TOWARD THE SENTIENT CITY

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Living City, *Gloop 4 Communications in the Living City*, Warren Chalk + Ron Herron, © Archigram 1963.

*When it is raining in Oxford Street the architecture is no more
important than the rain, in fact the weather has probably more
to do with the pulsation of the Living City at that given moment.*
— Peter Cook [1]

One could argue that this provocation by British architect Peter
Cook remains relevant to the design and inhabitation of the con-
temporary city. Appearing in the introduction to an issue of Living
Arts magazine published in 1963, it suggests that architecture,
at least as it was traditionally conceived, might no longer play a
vital role in shaping the urban experience. This issue of Living
Arts was a catalog for Living City, an exhibition organized by the
young British architecture collective Archigram and presented at
the Institute for Contemporary Art (ICA) in London. At the time of
the exhibition, "swinging" London epitomized the modernization
of British cities in the 1950s and 1960s.[2] The glare of neon lights,
the proliferation of urban advertising, the glitter and glam of
new (American) products displayed in storefront windows, or the
horror of "garishly decorated restaurants"[3] — this illuminated
"pop" city became the curse of "proper" British architects and
urban planners. The urban vernacular, Living City claimed, made
fussing with the detailing of urban facades or interior lobbies
irrelevant, as the experience of the street was more influenced by
ambient, immaterial, and kinetic forces than by the detailed formal
articulation of space and material.

Instead, as the exhibition made clear, the flotsam and
jetsam of everyday urban life were to become the new materi-
als of architecture. Organized around seven thematic sections
— Man, Survival, Crowd, Movement, Communication, Place,
and Situation— the exhibition catalogued the more ephemeral
and intractable qualities of urban life, celebrating a new urban
reality with which many within the architectural establishment
were not entirely comfortable.[4] "We are in pursuit of an idea, a
new vernacular," writes Archigram member Warren Chalk in the
catalogue, "something to stand alongside the space capsules,
computers and throw-away packages of an atomic/electronic
age."[5] In embracing a pop aesthetic common to an everyday
urbanism, Living City arrived on the London architectural scene
as a provocation: architecture would need to embrace the ebb
and flow of modern urban life, at least if it wanted to maintain
any claim to cultural relevance.

However radical they may have seemed at the time,
these claims were neither new nor original. Futurists such as
Antonio Sant'Elia had long since cited the visual speed and
aural volume of the modern industrial metropolis as inspira-
tion for radical architectural forms. Likewise, urban sociologist
Georg Simmel explored the impact of the visual cacophony of
urban environments on the mental life of the people who lived
in rapidly-industrializing cities like Berlin at the beginning of the
20th century, [6] and German cultural theorist Walter Benjamin
addressed the reception of architecture as something appro-
priated in a state of distraction through habitual use over time
in his 1936 essay "The Work of Art in the Age of Mechanical
Reproduction."[7]

1. Peter Cook, Introduction to
Living Arts 2 (London: Institute for
Contemporary Arts and Tillotsons,
1963), 70.
2. Simon Sadler, Archigram:
Architecture without architecture
(Cambridge: MIT Press, 2005).
3. Christopher Booker, C. "The neo-
philiacs: A study of the revolution" in
English life in the fifties and sixties
(London: Collins, 1969), 269. As quoted
in Sadler.
4. For more background on the Living
City exhibition, see Hadas Steiner,
"Brutalism Exposed: Photography
and the Zoom Wave," Journal of
Architectural Education 59:3 (2006):
15-27.
5. Warren Chalk, "Gloop 7 Situation",
in Living Arts 2 (London: Institute for
Contemporary Arts and Tillotsons,
1963), 110.
6. Georg Simmel, "The Metropolis and
Mental Life," in Simmel on Culture:
Selected Writings (New York: Sage,
1997).
7. Walter Benjamin, "The Work of Art in
the Age of Mechanical Reproduction,"
in Illuminations: Essays and Reflections
(New York: Shocken, 1969), 217-252.

Declaring a crisis in architecture in the face of contemporary conditions as a means of arguing for its reinvention is a classic and well-worn tactic. Thirty years after Living City, Rem Koolhaas introduced the concepts of *Junkspace* and the *Generic City* to describe the global, undifferentiated extension of built space, where the drive toward Bigness superseded the attentive detailing of architectural and urban design. Declaring "The city is no longer. We can leave the theatre now,"[8] he echoes Archigram's assessment that the 'old' tools, techniques and obsessions of architecture are no longer relevant to current conditions. "People can inhabit anything," he claims. "And they can be miserable in anything and ecstatic in anything. More and more I think that architecture has nothing to do with it."[9]

Yet unlike Koolhaas, Archigram viewed the flotsam and jetsam of urban life not as something beyond the reach of architecture; rather, they sought to bring architecture beyond itself in order to engage the ephemeral qualities constituting the Living City. These were the materials of a new architecture, an urban dynamic composed of light, sound, and other forms of urban communications: "static communications + motile communications + verbal and non-verbal communications + signs + symbols," lists one montage created for the exhibit, "watch it happen + listen to the sound + see it flow."[10] Not satisfied with viewing the architecture of the city as a collection of formal, static, immobile, and timeless monuments within and around which life is organized, Archigram called for an urban architecture capable of engaging the less determinate, more ephemeral, untidy ebbs and flows of urban life: "Situation, the happenings within spaces in the city, the transient throw-away objects, the passing presence of cars and people," writes Chalk, "are as important, possibly more important, than the built demarcation of space."[11]

As the data clouds of the twenty-first century descend on the streets, sidewalks, and public spaces of contemporary cities, we might ask: to what extent are these informatic weather systems becoming "as important, possibly more important" than the formal organization of space and material in shaping our experience of the city? Since the 1980s, computer scientists and engineers have been researching ways of embedding computational "intelligence" into the built environment. Looking beyond the paradigm of personal computing, which placed the computer in the foreground of our attention, research in ubiquitous computing projected a world where computers would disappear into the background, displaced to the periphery of our awareness. Enabled by tiny, inexpensive microprocessors and low-power wireless sensor networks, processing was to become ambient. No longer solely "virtual," human interaction with and through computers in this near-future world would be more socially integrated and spatially contingent as everyday objects and spaces became linked through networked computing.

Today, as computing leaves the desktop and spills out onto the sidewalks, streets and public spaces of the city, we increasingly find information processing capacity embedded within and distributed throughout the material fabric of everyday urban space. On any given day, we pass through transportation systems using magnetic strip or Radio Frequency ID (RFID) tags to

8. Rem Koolhaas, "Generic city," in S.M,L,XL (New York: The Monacelli Press, 1995).
9. Katrina Heron, "From Bauhaus to Koolhaas," in Wired Magazine issue 4.07 (July 1996), http://www.wired.com/wired/archive/4.07/koolhaas.html
10. Sadler, 56-57.
11. Chalk, 110.

