

ogy/philosophy/design

olm McCullough conducts a deep and broad exploration into a territory as once imaginary, but is now part of everyday life. The latest news and entertainment is available on high-definition, stadium-sized screens on public buildings and on handheld gizmos that know where you are and who you are at broadcast as well as receive. *Ambient Commons* is a call to become more mindful about the way our attention encounters the environment and about how digital environments influence attention—and a sourcebook for those who want to take more control of the process.”

Harvard Rheingold, author of *Net Smart*, *Tools for Thought*, *The Virtual Community*, and *Smart Mobs*

John McCullough’s book is to information what Central Park is to Manhattan—a place of reflection and circumspection that reveals helpfully the confusion of the world we have constructed and hopefully an outline of the world we could build, the ambient commons.”

Robert Borgmann, author of *Real American Ethics* and *Holding On to Reality*

Ambient Commons is a timely wake-up call and a hugely valuable guidebook to navigating the post-‘digital’ landscape of contemporary urban culture. McCullough articulates how important it is that we understand technology as culture, and that it is worthy of philosophical inquiry. He conveys these complex ideas in a way that is both accessible and rigorously researched and instantly appealing. This book, unlike most texts that pivot around technology, is beautifully written.”

—Hill, Fabrica

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McCullough

Ambient Commons



Ambient Commons

Attention in the Age of
Embodied Information

Malcolm McCullough

For the technology of atmosphere, and with respect to attention, the idea of cooperative buildings raises two important questions. Does the psychological comfort of having a stake in environmental management offset the physiological discomfort that may result from a tendency to overcompensate or from how no atmospheric state pleases everyone? And does participation in environment provide some grounding or calming, and thus a balance in kinds of attention, or does it become just one more annoyance adding to a sense of overload?

8. ARCHITECTURAL ATMOSPHERES

Main idea: Ambient is not uniform; atmosphere is design subject matter.

Counterargument: Air should go unnoticed

Key terms: Atmosphere, conditioned by air

What has changed: Smarter, greener building

Catalyst: Environmental awareness

Related field: Architecture

Open debate: Do inhabitants want to participate?

Megacity Resources

9

Urban computing now comes of age. Beyond the responsive room, the outdoor screen, or the location tag, information media permeate the built environment and form urban resource networks. At this scale, it becomes harder to study attention itself, yet easier to understand inhabitation and usability as one.¹

As mobile technology remakes attention at street level, it meets the embedded. Everyday transactions use and create long trails of data. New layers remake experiences of transit, shopping, basic utility connections, and, in some cases, even the allocation of housing. Although the usual image of smart cities has been wealthy and utopian, the more profound significance of their new information layers may lie in new living patterns across the multicentered urban archipelagoes sometimes known as “megacities.”² Active participation in emergent networks helps make local habits and routines comprehensible. Wherever people improvise organizations to get on with life amid the chaos of new settlement patterns, ambient information plays a part.

Many of these provisional arrangements provide access to infrastructure, identity to community, or opportunity for local business. Unlike global finance, which tends to operate in disembodied and disengaged ways, these ad hoc arrangements operate on the ground, in small transactions that can seldom be predictably formulated—maintaining, and sometimes even increasing, the kinds of human, social, or natural capital that remote corporations may not even recognize. As such, they demand new approaches of design, research, and interface arts. They also need a new name.

The Rise of Urban Informatics

Just thirty years ago, “smart city” meant “fashionable dress.”³ Just ten years ago, “smart grid” had yet to appear in the mainstream news media.⁴ And, less than a decade ago, the field of urban informatics first emerged. In 2006, the U.S. technology research journal *IEEE Pervasive Computing* organized a conference theme on *urban computing*, a term introduced by Eric Paulos, then at Intel Research.⁵ The following year, a workshop on “urban informatics” was held in Australia, and a research handbook by Marcus Foth published.⁶ The coinage “urban informatics” is often credited to the pioneering virtual communitarian Howard Rheingold, who foresaw the significance of street-level experience to digital culture.⁷ Rheingold was responding to the New York City Wireless Initiative and to the writings of William J. Mitchell, whose urban technology trilogy told of “teleserviced neighborhoods” and “computers for living in.”⁸

For architects, “smart city” means a departure from the algorithmically fabricated forms that have preoccupied most digital designers; for engineers, it represents a departure from all-powerful

handheld gadgets. In a 2006 interview with *Metropolis* magazine, Mitchell explained how the smart city is not all mobile; it also runs on new combinations with embedded intelligence: “A particularly powerful design strategy under these conditions is to look for the ways that embedded intelligence loosens traditional relationships and constraints, and seize these as opportunities for fundamentally reimagining a product or system’s organization, shape, and scale.”⁹ Thus the oft-cited MIT project for a new CityCar applied the battery capacity from racks of parked cars to citywide power storage balancing. Even everyday Zipcars demonstrate the network principle of product-service systems, nontragic commons, and productive combinations of mobile and embedded technologies.

