 30 percent of the world's trash and tossing out around 0.8 US tonnes (0.72 tonnes) per US citizen per year (EPA 2008). Ungracefully, our American value system is somewhat distressed. It seems value has devolved into rampant waste production: megaproducts scaled for super-sized franchise brands,



Brooklyn Urbaneering 2110, city of the future

big-box retail, XXL jumbo paraphernalia and so on. The US mindset is thus encapsulating a joint race for ubiquity and instantaneity. Where does it all end up? Heather Rogers affirmed in her investigative book *Gone Tomorrow* that throwing things away is unsustainable (2006, 54–67, 104–32). The first step we must take is reduction — meaning a massive discontinuation of objects designed for obsolescence. Then we need a radical reuse plan. Our waste crisis is immense. What is our call to action?

One such dilemma lurks in New York. New York City is currently disposing of 36 200 US tonnes (32 840 tonnes) of waste per day (Cohen 2008). Previously, most of this discarded material ended up in Fresh Kills on Staten Island, before operations were blocked. Manhattan's inhabitants discard enough paper products to fill a volume the size of the Empire State Building every two weeks. Terreform ONE's Rapid Re(f)use and Homeway projects strive to capture, reduce and redesign New York's refuse infrastructure. The initiative supposes an extended city reconstituted from its own junked materials. The concept remakes the city by utilizing all the trash entombed in the Fresh Kills landfill. Theoretically, the method should produce, at minimum, seven entirely new Manhattan Islands at full scale. New York City's premier landfill

was started by Robert Moses and driven by apathetic workers and machines (Moses 1951). Now, guided by a prudent community with smart equipment, we must reshape it.

How could this work? Outsized automated 3-D printers could be modified to rapidly process trash and to complete the task within decades. These potential automatons would be entirely based on existing techniques commonly used in industrial waste compaction devices. To accomplish this job, nothing drastically new needs to be invented. Most technologies are intended to be off-the-shelf. Instead of machines that crush objects into cubes, compaction devices could benefit from adjustable jaws that would craft simple shapes into smart "puzzle blocks" for assembly. The blocks of waste material could be predetermined, using computational geometries, in order to fit domes, archways, lattices, windows, or whatever patterns would be needed. Different materials could serve specified purposes: transparent plastic for fenestration, organic compounds for temporary decomposable scaffolds, metals for primary structures and so on. Eventually, the future city would make no distinction between waste and supply.

Admittedly, this meta-design theme is not entirely novel. At approximately the same time that Rapid R(e)fuse was initiated, the feature film *WALL·E* was conceptualised. The film profoundly infused Terreform ONE's research agenda.

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EXCURSION TO DISNEYLAND

Inspired by an equal interest in fictive productions of tomorrow such as Disney's Tomorrowland, Terreform ONE visited the Walt Disney Imagineering (WDI) headquarters in Glendale, Southern California. The group had prepared a presentation that would unpack a comprehensive view of its version of the future: a world free of carbon loading in the atmosphere and abundant in self-sufficient lifestyles. As architects invested in an ecological future vision, the team had meticulously crafted cities within the rubric of a socio-ecological domain — rethinking the design of entire systems, from doorknobs to democracies.

When Ben Schwegler, mastermind and chief imagineer, pulled back the proverbial curtain to reveal WALL·E, the group was crestfallen. Disney had beaten them to it. WALL·E was perfect — almost: a tightly packaged, solar-powered, curious, obedient, evolved, robotic trash compaction and distribution device. His name is an acronym: Waste Allocation Load Lifter Earth

Class. Left behind by mankind, he toils with trillions of tonnes of non-recycled inner-city trash. Not only is WALL·E a highly advanced rubbish manager, he is also a mechanized and inventive architect. He accomplishes his immense tasks while remaining completely adorable. Not easy to do.

WALL·E's life is a tale of an ultramodern trash compactor in love. Ceaselessly, he configures mountains of discarded material. Why pyramids of trash? WALL·E's daily perpetual feats seem almost futile. Disney omits exactly why he is programmed to pile refuse — and there is the shortcoming.

FUTURE WASTE AND PAST CITIES

Collaborators at Terreform ONE were interested in exploring a deeper motivation for stacking refuse. Similar to the Disney film, what if the refuse was refabricated to become real urban spaces or buildings? If it is plausible to adapt current machinery, how much material is available? At first sight, any sanitary landfill may be viewed as an ample supply of building nutrients. Heavy industrial technologies to compact cars into lumber or to automatically sort out garbage are readily available. Other technologies, which would make possible the articulation of specific forms, are also available if scaled in larger sizes. Three-dimensional printing has exhausting capabilities if adjusted to larger scales. This is where Terreform ONE's city began.

The envisioned city would be derived from trash: not ordinary trash, but "smart refuse". A significant factor of the city composed from smart refuse is "post-tuning". Unitized devices would not immediately adapt. Integration into the city texture would be a learning process. In time, the responses would eventually become more attenuated to the needs of the urban dweller. This city is envisioned from trash, but each individual component would be enhanced with a modicum of CPU power. Brief durational events would endow these "smart units" with experiences needed for their evolution.

The main objective for the city of Rapid R(e)fuse is to establish a smart, self-sufficient, perpetual-motion urbanism. It has been advocated that perpetual motion cannot exist. Perpetual motion defies the laws of thermodynamics and energy conservation, since it would necessitate a machine that produces more energy than it consumes. Cities, unlike machines, are similar to a complex ecology.[1] Ecology is capable of achieving a continuous harmonious state, or even

1. "Cities are not machines and neither are they organisms, and perhaps resemble them even less – Rather then communities of non-thinking organisms undergoing inevitable phases until they reach a certain iron limit – cities are the product of beings capable of learning. Culture can stabilize or alter the habitat system, and it is not clear whether we wish it to be otherwise." (Lynch 1984, 26–7).