Bill Sullivan. *More Turns,* 2004. Courtesy of Bill Sullivan.

pay a fare; we coordinate meeting times and places through SMS text messaging on the run; we cluster in cafes and parks where WiFi is free; we move in and out of spaces blanketed by CCTV surveillance cameras monitored by computer vision systems. Artifacts and systems we interact with daily collect, store and process information about us, or are activated by our movements and transactions.

Ubiquitous computing evangelists herald a coming age of urban infrastructure capable of sensing and responding to the events and activities transpiring within the city. Imbued with the capacity to remember, correlate and anticipate, this near-future "sentient" city is envisioned as being capable of reflexively monitoring its environment and our behavior within it, becoming an active agent in the organization of everyday life in urban public space. Few may quibble about "smart" traffic light control systems that more efficiently manage the movement of cars, trucks, and busses on our city streets. But some may be irritated when discount coupons for their favorite espresso drink are beamed to their mobile phone as they pass by Starbucks. And many are likely to protest when they are denied passage through a subway turnstile because it "senses" that their purchasing history, mobility patterns and current galvanic skin response (GSR) reading happen to match the profile of a terrorist.

That these evolving urban conditions alter traditional sites of practice and working methods of architecture and urban planning is obvious. Less apparent is how these fields might respond — indeed, even influence — the development trajectory of urban environments. While comparisons of contemporary conditions to those of Archigram's Living City do help situate these problems in terms of historical cycles of crisis and renewal in professional disciplines, both the nature of cities and the technologies enabling them have evolved significantly since 1963. In particular, two threads can be outlined that help reframe the contemporary city in terms of the specific techno-social spaces it presents and the organizational logics underlying them. The first concerns looking beyond materiality in architecture and shifts the locus of practice from the architectural "hardware" of urban space to the immaterial architecture of "software" infrastructures and their ability to inform, perform and enact new urban organizations and experiences. This thread extends ideas introduced by Living City and establishes an historical continuity with current conditions of urban life. The second addresses the implications of higher-order information processing in urban environments, and examines various ways in which the concept of "sentience" when applied to non-human actors (such as cities) produces a rupture within an historical continuum that has for centuries defined both the nature of cities and who (or more precisely what) constitutes its citizens.

Beyond Materiality in Architecture

The modern city exists as a haze of software instructions. Nearly every urban practice is mediated by code.
—Amin and Thrift [12]

12. Ash Amin and Nigel Thrift, Cities: Reimagining urban theory (Cambridge: Polity Press, 2002), 125.

Two years prior to Living City, author and urban activist Jane Jacobs published her influential book The Death and Life

of Great American Cities. In one extended passage, she describes the cycle of daily (and nightly) activity transpiring on Hudson Street, located in her neighborhood on the Lower West Side of Manhattan. This narrative of a sidewalk "ballet," as she calls it, takes the form of a list of casual events, encounters, and interactions between neighbors, workers, and passers-by:

Mr Halpert unlocking the laundry's handcart from its mooring to a cellar door, Joe Cornacchia's son-in-law stacking out the empty crates from the delicatessen, the barber bringing out his sidewalk folding chair... Simultaneously, numbers of women in housedresses have emerged and as they crisscross with one another they pause for quick conversations that sound with either laughter or joint indignation, never, it seems, anything between... Longshoremen who are not working that day gather at the White Horse or the Ideal or the International for beer and conversation... As darkness thickens... the ballet goes on under lights, eddying back and forth but intensifying at the bright spotlight pools of Joe's sidewalk pizza dispensary, the bars, the delicatessen, the restaurant and the drug store.
— Jane Jacobs [13]

If Archigram viewed the city as an environment that conditions our emotions, today, the "feel" of the street is defined less and less by what we can see with the naked eye. Taking a cue from Jacobs, Dan Hill describes the informational ballet transpiring on a typical street today in terms of what we cannot see:

We can't see how the street is immersed in a twitching, pulsing cloud of data... This is a new kind of data, collective and individual, aggregated and discrete, open and closed, constantly logging impossibly detailed patterns of behaviour. The behaviour of the street. Such data emerges from the feet of three friends, grimly jogging past, whose Nike+ shoes track the frequency and duration of every step, comparing against pre-set targets for each individual runner. This is cross-referenced with playlist data emerging from their three iPods. Similar performance data is being captured in the engine control systems of a stationary BMW waiting at a traffic light, beaming information back to the BMW service centre associated with the car's owner. The traffic light system itself is capturing and collating data about traffic and pedestrian flow, based on real-time patterns surrounding the light, and conveying the state of congestion in the neighbourhood to the traffic planning authority for that region, which alters the lights' behaviour accordingly... In an adjacent newsagent's, the stock control system updates as a newspaper is purchased, with data about consumption emerging from the EFTPOS system used to purchase the paper, triggering transactions in the customer's bank account records. Data emerges from the seven simultaneous phone conversations (with one call via Skype and six cellular phones) amongst the group of people waiting at the pedestrian crossing nearest the newsagent.
— Dan Hill [14]

To understand the implications of this folding of people, street, and data onto each other requires thinking about space in non-visual ways, where formal geometry and material articulation become less relevant than the topologies of networked information systems and their intersection with the socio-spatial practices of daily life. Martin Dodge and Rob Kitchen have suggested that