“The real-time city is now real!” declared MIT’s SENSEable City Laboratory in 2011. “The way we describe and understand cities is being radically transformed—alongside the tools we use to design them and impact on their physical structure.”¹⁰ Among the lab’s many well-known projects, the Copenhagen Wheel (2009) combined energy harvesting, route selection, and ambient environmental data for bicyclists. After an interview with lab director Carlo Ratti, blogger Dan Hill described a “new soft city,” where “you can see real-time information along one slice, one axis, and this enables us to anticipate a future city where perhaps the majority of the urban activity will generate impossible swathes of real-time data.”¹¹ In his 2010 book, *Smart Things*, Mike Kuniavsky connected this phenomenon of “information shadows” with a more fundamental notion of “information as a material.” Both are evident in street-level resources such as Zipcar, or its bicycle counterpart, Velib. “Information processing no longer needs to be the purpose of an object, but is one of

many qualities that enables it to be useful and desirable in ways that are more directly related to people's wants and needs. In other words, information processing no longer defines the identity of an object, but is one of many materials from objects can be made."¹² To the visionaries of urban informatics mentioned here, these new materials and shadows become as intrinsic a part of embodied urban experience as tags, city lights, and media facades.

Over the last decade, hundreds of aspiring labs have produced thousands of street-level applications for arts festivals like ZeroOne and Ars Electronica. Research conferences such as those sponsored by *IEEE Pervasive Computing* increasingly accept smart city design project presentations. Burgeoning business conferences such as *Where 2.0* test the entrepreneurial prospects of street-level location-based media. Interlink research policy initiatives from the European Union focus on "ambient computing and communications environments."¹³ Big technology corporations have entered the field as well. IBM, for example, now promotes "A Smarter Planet." In a white paper entitled "Smarter Cities for Smarter Growth," IBM asserted the importance of better information services to overall urban prosperity. The experience of using urban infrastructures has become an ever more crucial component of livability, as measured by, say, the Human Development Index. Seen from the top, where IBM provides consultation to policy makers and infrastructure builders, the challenge is to integrate. The city is a "system of systems," which integrates core services in transportation, health care, public safety, and public education. But even from the top, this challenge increasingly emphasizes bottom-up social phenomena. The way to integrate, the white paper asserts, is to

leverage the vast amount of existing data that accumulates in the course of everyday behaviors, and to make it "widely accessible to citizens."¹⁴

"Smart Grid will be bigger than the Internet,"¹⁵ Cisco's CEO John Chambers proclaimed in 2010 as his company joined the race to build new energy infrastructure. Pervasive computing pioneers have often pointed out that, like electrical power in the twentieth century, digital processing in the twenty-first has disappeared into everyday life. Arguably the core technology of modernity, electricity introduced such concepts as appliances, pay as you go, and the grid itself into popular consciousness.

Alas, the electrical grid suffers from excessively top-down control, with huge power plants and distribution networks administered as public utilities; and it has been astonishingly wasteful, not just in how it transmits power but also in how its end users apply that power. By many estimates, a third to a half of the electricity used in buildings in the United States is wasted, and, by most estimates, buildings surpass vehicles as producing the largest fraction of the nation's avoidable carbon emissions. Thus electricity now seems ripe for, as Internet strategists would put it, "distributed social production." Today's investors bet on smart grids; consumers become cogenerators; devices time their operations to help balance demand loads; lights turn themselves off when you leave the room; and organizations actively monitor and reconfigure their consumption patterns. And, as with electricity, so with many other aspects of everyday life.