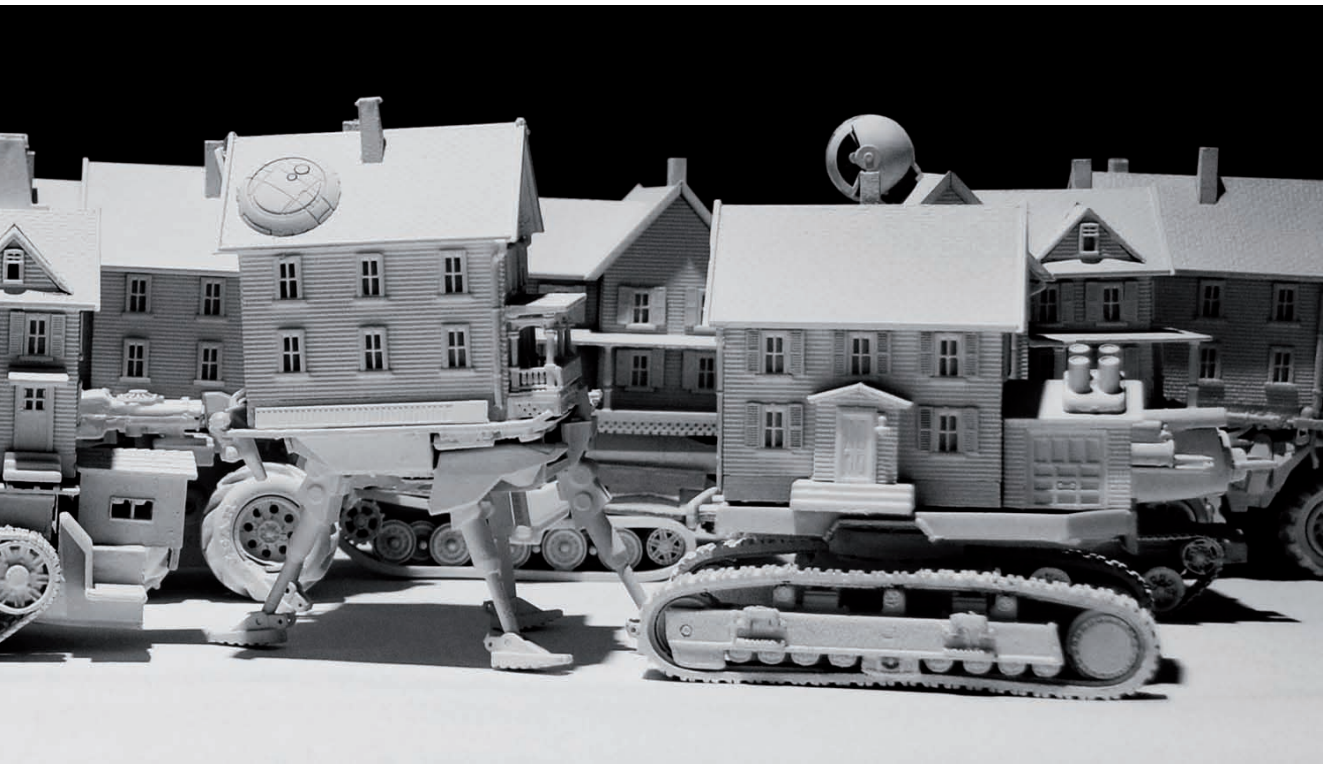
Homeway; the great suburban exodus

further, a positive intensification. If ecological models are productively everlasting, urban models can logically follow.

Architects have ruminated over improbable instruments of physics since the Middle Ages. In the thirteenth century, evidence of the perpetuum mobile was uncovered in the sketchbooks of French architect Villard de Honnecourt (Bowie 2006, 32–49). What if the Rapid R(e)fuse city was like an instrument that produces more energy from renewable sources than the energy it consumes? In this case, "nothing can be thrown away". Every bit would be a vital piece of stored energy, poised to be reused in a cyclical nutrient stream (McDonough 1998, 5–57). Rapid R(e)fuse is imagined as a city without a tail pipe; a city that not only has zero impact, but a positive contribution towards the natural surroundings.

John Fitzgerald Kennedy once declared: "Our problems are man-made, therefore they may be solved by man."[2] The matter posed on the table is not only about solving our ecological issues,

2. John F. Kennedy, during a speech at The American University, Washington, DC, June 10, 1963.



but also about returning to a system of perpetuity. This is the only possible future for a truly breathing, interconnected, metabolic urbanism. Cities have passed the age of industrialization and entered the age of recovery. After this great cleansing, we may transition into a greater order: “positive waste”. Here is an order that captures our socio-ecological needs: not Utopia, but a place where everything is precious and nothing is disposed of.

ENVISIONING ECOLOGICAL CITIES

How should urban design foresee new instrumentalist technologies for cities? For 150 years, the innovation of the elevator has done more to influence urban design than most urban designers. Elevator systems had incredible success in the creation of compact and greener cities. Imagine what the advent of the jet pack will do for cities. Urban design is greatly altered by such devices. For instance, automobiles have defined limits in cities for almost a century. Unlike the elevator, however, the car has arguably caused more problems than it has solved.

Perhaps it is time for urban design to rethink technologies to fit cities, not constrain them. As a wide-ranging discipline, it can effortlessly illuminate the technological potentials for cities. Urban design will successfully situate itself through the production of future macro-scaled scenarios predicated on innovative devices.