13. Jane Jacobs, The Death and Life of Great American Cities (New York: Random House, 1961), 52-53.
14. Dan Hill, "The Street as Platform," City of Sound, 11 February, 2008. http://www.cityofsound.com/blog/2008/02/the-street-as-p.html (last accessed 5 July 2010).
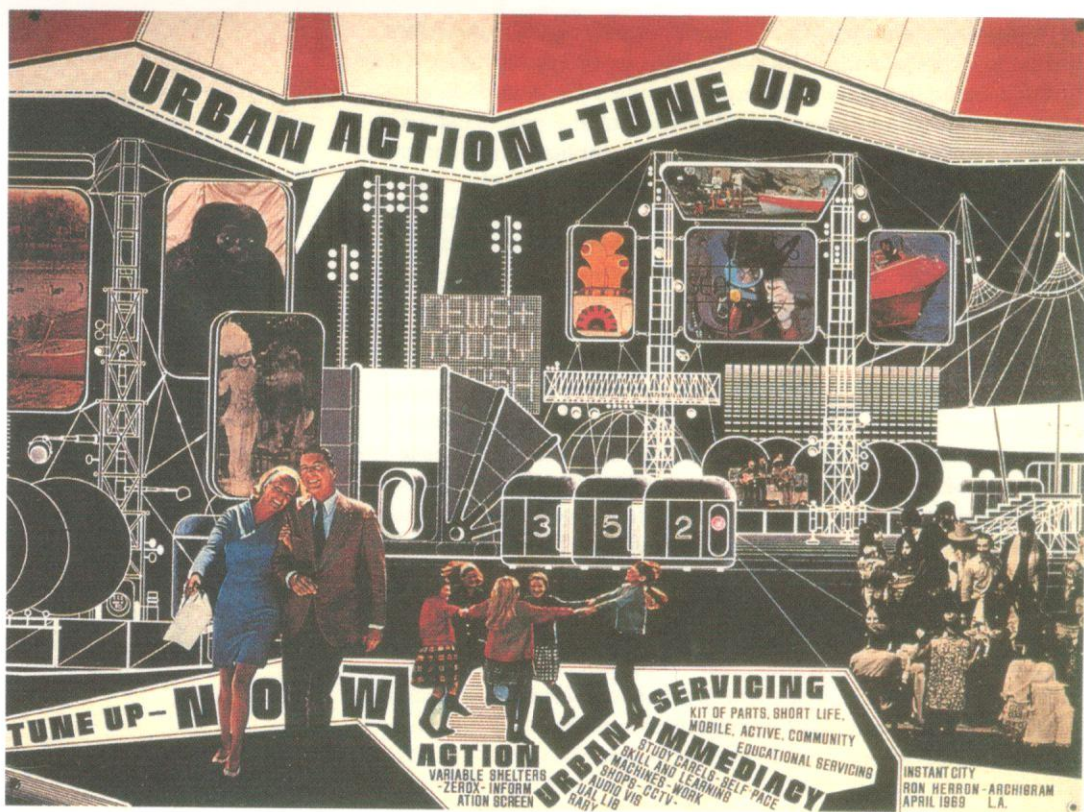
Archigram. Instant City. Urban Action Tune-Up. Collage. 1969. Courtesy Simon Herron.

these kinds of "code/space" need to be understood ontogenetically, that is, as something continually brought into being through specific practices that alter the conditions under which space itself is (re)produced. [15] Building on the work of Adrian MacKenzie, [16] they differentiate between technicity (the productive power of technology to make things happen) and its realization through transduction (the constant making anew of a domain in reiterative and transformative practices). [17] These assemblages of code, people, and space are thus brought into being through specific techno-social performances or enactments within the course of daily life.

The idea that space itself is a social product [18] — one less designed and constructed than enacted or performed through specific behaviors and practices [19] — runs counter to the absolute ontologies of space based on the Cartesian grid and Euclidean geometry that underlie the dominant spatial models of mainstream 20th century architecture. To a certain extent, Living City launched a frontal assault on these models, and Archigram explored alternatives to these spatial absolutes through a series of projects that followed the Living City exhibition. From Plug-in City, which proposed a mega-structural framework to be in-filled by its inhabitants as they saw fit, to Instant City, a kit of parts and set of procedures for delivering temporary entertainment infrastructures to sleepy English suburbs, Archigram looked for ways by which the technicity of architecture would, at least in part, be dependent on its transduction through the behavior and practices of its inhabitants.

Yet if these projects sought to open up the material 'hardware' of architecture to change and adaptation over time in the context of varied uses, others pursued 'software' architectures or spatial 'programs' as a way to redress the spatial absolutism of high modernism. [20] An architectural program is a set of functional requirements or uses ascribed to a set of spaces that, when taken together, make up a building. A program for a house, for example, typically consists of a number of bedrooms, a living room, kitchen, dining room, and supporting spaces such as bathrooms, hallways, etc. Each of these named spaces is associated with a set of normative activities or uses that they are designed to support. Encoded within the architectural program, then, are a set of behaviors and activities that are given form through the material support of designed furnishings, fittings and spatial arrangements. At the scale of the city, this takes the form of planning and zoning codes governing land use and of legislation regulating what one can and cannot do in urban public space.

One response to programmatic absolutes, perhaps illustrated best by Koolhaas, is that of the 'generic' program. The generic program recognizes that in certain instances, people will inhabit and make use of any space whatsoever — regardless of, indeed even in spite of, its formal arrangement and functional assignment. Take the conversion of industrial loft space to multi-million dollar residences, for example. Here, the form of the spatial container remains the same, regardless of its function. Another response, perhaps best represented by Bernard Tschumi, involves deliberately planning programmatic hybrids and disjunctions that provoke new uses and activities that are, by design,

15. See Dodge and Kitchin, op. cit.
16. See for example Adrian Mackenzie, Transductions: Bodies and machines at speed (London: Continuum Press, 2002) or Transduction: Invention, innovation and collective life, Unpublished paper (Lancaster: Institute for Cultural Research, Lancaster University, 2003) http://www.lancs.ac.uk/staff/mackenza/papers/transduction.pdf (last accessed 5 July 2010).
17. Martin Dodge and Rob Kitchin, "Code and the transduction of space," in Annals of the Association of American Geographers 95 (1) (2005): 162–180.
18. Henri Lefebvre, The Production of Space (London: Blackwell, 1991).
19. Michel de Certeau, The Practice of Everyday Life (Berkeley: University of California Press, 1984).
20. See Steiner, op. cit.

indeterminate. Consider the popular bar/laundromat hybrid, for example. Here, the juxtaposition of ordinary programs in an unconventional way generates spatial uses and activities that break the normative roles ascribed to each program separately. The architecture becomes a stage-set for a set of spatial practices that, in turn, enact the architecture.

The Mobile Device as Territory Machine

Imagine Hegel, Marx and McLuhan encountering the keitai [mobile phone] of the twenty-first century. Georg Hegel is astonished at seeing the spirit of the era dwelling persistently in our palms. Karl Marx complains that it is an alienating fetish object. Marshall McLuhan, his eyes sparkling, chimes in that it will turn the whole world into a village—no, a house. But in the next moment, he comes upon a realization that appalls him. "But wait!," he exclaims. "My wife and children will have the equivalent of a private room with a twenty-four-hour doorway to the outside world, fully equipped with a TV, a bed, and even a bathroom. Where would my place be in such a house?"
— Kenichi Fujimoto [21]

A new twist to the old problem of 'programming' space arises with contemporary everyday practices involving mobile devices and wireless information systems. In Japan, for example, the mobile phone has been described by Kenichi Fujimoto as a personal "territory machine," capable of transforming any space — a subway train seat, a grocery store aisle, a street corner — into one's own room and personal paradise. Born out of the so-called girl's pager revolution of the 1990s, the mobile phone became a key weapon in a young Japanese girl's arsenal for waging gender warfare against older "raspy and thick-voiced" *oyaji*, intent on peeping at young female bodies from behind a newspaper. Armed with her *keitai*, speaking freely in a high-pitched voice, "wearing loose socks and munching snacks," these *kogyaru* "couldn't care less if a subhuman *oyaji* peeked at their underwear or eavesdropped on their conversations."[22] These techno-social practices remade space in the Japanese city in new ways, transforming the paternalistic communities of city streets and subway cars into private territories for women and children.