Physicist and polymath Freeman Dyson has said that the best way to comprehend our near urban future is to examine science fiction, not economic forecasts. In his experience, sci-fi is good for decades of technological fulfillment. Unfortunately, economic forecasts are only accurate within five to ten years. Most of these predictive economic models are quantity based and find it difficult to extrapolate the qualifiers associated with creativity. Sci-fi is a phenomenal way to chronicle our plausible urban future that should not be dismissed by urban designers.

Dyson (1988) is certain that the urban era of information will soon transition into "the age of domesticated biotechnology." In his novel, *Infinite in All Directions*, he states: "Bio-tech offers us the chance to imitate nature's speed and flexibility." He envisions a realm of functional objects and art that humans will "grow" for personal use. According to a New York Times article on Dyson, "The Civil Heretic," he also believes that climate change is profoundly misstated. "He added the caveat that if CO_2 levels soared too high, they could be soothed by the mass cultivation of specially bred 'carbon-eating trees'" (Dawidoff 2009). He is not concerned with predicting the future but rather with expressing the possibilities. These expressions are founded along societal desire lines as a kind of relevant optimism. Therefore Dyson measures the wants of civilization and advances our expectations.

At some level, urban design engages this position that promises a better tomorrow. Numerous practitioners and urbanists mildly suffer from this invariable search for direction and clairvoyance. Alex Krieger (2009) strongly asserts the broadly defined vocation is more of a scrupulous sensibility than an exclusive authority. The profession is torn between many incompatible agendas, weighty theories and oversimplified applications, ivory towers and new urbanism, developer brands and radical ecologies, and vernacular forms and futurology. One of my research group's chief directives is about shrewdly locating the intersection of technology and urbanism, especially under the rubric of ecology. Our projects range from highlighting the possible effects of self-sufficient cities to studying flocks of jet packs. These ideations keep us thriving as urban design researchers. It is our supposition that the prospective ecological city is about extreme solutions to an extreme predicament. Our future fundamentally depends on the immensity our solutions envision.

Envisioning is by definition a view or concept that evolves beyond existing boundaries. This notion of foresight may be interpreted in many different ways, each foregrounding particular ideations and processes describing the next event. Here in America, we need these radical new visions to assist in solving our current global calamity. As of now, the

earth's climate endures an unremitting state of trauma. We seek precise prescriptions that cover a wide scope to alter this massive dilemma. To paraphrase, John F. Kennedy said: "If man created problems, man can solve them." This future vision unfolds a truly breathing, interconnected metabolic urbanism. How does it reify from statistics to architectural form? What does the future look like for America's cities? How do technological devices affect these functions?

For a popular audience, Disney sci-fi film *WALL·E* enabled society to anticipate one conceivable future. The film is set in a generic city that is completely buried in trash. Humans have abandoned life on earth for off-world dwelling, leaving being one lone solar-powered robot to clear the rubbish. Part of the message of the film is that technology alone can't solve humanity's "affluenza," yet the film's powerful computer-generated visuals encourage us to confront our colossal wastefulness and rethink the city.

For centuries, cities have been designed to accommodate the theater of our human desire. We have joined the ranks of those delivering a new sense of the city, one that privileges the play of nature over anthropocentric whims. We are constantly vying for a profound clairvoyant perspective

We foresee strategies for people to fit symbiotically into their natural surrounds. To achieve this, all things possible are considered. We design the scooters, cars, trains, and blimps, as well as the streets, parks, open spaces, cultural districts, civic centers, and business hubs that comprise the future metropolis. For centuries, cities have been designed to accommodate the theater of our human desire. We have joined the ranks of those delivering a new sense of the city, one that privileges the play of nature over anthropocentric whims. We are constantly vying for a profound clairvoyant perspective. We desire to preview a likeness of our collective future yet untold.

Our foresight of ecological design is not only a philosophy that inspires visions of sustainability but also a focused scientific endeavor. The mission is to ascertain the consequences of fitting a project within our natural environment. Solutions are derived from numerous examples: living material habitats, climatic tall building clusters, and mobility technologies. These design iterations succeed as having activated ecology both as a productive symbol and an evolved artifact. Current research attempts to establish new forms of design knowledge and new processes of practice at the interface of design, computer science, structural engineering, and biology.

EXTRATERRITORIALITY NEXUS, A NEW GENEALOGY: INVESTIGATIONS ON CITIES THROUGH REDEFINING EXTRATERRITORIALITY IN THE CONTEXT OF ECOLOGY

We no longer map territories, but territories map us. Humanity is inscribing its vast impacts on the Earth's surface; these new engraved territories have no boundaries, they portray who we are, what we have done and where we are moving.

Within these global networked shapes and their interrelations they unveil our ever-changing cities and landscapes. These immeasurable human impressions are so complexly woven, that it is becoming increasingly difficult to maintain a distinction between nature, culture and the built environment. Fragmented exceptions defined as geographically autonomous zones of extraterritoriality disseminate these interacted figures. What are the unconditional opportunities that lie within these confined processes?

Utopian thought has been critical to our evolution and will be a necessary paradigm to envision an interconnection on extraterritoriality and ecology as a novel scenario of experimentation that challenges an innovative discourse beyond a conduit of sustainability. The investigations described by extraterritoriality nexus are centered on the comprehension of new approaches to the reification of the city. This may be best accomplished by further understanding these fragmented emerging ecologies of exception, and how they relate to architecture and urban design, as concise instruments in the development of society. In order to verify this vision in a socio-ecological realm, beyond a world of net-zero motivations as described by sustainability advocates, the aim is to structure an inquiry of mutable urban conditions as they pertain to global crisis and phenomena. There are a number of questions that come to mind addressing this predicament. How can we integrate and reinvent the already existing political mechanism of extraterritoriality as a tool of exception to address social and ecological disturbances that are prevailing our urban landscapes? What can we learn and extract from our past conceptions of cities and humanity? When confronted with any utter urban calamity from Port-au-Prince, to New Orleans, to Fukushima, what is the extent of architecture impact, if any? After the destruction of Fukushima, and many places like it, the bona fide intervention of architecture has been ineffectual. Events occur with such speed and complexity today that nothing remains certain. Large numbers live in a world where local economies and cultures are tightly bound into global ones through which effects ripple with enormous velocity and consequence (Sassen 1996).

Natural and synthetic disturbances are dynamisms of immense force that set apart worlds. Governmental guidebooks and laws around the world map out detailed solutions for rescue operations in crisis scenarios. Hazard mitigation plans, military scenarios, and crisis strategies are instrumental directives that provide society with a safety mechanism to prevent and overcome the dangers created by forces of natural disasters, fire, mudslides, earthquakes,

hurricanes, flooding, and tsunamis as well as crime, violence, acts of terror, war, and destruction. Planned in every detail it enables their creators to satiate society with a constant answer for unpredictable demands that relate to the influence of natural and societal instabilities on our built environment.[3]

Post the traumatic event of 9/11, the act of terror is still desensitizing our resilience to conquer new challenges. The effects of catastrophe on the built environment and its inhabitants continue to intrude everyday life. New York City provides a significant locus to analyze the politics of shock and terror. A city of immigrants, many of whom are connected to other cities that have suffered catastrophe, New York citizens have a unique contribution to offer to the many urgent projects of reimagining cities around the world today. To address the devastating destruction by the events that took place on September 11, 2001, the call for entries to rebuild the World Trade Center site resulted in the world's largest architecture competition with the most amount of entries in history. The immediate urgency to restore and recover from such damaging incidents is implied (Columbia University 2011).

If we are going to study cities then we should also study that which is radically anti-city. Threats against our cities are measured in terms of armed gangs or moments of staged terrorist assaults as well as disturbances created by natural disasters; hovering over all of this is still the apocalyptic thought of something that could simply annihilate cities altogether. Nuclear catastrophes mark the only true long-term marker of human presence on earth. Weapons created by geology, minerals made all together unearthly, post-terrestrial, through anthropological intervention form a destructive power that turn them into a ubiquitous anti-landscape, something that no geography, built or natural, can resist.

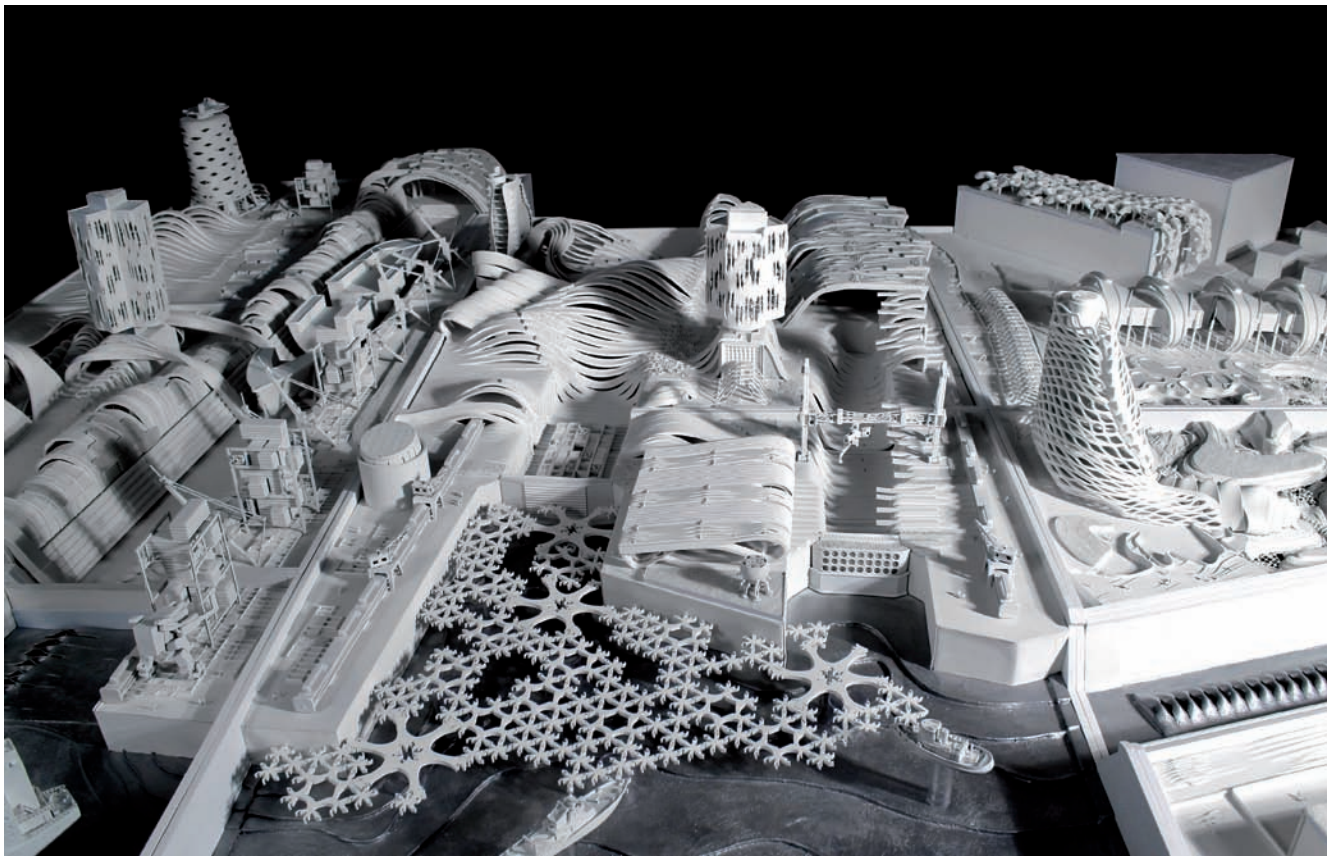
The worst nuclear disaster to strike Japan since a single bomb fell over Nagasaki in 1945 occurred in the spring of 2011, at the Fukushima nuclear power plant following the epic tsunami (Hirose 2012). The wide release of radiation, and fear of same, has forced the Japanese and others all over the world to reflect on what happened to the country in 1945, and the continuing threat of nuclear weapons and energy today. On August 6, 1945, the first atomic bomb was dropped from an American plane on the 245 000 residents of Hiroshima, Japan. Most of the city was destroyed and thousands of its inhabitants died. Some of its citizens survived and suffered the debilitating effects of terrible burns and radiation illness. The lives of six of those survivors are recounted in the days following the bombing. *Hiroshima*, John Hersey's journalistic masterpiece (1989), tells what happened on that day. More than six decades after the events in Hiroshima, a new activism of survivors of the bombing is campaigning against nuclear power, which has provided most of their country's energy needs. Survivors, who are now called