In the West, spatial practices involving the iPod are, perhaps, more familiar. Michael Bull has studied how people use these devices to mitigate the contingencies of daily life. On one level, the iPod enables one to personalize the experience of the contemporary city with one's own music collection. When you are on the bus, at lunch in the park, or shopping in the deli, the city becomes a film for which you compose the soundtrack. The iPod also provides gradients of privacy in public places, affording the listener certain exceptions to conventions for social interaction within the public domain. Donning a pair of earbuds grants the wearer a certain amount of social license, enabling one to move through the city without necessarily getting too involved and, to some extent, absolving one from responsibility to respond to what is happening around him or her. Some people use earbuds to deflect unwanted attention, finding it easier to avoid responding because they look already occupied. Faced with two people on the sidewalk, we will likely ask the one without earbuds for directions to

21. Kenichi Fujimoto, "The third stage paradigm: Territory machines from the girl's pager revolution to mobile aesthetics," in Personal, Portable, Pedestrian: Mobile Phones in Japanese Life, ed. M. Ito, D. Okabe, and M. Matsuda (Cambridge: MIT Press, 2006), 77.
22. Fujimoto, 98.

the nearest subway entrance. In the same way, removing one's earbuds when talking to someone pays the speaker a compliment. So, in effect, the iPod becomes a tool for organizing space, time, and the boundaries around the body in public space.

What is significant here is that as these mobile devices become ubiquitous in urban environments (and in many places they already are), the technicity of architecture as the primary technology of space making is challenged by the spatial transductions these devices afford. Regardless of the formal geometries and material arrangements of a space as defined by architecture, and irrespective of the normative activities or uses encoded (or elicited) by its program, these devices and the ways in which we use them have perhaps become as important as — if not more important than — architecture in shaping our experience of urban space.

Urban Computing, Locative Media and the Read/Write City

The relatively recent emergence of Location-based Services (LBS) for mobile devices is beginning to provide insights into new ways by which information can be accessed, shared and distributed in urban environments. These services deliver information specific to location, time of day/year, and the preferences or profile of an individual, group or network. Common commercial applications include GPS-based navigation systems for mobile phones that direct one to a local restaurant or business meeting, and location-aware city guides that assist visitors to unfamiliar places in finding what they are looking for. But location-based services can also enable ordinary people to tie bits of media and information to specific locations in the physical world, marking up the built environment with personal notations, stories and images. Less common are applications that explore the ability of GPS enabled technologies to correlate place, time and identity in ways that empower users to not just read information, but also write it.

With Apple's introduction of the iPhone 3G in the summer of 2008, urban computing and locative media — formerly indicating somewhat experimental research or artist-driven explorations of location-based technologies — began being mainstreamed to the masses. We are now beginning to see social practices emerge by which location-based or context-aware media and information are consumed *en-masse* in urban environments, and, in turn, how urban space is transduced in the process.

For one thing, the way we read the city is changing. As Varnelis and Meisterlin note:

As we have grown accustomed to navigating the city with our smart-phones and our printouts from Google maps, we have come to know it from above, as a two-dimensional, planimetric experience. Instead of seeing ourselves as part of the city fabric, inhabiting a three-dimensional urban condition, we dwell in a permanent out-of-body experience, displaced from our own locations, seeing ourselves as moving dots or pins on a map.

— Varnelis and Meisterlin [23]

Here, the emphasis on reading the city through "intelligent" maps, and on the implications for urban experience of the habitual

23. Kazys Varnelis and Leah Meisterlin, "The invisible city: Design in the age of intelligent maps," Adobe Design Center Think Tank, http://www.adobe.com/designcenter/thinktank/tt_varnelis.html (last accessed 5 July 2010).

patterns by which we use them, implies forms of passive consumption with which we are all likely familiar. The city becomes a network of nodes and pathways through which we circulate like data packets. "The city is here for me to use" is the underlying logic: a searchable city with an easily accessible shopping cart. [24] If, as McLuhan suggested[25], every extension of our capabilities leads to a corresponding amputation of another, wayfinding skills grounded in physical geographies run the risk of atrophy in an age of intelligent maps. Reports of mishaps stemming from reliance on GPS-enabled SatNav devices are becoming common. Recently, the London Daily Mirror reported that these devices have been responsible for at least 300,000 accidents, including that of Paula Ceely, 20, of Wales, who "vowed never to listen to her SatNav again after she was directed into the path of a speeding train at the Ffynnongain level crossing in Wales. The train slammed into her car, leaving the student within inches of her life."[26] Fortunately, no one was hurt in this instance.

If location-based technologies such as GPS navigation systems can lead to both a disembodied experience of the city as well as potential bodily harm, this has as much to do with the ways in which we use the technologies and the practices by which this space is enacted as it does with the technology itself. In this regard, revisiting early work in locative media that focuses on urban environments is instructive. Amsterdam Realtime (2002) [27], a project by the WAAG society in association with Esther Polak, traced movements through the city of people carrying GPS-enabled devices, which transmitted their location in real time to a remote server that, in turn, projected these movements as an animated "map" in an art gallery. This map represented the city not as a static network of streets, buildings, and spaces, but as a series of traces that aggregate over time to represent the city as different people traverse it. Here, the traditional authority attributed to maps and their ability to structure the way we navigate cities is subverted. Rather than a map that informs how one moves through a city, one's movements inform the map.

Further, the ability not only to read, in situ, bits of media and information associated with specific locations in the city, but also to write or otherwise add geocoded data to these urban data clouds, leads to more subtle shifts in the way we experience the city and the choices we make within it. As Malcolm McCullough notes [28], cities have throughout history been inscribed by various information layers that shape our experience of urban space, be they "grand expressions carved in stone facades, mundane signage in the streets," or smaller markings identifying significant sites or directing traffic and pedestrian flow. These urban annotations, in the past, have been governed by various public and private agencies, defined by different communities of practice: utilities providers, tax assessors, insurance underwriters, urban historians. When open to public consumption, these markings have generally served specific private interests, such as local business improvement districts (BIDs) or community associations. One of the more significant aspects of urban computing and locative media is how they open up the process of urban annotation by enabling ordinary people to contribute to the information layer overlaid on contemporary cities.