3. City of Los Angeles, "Hazard Mitigation Plan."

hibakusha, have become the targets of politics and the peace movement. The radioactive fallout in Fukushima, Japan as the most recent nuclear disaster reminded everybody that there are no boundaries for threats. The fallout, triggered by an earthquake that set off a tsunami heading towards the coast of Japan and destroying the nuclear power plant in Fukushima, was just the beginning of a keychain that will affect all future life on earth and beyond. Three elements — buildings, communications, and transportation — constituted the immediate effect of the disaster on the city. A further ominous phase of the disaster appeared after news of the first explosion at the Fukushima Daiichi nuclear power plant unwrapped. Power cuts, product shortages, radiation and health warnings followed this information, emphasized by uncertainties about the actual aftermath of this impact. Within a week the nuclear cloud arrived at the coast of California continuing its journey cross-country heading towards Europe and Asia. Carried by Aeolian forces and strong ocean currents, the effects of the threat are immeasurable and its longevity is implied. This period of suffering, restraint and sobriety was reminiscent of the struggles of the postwar years, and even further back to the years after the massive earthquake that destroyed Tokyo in 1923. Despite their difficulties, the reconstruction years were times of energy and aspiration, when a new city and a new nation were built.

Architecture was the immediate response to the threat of nuclear weapons by designing fallout shelters as a critical part of civil defense strategy of the 1950s and 60s (Monteyne 2011). In an era of nuclear weapons, the federal government — tasked with protecting American citizens and communities — relied on architectural expertise in order to survey, design, and build fallout shelters. During the height of the Cold War, architects and urban planners became instrumental to the importance and efficacy of both purpose-built and ad hoc fallout shelters, which granted them expert status. Architecture for civil defense planning in the United States was, ultimately, a failure due to a lack of federal funding, contradictions and ambiguities in fallout shelter design, and growing resistance to its political and cultural implications. Yet the partnership between architecture and civil defense influenced the perception and use of urban and suburban spaces. The result of this bunker architecture was a philosophy of building and urbanism that shifted focus from nuclear annihilation to urban unrest (US Department of Defense 1961).

The future will not be the same as the past but disruption on the one side sparks legacies of feedback on the other. Hip Hop, a cultural movement during the 1970s in New York City, in many ways comes out of a disruption — the disruption of a neighborhood and community in the Bronx through massive highway infrastructure that would soon segregate their neighborhood, leading newly formed gangs to resonate this impact through acoustic portraits of its interrupted built environment. Robert Moses was the lead figure for these massive urban renewal projects and practices in mid-twentieth-century New York City (Caro 1975). Facing the destruction of another local neighborhood in 1961, community activist Jane Jacobs (1992) organized



Super docking in the Brooklyn Navy Yard. View of the clean technology industrial waterpark

grassroots efforts to block urban-renewal project for the Greenwich Village, which were instrumental in leading to the cancellation of the Lower Manhattan Expressway.

Events all over the world identifiable as volatile social, political, economic and ecological disturbances are impacting the world's fragile ecosystem and ultimately influence how we reimagine cities around the world today. Comprehending unstable processes and environments is an attempt for a new and suggestive contemporary global order that recognizes a continuous spatial flow of extraterritorial zones and utilizes their exception as a progressive tool for envisioning our future. An investigation on extraterritoriality emerges as a nexus for explorations of ecological and social disturbances as an active tool to re-invent and re-imagine our cities and vast networks today. The framework for this emergence defines our history, present and future: the impact to recognize these processes, as a positive impulse to regenerate new emergent landscapes of emergency, has to be created.

Extraterritorial places are positioned outside of the sovereignty and jurisdiction that surrounds them or that are contiguous to them. International ownership treaties demarcate

airports and ports, international waters, international seabed, the Moon, outer space, international zone, the United Nations, Antarctica, extraterrestrial real estate. These spaces aspire to be worlds within themselves, and they provide vivid evidence of the weakness, resilience, or violence that these enclaves carry. Jurisdictionally ambiguous, they are infused with myths, desires, and symbolic capital (Easterling 2007). The condition of extraterritoriality, which is defined by its segregation, transforms these hybrid spaces into spaces that attempt to create long envisioned utopian places and a radical new socio-ecological order. These new characteristics of our time could envision the power of new intense transformations and processes of global connectivity, where the cultural collision and segregation provide new techniques for a discourse on the political composition of our urban landscapes (Weizman, Franke and Keenan 2005).