24. It should come as no surprise that the design and development of urban informatic systems is currently dominated by people coming from a background in web design. Despite the fact that these are very smart, extremely talented people, they struggle — as we all do — with the received assumptions, latent biases, and hidden agendas that one's background inevitably brings to new and relatively uncharted territory. So you find urban systems designers that can't help but view the city as a website. The dominant business model is one heavily invested in making the city easier to use for the tourist looking for that unique lunch spot or for the hipster looking for that "serendipitous" encounter with friends close-by.
25. Marshall McLuhan, Understanding Media. (New York: Mentor, 1964).
26. See Tanith Carey, "SatNav danger revealed: Navigation device blamed for causing 300,000 crashes," Mirror.co.uk, 21 July 2008, http://www.mirror.co.uk/news/top-stories/2008/07/21/satnav-danger-revealed-navigation-device-blamed-for-causing-300-000-crashes-89520-20656554/ (last accessed 5 July 2010).
27. http://realtime.waag.org (last accessed 5 July 2010).
28. Malcolm McCullough, "On urban markup: Frames of reference in location models for participatory urbanism," Leonardo Electronic Almanac 14 (3) (2006), http://leoalmanac.org/journal/vol_14/lea_v14_n03-04/mmccullough.asp (last accessed 1 September 2008).

Amsterdam Realtime, 2003. Courtesy of Amsterdam Realtime/Esther Polak, Jeroen Kee, and Waag Society.

Yellow Arrow (2004) [29], a global public art project originating in New York, employed simple SMS messaging techniques to enable people to "markup" the physical spaces of the city with virtual "tags" or "geo-annotations"— short text messages associated with a specific spot or location (see www.yellowarrow. net). Using stickers obtained from the project website, participants affix markers bearing a unique code in the public realm. When others encounter a sticker on the street, they send the code printed on it via a text message to a particular phone number. A text message is subsequently received that contains a message left by the person who placed the sticker. In place of the ubiquitous bronze plaque providing "official narratives" affixed to the side of "significant" urban structures or spaces, Yellow Arrow provides for the unofficial annotation of everyday urban places by ordinary citizens.

Urban Tapestries (2004/2006) [30], a project by the London-based social research group Proboscis, further investigated this idea of "public authoring" of urban environments. From the project website:

Urban Tapestries investigated how, by combining mobile and internet technologies with geographic information systems, people could 'author' the environment around them; a kind of Mass Observation for the 21st Century. Like the founders of Mass Observation in the 1930s, we were interested in creating opportunities for an "anthropology of ourselves" — adopting and adapting new and emerging technologies for creating and sharing everyday knowledge and experience; building up organic, collective memories that trace and embellish different kinds of relationships across places, time and communities.

The project enabled people to create relationships between places and to associate text, images, sounds and videos with them. Using a mobile phone or PDA with wireless connectivity, project participants authored "pockets" consisting of text and media objects related to specific locations in the city. A series of pockets by a single author formed "threads" that connected these locations. Significantly, the system enabled people "not only to personally map their urban spaces, but also [to] read the maps of the neighbors and strangers who share those spaces."[31] The project thus focused less on the uniqueness of individual expressions and more on the aggregation of these personal annotations and how they form a collective representation of urban life in a particular place at a particular time.

Questions concerning attention/distraction and the influence of ambient informatics on the perceptual conditions of urban space and the cognitive states of those who live in cities are longstanding. Benjamin's oft-cited observation in "The Work of Art in the Age of Mechanical Reproduction" that architecture is primarily received collectively in a state of distraction and Simmel's discussion of the origins of the blasé attitude in his seminal essay "The Metropolis and Mental Life" are both implicated in these recent transformations. More recently Clive Thompson has described a new kind of "ambient awareness" emerging out of social web media such as Twitter and Facebook status updates.[32] Individually, these short strings of text are relatively meaningless,