THE NECESSITY OF ALL SCALES: PLANETARY DESIGN IN THE AGE OF GLOBALITY

Globalization has a final outcome; it is not unending. Without recourse, humanity is headed into the age of globality, the final state of the globalization process. Globality is the endgame, an all-inclusive terrestrial status. In this fully connected world, populations will compete with everyone, everywhere, for everything at all times in all scales. Vast networked communication linkages will reverse developing world economies and cause developed nations to partially corrode if not yield. A conceivable state of planetary equilibrium ought to influence the major sectors of industry, commerce, resource management, infrastructure, technology, energy, and governance with profound transformations. What is design like in this saturated condition of globality?

The American economist, Jeremy Rifkin, infers that the modern age has been characterized by a "Promethean spirit," a restless energy that preys on speed records and rapid solutions, unmindful of the past, uncaring of the future, existing only for the moment and the quick fix (Rifkin 2000). The earthly rhythms that characterize a more pastoral way of life have been shunted aside to make room for the fast track of an urbanized existence. Lost in a sea of perpetual technological transition, contemporaneous people find themselves increasingly alienated from the ecological choreography of the planet. Humanity expects jet airliners to collapse the space of a continent in a matter of hours. We have partly lost our sense of scale, time, and distance.

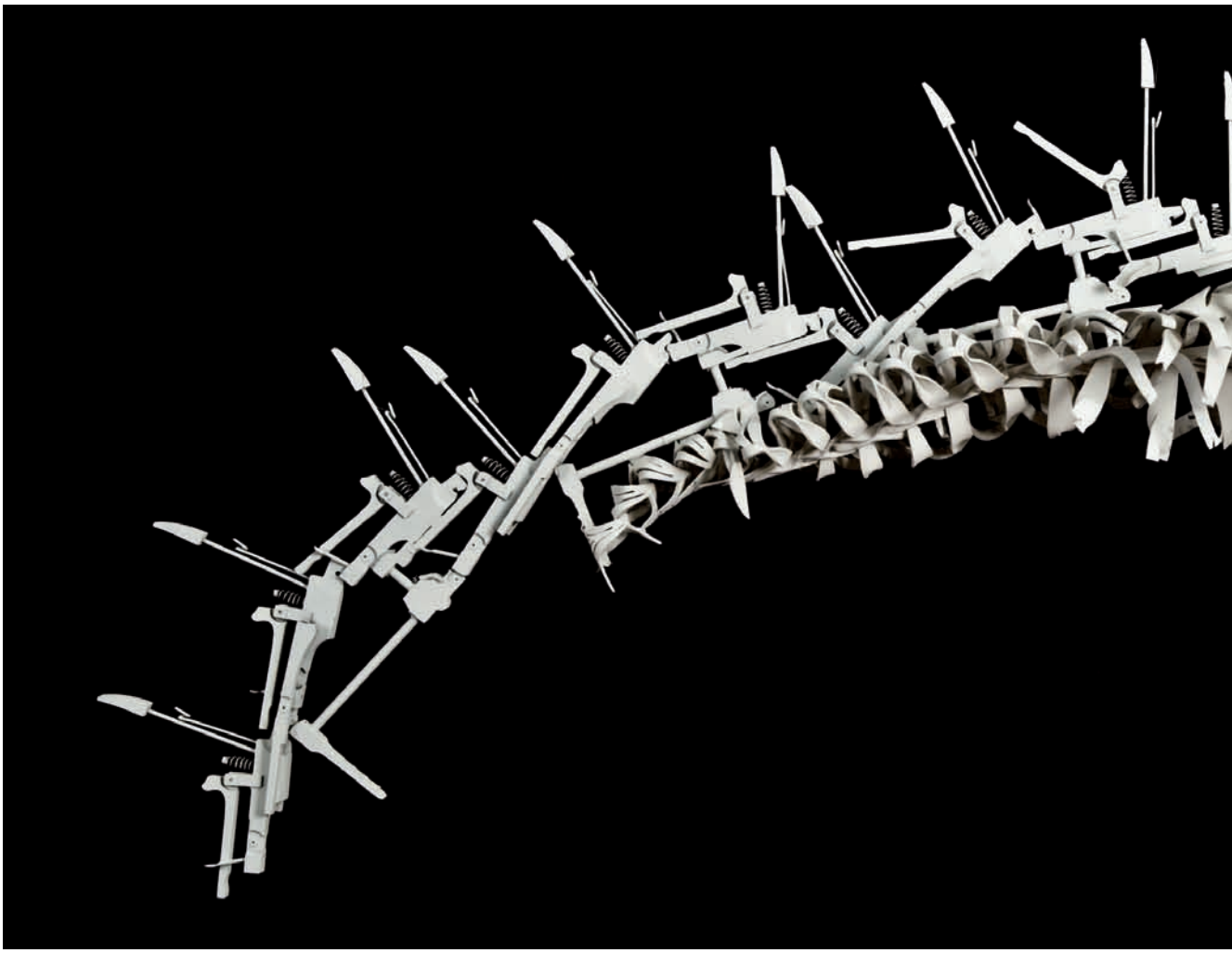
Scale also determines our profound connection to place. Yi Fu Tuan's environmental conjecture (1974) conveys knowledge and love of place with descriptions, maps and itineraries enabling people to appreciate their location as do aborigines or animals. Such literature also enlivens the experience of everyday places with new facts and rhetorical devices that can recalibrate familiar environs to keep alive a sense of the undiscovered country of the nearby.