29. http://yellowarrow.net/
30. http://urbantapestries.net/
31. Roger Silverstone and Zoetanya Sujon, "Urban tapestries: Experimental ethnography, technological identities and place," MEDIA@LSE Electronic Working Papers 7, http://www2.lse. ac.uk/media@lse/research/media-WorkingPapers/ewpNumber7.aspx (last accessed 5 July 2010).
32. Clive Thompson, "Brave New World of Digital Intimacy, The New York Times Magazine, September 5, 2008, http://www.nytimes.com/2008/09/07/magazine/07awareness-t.html (last accessed 5 July 2010).
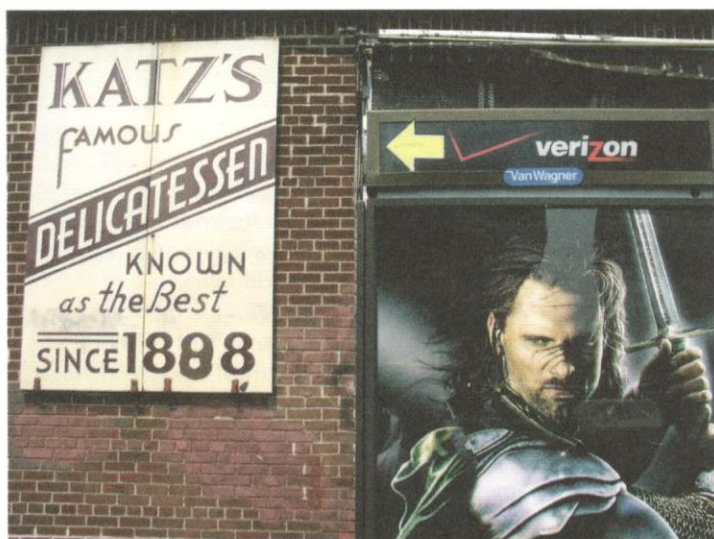
Yellow Arrow is a project created by Christopher Allen, Michael Counts, Brian House, Jesse Shapins and Counts Media Inc. Photography Jesse Shapins.
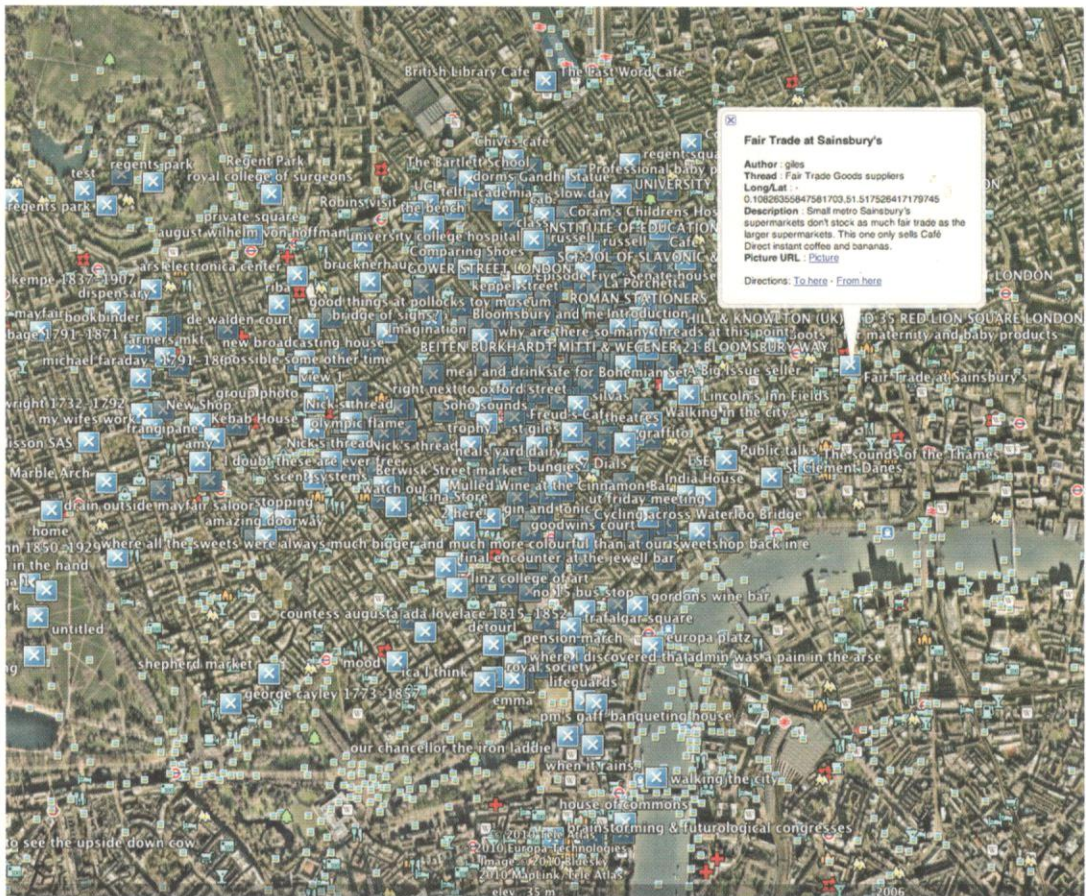
Urban Tapestries, Proboscis, 2003. Courtesy of Proboscis.

providing quotidian updates on the minutia of the daily lives of friends and acquaintances. Yet by skimming these short bits of information, Thompson suggests, we construct a peripheral awareness — a co-presence of sorts — with these absent others. As information is displaced from physical to virtual environments, our attention now becomes divided not just within our field of vision, but also between two radically different fields of vision, one human and one non-human.

But what happens when another layer of information processing is added to the mix? When we move beyond the direct action-reaction responses of systems such as subway turnstiles, or the read-write interactions involved with accessing urban markup in real-time, information processing capacity reaches a different order of magnitude. Here one's transaction history (what you've bought), mobility patterns (where you've been) and personal profile (sex, age, zipcode and related demographics) can be mined for patterns that match known profiles (of a likely customer, or a potential terrorist) and inferences can be made (what you might buy next, where you might strike). Here, computational systems operate on metadata, having been trained what to look for using neural network algorithms, where performance is measured in terms of the percentage of false-positives (or false-negatives). Here, we have urban systems and infrastructures that take on a quality of what might best be described as 'sentience' — not quite the 'smart' city we've been promised by techno-evangelists, yet not exactly dumb either.

Pathetic Fallacies and Category Mistakes: Making Sense and Nonsense of the Sentient City

And supposing there were a machine, so constructed as to think, feel, and have perception... we should, on examining its interior, find only parts which work one upon another, and never anything by which to explain a perception.
— Leibniz[33]

What are the implications of calling a city 'sentient'? The word 'sentience' refers to the ability to feel or perceive subjectively, but does not necessarily include the faculty of self-awareness. Which is to say, the possession of 'sapience' is not a necessity. Sapience can connote knowledge, consciousness, or apperception. The word 'sentience,' derived from *sentre*, means 'to feel' or 'to hear.' Sapience comes from *sapere*, meaning 'to know.' So a sentient city, then, is one that is able to *hear* and *feel* things happening within it, yet doesn't necessarily know anything in particular about them. It *feels* you, but doesn't necessarily *know* you.

Wherein lies this perception? How do we account for it? In the passage quoted from above, Leibniz goes on to claim "it is in a simple substance, and not in a compound or in a machine, that perception must be sought for." His belief that the gap between the physical and the subjective is unbridgeable, that we cannot explain subjective experience through an accounting of physical processes, can be traced to Descartes and his theory of dualism. [34] Cartesian dualism, commonly known as the "mind-body problem," asserts that mind and matter are fundamentally different

33. Gottfried Wilhelm Leibniz, Monadology, and Other Philosophical Essays (Indianapolis: Bobbs-Merrill, 1965). Originally published 1714.
34. Réne Descartes, Meditations on First Philosophy, trans. Cottingham, J., (Cambrdge: Cambridge University Press, 1966). First published 1641.

kinds of substances, and argues that mental processes are immaterial and that material organisms don't think. In <u>Meditations on First Philosophy</u>, Descartes attempted to account for animal behavior by purely physical processes as a means to distinguish living things that merely sense from those that are sentient. In doing so, he claims that this distinction marks an essential metaphysical difference: human beings are those that are sentient, all others are merely capable of sensing.

Sensing, the thinking goes, is something animals, some plants, and some machines can do. Sensing involves a sensing organ, or device that enables the organic or inorganic system of which it is a part, to actively respond to things happening around it. An organism or system may sense heat, light, sound, or the presence of rain, for example. Yet having a sensation or a feeling is something which goes beyond mere sensing, for it involves an internal state in which information about the environment is processed by that organism or system so that it comes to have a subjective character. *Qualia* is the philosophical term for this, which Dennett defines as "an unfamiliar term for something that could not be more familiar to each of us: the ways things seem to us."[35]

Non-human sentience has long been a flash point of controversy between the humanities and sciences. In <u>Modern Painters</u>, Ruskin coined the term "Pathetic Fallacy" to signify any description of inanimate things that attributes to them human capabilities, sensations, and emotions.[36] His translation of the Latin phrase *natura abhorret a vacuo* (nature abhors a vacuum) is widely known and has become part of common, everyday language. Within literature, anthropomorphism is by now an accepted literary device, yet within the natural sciences, for example, it is still considered a serious error in scientific reasoning if taken literally. Bruno Latour suggests that the difficulty lies in describing agency in the absence of anthropomorphic actors, that there is a lack of accepted vocabulary to address the non-human agency of 'things,' technological or otherwise. "[E]very time you do that," he states, "immediately people say... 'Oh, you anthropomorphize the nonhuman.' Because they have such a narrow definition of what is human, that whenever a nonhuman does something, it looks human, as if it's sort of a Disney type of animation."[37]

The term "Category Mistake" — introduced as the fundamental mistake of Cartesian dualism by Gilbert Ryle in <u>The Concept of Mind</u> — describes a seemingly nonsensical mixture of logics. [38] For Ryle, Cartesian dualism mistakenly assumes it is sensible to ask of a given cause, process, or event, whether it is mental or physical, implying that it cannot be both. He argues that saying "there occur mental processes" does not mean the same type of thing as saying "there occur physical processes," and, therefore, that it makes no sense to conjoin or disjoin the two. Keller Easterling elaborates on the category mistake: "For instance, one mistakes a part for a whole, or inverts levels in a hierarchy. Or a child thinks a division is a smaller part commensurate with a battalion or a squadron, when it is the overarching category for those of smaller divisions." She goes on to show how beginning with Jesus and extending to

35. Daniel Dennet, "Quining Qualia" in A. Marcel and E. Bisiach, eds, <u>Consciousness in Modern Science</u> (Oxford: Oxford University Press, 1988).
36. John Ruskin, <u>Modern Painters</u> (New York: John Wiley and Sons, 1864)
37. Bruno Latour, "Where Constant Experiments Have Been Provided," Interview, http://www.artsci.wustl.edu/~archword/interviews/latour/interview.htm
38. Gilbert Ryle, <u>The Concept of Mind</u> (Chicago: University of Chicago Press, 1949).

messianic characters in general, category mistakes are markers for dominant logics with universal claims. She also suggests how they can serve as an escape hatch out of the monotheisms of logic and discipline. "In order to find the trapdoor into another habit of mind, one would not quarrel with, but gather evidence in excess of" these dominant logics.[39]

The Sentient City thus becomes a contested site: a theoretical construct within which longstanding claims of essential human qualities, capabilities and characteristics are critically destabilized through their attribution to non-human actors. This destabilization is understood to work actively, as a tactical maneuver enabling other ways of thinking that not so much confront dominant ideologies but elide common wisdoms about, not only what it means to be human, but also what it might mean to be a city.

This method is, of course, by no means new. What follows is a cross-section of representations of the Sentient City culled from the fantasies of science fiction writers, the research agendas of computer scientists, and the claims accompanying recent applications deployed by corporate interests, governmental agencies, and the military. The intent here is less to provide a comprehensive overview, but rather to provender a selection of examples that point to the historical persistence and cultural pervasiveness of the sentient non-human meme.

Non-human sentience is no stranger to the science fiction community. From Arthur C. Clarke's Diaspar, the computer controlled city described in <u>The City and the Stars</u>, to his work with Stanley Kubrick on HAL (sentient machine); from Stanislaw Lem — and Andrei Tarkovsky's — Solaris (sentient planet) to DC Comics' Ranx, the Sentient City created by Alan Moore; from Gibson's sentient cyberspace as portrayed in <u>Neuromancer</u>, to the sentient programs of the <u>Matrix</u>, or Bruce Sterling's spime (to name but a few), science fiction has imbued a range of inanimate "things" of all scales with forms of sentience that do not map neatly to those of ordinary humans.

These technological fantasies of non-human sentience exhibit no consensus regarding the place or nature of sentience, however. Sentience is at times centralized (Clarke, Kubrick, Moore), at times distributed (Lem, Gibson, Sterling). While Clarke and Kubrick attempt to anthropomorphize HAL, as symbolized by his iconic and omnipresent red eye and reinforced by his conversational acuity, Lem persistently portrays Solaris' *otherness*: the planet's sentience is evidenced through the manipulation of a simple substance constituting its oceans that has nothing in common with anthropomorphic figuration or behavior.

Addressing sentience as a technical challenge, the <u>Economist</u> published an article five years ago titled "The sentient office is coming" that described then current research in augmenting computers and communication devices with sensors to enable them to take into account their environment and adapt to the changing conditions of their use.[40] Here the aim was to create "convivial technologies that are easy to live with." Yet as the article points out, cohabitation with sentient things is not without dilemmas. What happens when the toaster in your home gets bored of always making toast, or the fax machine in the office thinks the tone of your fax doesn't jive with that of the firm?

39. Keller Easterling, "Only the Many," <u>Log</u> 11 (2008)
40. "The sentient office is coming," <u>The Economist</u>, June 21, 2003.

Achieving "sentience" in the domain of Artificial Intelligence (AI) is a serious research agenda with a long history. ATT/Cambridge University's Sentient Computing project (1999) [41] attempted to "combine sensors and computers to monitor resources, maintain a computational model of the world, and act appropriately." Combining sensors and computers was at the time nothing new, but the broad attempt to "maintain a computational model of the world" proved daunting. As of 2006, the project was re-focused on tracking and location systems for "sentient" vehicles and sports.

Today the emphasis is less on trying to maintain a proprietary computational model of the world, and more on using the world itself as 'model' and letting ordinary people contribute to its making. More than a few early Urban Computing and Locative Media projects focused on crowdsourcing metadata about a place by enabling people to markup and annotate digital maps with notes, images and media objects geocoded to specific locations (Urban Tapestries, Yellow Arrow, Semapedia, to name but a few). Google Maps and Google Earth have further catalyzed the collective production of these geospatial datasets. With the introduction of the GPS enabled iPhone 3G in 2008, location-based services building on these datasets began being mainlined to the masses.