These texts direct both official and intuitive knowledge toward "topophilia," the love of place. The intention is to expand our sense of the land, not to confine it to one size. We are in need of terrain propinquity, not dislocation.

Already the disasters at Chernobyl and Fukushima have demonstrated long-reaching influences on worldwide environmental health and ultimately on global financial markets. Effects of scale become constantly transferred between the irreducible and the colossal. Small changes ramify into massive results and vice versa. Globality operates in all scales simultaneously without privileging one form. Its very nature implies measureless shifts in size. Ideas of thinking inside strict categories of scale are defunct and counter-intuitive. Charles and Ray Eames (1968) provided the perfect case. Illustrated in the *Powers of Ten*, scale is conveniently defined in neat square-shaped frames. The point of their animation is to bridge the different perceptions of scale cohesively. Their concept is to empower individuals to visualize the ranges of observation melded as one. Unfortunately, a few viewers also interpret this to mean you actually should bracket places and things in specific scales. That's a common oversight of their *Powers of Ten* message. Nothing happens in only one frame of space/time. Framing can help to study a phenomenon at a particular moment but things always stir. Moreover, artificially binding a place to a numerical scale is to some extent random and arbitrary. What law declares measures must be in units divisible by ten? In his lectures, Jamer Hunt points this out nicely by making a reference to the film *This Is Spinal Tap*. One scene in particular shows the actor, Christopher Haden-Guest, referring to his guitar amplification equipment with a volume knob that goes to eleven. Within the central idea of this farcical narrative, scale is portrayed as being truly capricious.

Rem Koolhaas and Bruce Mau (1995) intended an emphasis on scale in the book, *S, M, L, XL,* yet also alluded to the in-between thresholds and differentiation of projects. A false read of *S, M, L, XL* is to suppose that the Office for Metropolitan Architecture's (OMA) works fit cleanly into categories measurable by an orderly unit. What exactly is designated a "small" project: a door hinge detail, an elevator, a wooden deck addition? More notably, what "small" project does not have significant impacts on an extra-large scale? Everything has consequent ramifications. Rem and group of course are fully aware, but may have failed to communicate its grandiose message in the title. Similar to *Powers of Ten*, it underscores an explicit simplification in degrees of change. Urbanism cannot be compiled into tidy categories defined by size. Design needs to break out of the emblematic question of size, especially as it relates to one planet. One size does not fit all; rather, all sizes fit one.

Visualizing in one scale is markedly problematic. An analysis comparing the views of Johann Wolfgang von Goethe and Isaac Newton best demonstrates this assertion. Goethe (1970) pioneered a comprehensive lucid description of color within a perceptual human context. He ardently conveyed that colors were defined by an inseparable relationship called *Zur Farbenlehre* [Theory of Colors]. One color cannot be reduced to a single element. It requires a setting of



Extraterritoriality in the context of ecology. Composition and speculation conditions on unstable processes

other colors and circumstances to be fully perceived as an observable phenomenon by humans. He proclaimed that to identify blue you need to, at some level, recognize red, orange, yellow, and the entire spectrum. Newton (1730), in opposition, treated color analytically and saw each color as discrete wavelengths in an optical spectrum. Newton surmised that it is absolutely possible to observe one color disconnected from its domain. Every color has a particular frequency and can be defined as such. While both thinkers are correct, the problem design professionals have with scale is identical. Scale can be Newtonian and viewable at one frame of unitized reference. However, scale is best perceived holistically in relationship to other scales in order to understand its true phenomenon.

Most archetypal designers tolerate a proclivity to divide concepts up into specific units. That is intended to help comprehend or visualize the problem better. However, this is inherently misguided. Design is a prescience that affects all disciplines and cannot be conceptualized as a bracketed or contained field. The condition of globality and scale asserts a restructuring of the design professions as we know them. This requires a new breed of designers who can speculate and produce at the nano-scale level up to feats of geoengineering and beyond. These thinkers can be referred to as planetary designers.

As a globalized meta-Pangea community, design is obliged to be pervasive. It simply cannot regulate itself to any one scale or project scope. If so, its relevance and instrumentality are

greatly diminished. The principal operations of scale and systems that deploy it restrain and confuse the complicated reality of design problems. The more it is used, the more designers fail to envision the whole picture. Computer-aided design is part of this dilemma, both a solution and a quandary.

Most design software unwittingly forces designers into forms of measure. As soon as the file opens, designers are asked to define the units of measure, view ports, and scale. The same is not true when an individual picks up a pencil. Freedom to draw and therefore conceptualize without boundaries is practically inestimable. To paraphrase Frank Stella, "artists don't think in units."

The processing capacities of computers distort the implications of measure. Software allows for seemingly limitless flexibility. Operators can shift from the smallest possible detail to the largest components. It is possible to zoom endlessly outwards into entire regions. On one level, this is a tremendously effective visualization capacity. Consider the design of a rail spike and its connection to the track: zoom onto the tracks themselves and further out to all the trains on those tracks and advance past Penn Station and finally out of the entire New York City metropolitan region. This is an acutely impressive tool. However, the software does not make any distinctions about the conventions of physics and natural forces that govern each zoomed layer. In many cases the current limitations of memory also fail to provide all the essential detail within each consecutive zone. Furthermore, the material and chemical behavior of the objects and places are not described in relationship to each other beyond geometric location. Admittedly, the current trend is to restructure computation to account for these missing characteristics. Envision a computer program that fully simulates the ecosystem of the earth and all the associative quantum mechanics. It would be a Jorge Luis Borges map of the world in such vast specificity that it would correlate to the exact size of the world at 1:1 (Borges 1975).