Context-awareness plays a significant role in current research in sentient systems. In addition to knowing where someone is, factors such as whom they are with and what time of day it is reduces the possibility space within which inferences and predictions are made. This real-time information is correlated with historical data of someone's mobility patterns, purchasing history, personal interests and preferences (as reflected by user-generated profiles) in order to make more accurate predictions about what his or her wants and needs may currently be, or what actions s/he is likely to take next. MIT's Serendipity project, for example, draws on the real-time sensing of proximate others using Bluetooth technologies built into mobile phones to search for matching patterns in profiles of people's interests. Developed by the Human Dynamics Group at the Media Lab, the project's goal is to facilitate corporate productivity by providing a matchmaking service for workers with shared interests or complimentary needs and skills who otherwise might not encounter each other within spaces organized around the office cubicle. A typical design scenario involves one worker needing the skills of another and the system facilitating their meeting:

When we were passing each other in the hallway, my phone would sense the presence of his phone. It would then connect to our server, which would recognize that Tom has extensive expertise in a specific area that I was currently struggling with. If both of our phones had been set to "available" mode, two picture messages would have been sent to alert us of our common interests, and we might have stopped to talk instead of walking by each other.
— Nathan Eagle [42]

This project presents at least two assumptions that are worth exploring further. The first is that 'matchmaking' should be based on comparing profiles and looking for 'synergies' between

41. http://www.cl.cam.ac.uk/research/dtg/attarchive/spirit/ (last accessed 5 July 2010).
42. Nathan Eagle, "Can Serendipity Be Planned?", MIT Sloan Management Review, Vol. 46, No. 1 (2004), 12.

two people. If the term 'serendipity' is understood to mean the process of finding something by looking for something else, the Serendipity project does precisely the opposite: it simply outsources the problem of finding something we are already looking for (that "expertise in a specific area that I was currently struggling with" that I have somehow indicated in my profile). Secondly, while the introduction of an "available" mode suggests that some attempt has been made to address privacy issues, there is no consideration of who has access to your profile data and how they use it.

Profile data considered private in one context can be publicly revealing in another. Another MIT project, code-named *Gaydar*, mined Facebook profile information to see if people were revealing more than they realized by using the social networking site. By looking at a person's online friends, they found that they could predict whether the person was gay. They did this with a software program that looked at the gender and sexuality of a person's friends and, using statistical analysis, made a prediction. While the project lacked scientific rigor — they verified their results using their personal knowledge of 10 people in the network who were gay, but did not declare it on their Facebook page — it does point to the possibility that information disclosed in one context may be used to interpret information in another.

Looking upstream, Mike Crang and Stephen Graham's recent essay "Sentient Cities: Ambient intelligence and the politics of urban space" does a great job of outlining how corporate and military agendas are currently driving the technological ecosystems we're likely to cohabit within the near-future. [43] Mapping the Sentient City as operative reality, they point to location-based search results and target-marketing databases storing finely grained purchasing histories as steps toward "data-driven mass customization based on continuous, real-time monitoring of consumers." Further, citing a study by the US Defense Science Board calling for a 'New Manhattan Project' based on Ambient Intelligence for "Tracking, Targeting and Locating" (DSB, 2004), they outline an Orwellian future that is in fact currently in operation in lower Manhattan.

The Lower Manhattan Security Initiative, as the plan is called, resembles London's so-called Ring of Steel, an extensive web of cameras and roadblocks designed to detect, track and deter terrorists. The system went live in November of 2008 with 156 surveillance cameras and 30 mobile license plate readers. Designed for 3,000 public and private security cameras below Canal Street, this system will include not only license plate readers but also movable roadblocks. Pivoting gates are being installed at critical intersections, which would swing out to block traffic or a suspect car at the push of a button.

While the implications of projects like Serendipity occupy a relatively benign problem space, The Lower Manhattan Security Initiative points toward possibly more serious outcomes from the false positives (or false negatives) inevitably generated by the pattern matching and data mining algorithms at the core of the system. What happens when Facebook profile data is added to the mix? How do we ensure the privacy of data about us that is collected through inference engines? What are the mechanisms

43. Mike Crang and Stephen Graham, "Sentient Cities: Ambient intelligence and the politics of urban space," Information, Communication & Society, 10:6 (2007), 789 – 817.

Recommendation:
Establish "Manhattan Project"-Like Program for TTL

- **Vision**
  - Locate, identify, and track people, things, and activities—in an environment of one in a million—to give the United States the same advantage in asymmetric warfare it has today in conventional warfare

- **Structure requires that CIA, Defense, Justice, and Homeland Security**
  - Agree this is an urgent national security requirement
  - Agree on centralized management to conduct research, acquire systems, implement architecture, manage operations, and integrate results
  - Agree on funding, legal, ethical, and jurisdictional issues
  - Agree on executive responsibility
  - Acknowledge this function as a Presidential priority

The global war on terrorism cannot be won without a "Manhattan Project"-like TTL program. Cost is not the issue; failure in the global war on terrorism is the real question.

Tracking, Targeting and Locating. From a report by the Defense Science Board, Office of the Undersecretary of Defense, Washington DC, 2004.

by which these systems will gain our trust? In what ways does our autonomy become compromised?

To the extent that business interests and government agencies drive these technological developments, we can expect to see new forms of consumption, surveillance and control emerge. Despite the obvious implications for the built environment, architects have largely been absent from this current discussion. Forty years ago Reyner Banham illustrated an architecture of the "well-tempered environment,"[44] where the conditioning of space and its attendant technologies were literally drawn out of the woodwork. Yet while advances in the design of building management systems (BMS) since then have enabled greater environmental responsiveness at the scale of a building, relatively little attention has been paid to the space between and beyond buildings — the sidewalks, streets, infrastructures and urban public spaces that give form to urban life. If one accepts that the various ways we interact with (and through) these embedded, mobile and pervasive technologies can shape our experience of the city and the choices we make there, then the role of architects in shaping these technologies becomes apparent. Architects are trained to shape our constructed environment, and are skilled in orchestrating complex relationships between space, material, technologies, and various modes of habitation and use. The critical question remains: can the profession of architecture at large engage a form of practice that no longer places the act of making buildings as the central and defining role of the architect?

The profession has a decision to make. Either it can cede the role of being the primary agent in shaping our spatial experience of the city to the designers and engineers of these technologies, or it can shed its disciplinary anxieties regarding the purview of its practice and take part in shaping these technologies. This is easier said than done, to be sure. Part of what inhibits the profession from doing so lies in the desire or need to cling to certain disciplinary claims. As with most cases of identity politics, these claims are staked in terms of power, authority, status and influence. There is a lot at stake in grounding architecture in material form, for instance, not only for architectural education (established pedagogy) but also for the construction industry and the development and finance worlds (ie: the underlying conditions of production). The ability to marshal material resources in vast quantities and at large scales has long been a measure of status and power. There were clear reasons why, for example, Vespasian built the Colosseum in Rome. For architects to address new and emerging kinds of space, they (and their clients) will need to learn to see them as valuable — as spaces open to the architectural imagination — even when they are not as heavily invested in material form appropriate to building as we know it.

44. Reyner Banham, The Architecture of the Well-tempered Environment (Chicago: University of Chicago Press, 1984).