Additional scenarios of scale in relation to the planet are depicted in *The End of Nature* by Bill McKibben (1999). He marshals the latest scientific evidence about the greenhouse effect, the depletion of the ozone layer and a harrowing array of other ecological ills, and unmistakably explains the frightening implications of the destruction cities have wrought on our planet. He questions ecological hysteria and reasonable scientific forecasts. Within either approach, *The End of Nature* has a philosophical position. McKibben declares confidently about the meaning of these changes, about the wretchedness of life where there is no escaping mankind. Although for centuries civilization has pillaged and polluted the earth, in the past those aggressions were relatively localized; now, with the globality shifts caused by greenhouse gases and ozone depletion, man and cities have altered the most elemental processes of life everywhere. Nature itself has been tainted, becoming the equivalent of a vast heated room. By turning nature into "an artifact" or by-product of economic development, society has lost something of profound importance: nature as a quasi-celestial source of ultimate meaning and value. It is this loss

that McKibben refers to as an apocalyptic calamity. The ending of nature is something independent of, larger than, and uncontrolled by man. In this nihilistic world every measurable space has been touched by human interference. Here, even the right of all life to breathe has been impacted.

Multiple designers and planners have become concerned in recent years with revealing "truth windows" into nature to avoid its end. They highlight ecological processes in their designs so that the users of the environment may experience, comprehend, and appreciate the scales of those processes aesthetically. In practice, revelation of ecological process has meant everything from capturing storm water on the surface of the land before it drains away into sewers, to planting a row of trees in an urban plaza where a creek once existed. In addition, the ecological processes that are revealed may themselves be truly natural, in the sense that they could continue to subsist without the management of society, or they may be deeply artificial, engineered systems that need relentless supervision if they are to persist in an urbanized context. Ultimately, the intention is make the scales of ecology visual and thereby expose an alleged spectacle of beauty otherwise unseen.

Our future in architecture recognizes that there is an immeasurable ecological quality that goes well beyond the borders of the building site. Architecture in the future or architecture even now must be understood without a solitary scale. It must be planetary, the extent of which contains the outer edges of the atmosphere all the way into the deep regions of inner space

Our future in architecture recognizes that there is an immeasurable ecological quality that goes well beyond the borders of the building site. It is clear that ecological principles comprise a web of interconnected concepts, and a breathing, healthy metabolism has to fit inside. Thus, architecture in the future or architecture even now must be understood without a solitary scale. It must be planetary, the extent of which contains the outer edges of the atmosphere all the way into the deep regions of inner space.

The new sophisticated field of geoengineering, for instance, exemplifies the lack of scale comprehension. In geoengineering, exertion is made on the scope of an entire continent. Geoengineers produce efforts equivalent to the Panama Canal as everyday feats. When looking at consequences and devices that can cause change at the regional level, we must look not at the region itself but the entire hemisphere, various megalopolises, as well as the smallest biological system. We must realize there is a kind of hubris, an unlimited bravery and power in conquering nature. Designing modifications at continental scale does infer accidents will be unmatchable.

The issue of scale seems rampant in the discussion and polemics of ecological cities. Scale is a pervasive term in engineering, architecture, urban studies, and design. It serves as a constant and definitive point of reference to help elucidate a given project although not without fault. We have separated our professional disciplines, project scopes, and programmatic language in terms of size, a redundant supposition in the age of globality. How designers can play a significant role in this expansive territory and live up to our proleptic merit is worthy of understanding further. Designers' responsibility is to re-tool the middle ground, the in-between, and the nexus points. In this case, infrastructure with applied innovative ecological directives becomes the penultimate goal, before completely reforming the world. Operations of infrastructure shape a broad range of circumstances. Infrastructure in all dimensions and extents is the actual frontier. Next to implemented technological, social, and ecological solutions from other disciplines, design innovations are rapidly being diminished if not surpassed by other competitive fields. We designers must take action and modify our stance on all scales and morphologies in order to have a positive effect on the global community. Our hypothesis is first and foremost based on one succinct predicate, the end of scale.

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Throughout the developed world, urban design is at an impasse, unable to mend the rift between theory and practice. This essay explores urbaneering, a new profession that can re-invent and negotiate the complex mix that encompasses the next city. It practices totalized schemes that rethink all scales of involvement from the doorknob to democracy. To inspire interdisciplinary innovation, Urbaneers encourage people to switch roles; architects must design cars, automotive engineers must devise eco-systems, and ecologists must draw up buildings. The next city needs a new breed of communicator: a person skilled in the art of cities beyond the typical utopists, planners, civil engineers, and architects in the present day. It is through this approach that Urbaneers seek to reform the city of today for the Utopia of tomorrow.

BIOGRAPHY

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Mitchell Joachim is an architect, urban designer and environmental planner. He is a Partner at Planetary ONE and founding Co-President of Terreform ONE, as well as an Associate Professor at NYU and EGS. Joachim holds a PhD from Massachusetts Institute of Technology, a Master of Architecture in Urban Design from Harvard University, a Master of Architecture from Columbia University, and a BPS SUNY from Buffalo, with honours. He has taught at Columbia University, Syracuse University, Parsons, The New School for Design, Washington University, and the Frank Gehry Chair at University of Toronto. He won the Zumtobel Group Award for Sustainability and Humanity, the History Channel and Infiniti Excellence Award for City of the Future, and Time Magazine Best Invention of 2007. His project, Fab Tree Hab, has been exhibited at MoMA and widely published.

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