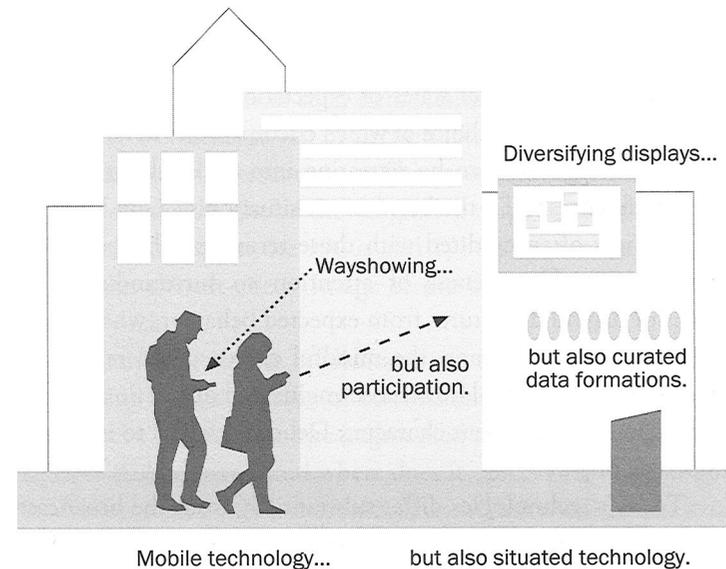
A more bottom-up approach to smart cities presents a new kind of design challenge. Just as electrification in the early twentieth century gave rise to a new discipline of industrial design, so smart, distributed, interoperable, data-intensive, citizen-accessible

urban infrastructure in the early twenty-first is giving rise to a new discipline of pervasive interaction design. “Street computing” provides another possible name for this shift. As explained by Marcus Foth, who has organized events and publications under this name, street computing at its core facilitates better bottom-up awareness of the city, making more systems queryable and programmable.¹⁶ As with electrification, this enables unforeseen appropriations and engenders new kinds of participation.¹⁷ In the words of Eric Paulos: “We need to expand our perceptions of our mobile phones as simply a communication tool and celebrate them in their new role as personal measurement instruments capable of sensing our natural environment and empowering collective action through everyday grassroots citizen science across blocks, neighborhoods, cities, and nations.”¹⁸

This participatory information stewardship transforms perceptions, both individual and social, of the city itself. Then, as urban usability constructs agreements to participate, to monitor, and to seek stewardship, it begins to take on aspects of a situated information commons.

A New Mental Map

With urban computing, “psychogeography” has entered a different era. Relations between embodied cognition, spatial mental maps, and explicit wayshowing systems now slip apart and recombine. From the perspective of architecture and urbanism, street-level media increase the importance of having worthwhile places to go. From the perspective of habitual attention, “worthwhile” means something more than momentarily amusing. In the rise of urban informatics, active participation supplants passive amusement (figure 9.1).



9.1 The basic idea of urban informatics.

“Psychogeography” was coined by the mid-twentieth-century situationists, whom today’s proponents of situated technology still read. Reacting to the politics of the broadcast monoculture, under which they saw the terms of viewing increasingly being furnished, the situationists proposed that the best way to step out of that monoculture was to engage physical space in unanticipated terms. The best way to do so was to walk a playful drift (*dérive*) among less-noticed things, to bring some of those things into telling juxtapositions (*détournement*) that would break the

spell of the politically engineered distractions (*spectacles*). To a situationist, play does not mean games with fixed rules so much as crossing in and out of states of expectation. This works better through serendipitous choice of which circumstances to ignore and which to exaggerate than by retreating into declared sets of personal preferences.¹⁹ To the best-known situationist, Guy Debord, who is most often credited with these terms, psychogeography cultivated a self-awareness of attention to surroundings. By means of playful departures from expected behavior, whether for personal or social reasons, the mindful citizen could repurpose situations, and so reveal how those engineered distraction.²⁰ This mindfulness had ambient character; Debord referred to it as “the ambiance of play.”²¹

Today’s technologies differ substantially from the broadcast media of the situationists’ era, of course. The monoculture that the situationists protested has dissipated. As noted in the chapter on screens, media have proliferated to the point where planned spectacles go unnoticed. The capacity to create spatial mental models hasn’t really changed, however. The body imposes a schema on space, and the arrangement of bodies in space expresses those schemas in society. Tacit knowledge of these configurations informs spatial mental models, whether of communities of practice, contested ground, or anonymous drift along avenues.

Also, as noted in the chapter on embodiment, elements of mental models become internalized and externalized by activity. According to first principles of anthropology, the experience of urban activity emphasizes interpersonal distance, spatial distributions of hierarchical orders, and sites of collective commemoration.²² Landmarks, districts, edges tacit and explicit, and nodes

among one or more infrastructures provide the building blocks of spatial mental models. These models often take the form of ever-adapting collages of such elements, and seldom occur just as tags on a two-dimensional projection like a Google map, or any single uniform Cartesian view. The most famous visualizations of these models might be the “cognitive maps” created by architects and planners in the 1960s and 1970s, the most original of which was the oft-cited “Image of the City” by urban planner Kevin Lynch.

Urban exploration applications in mobile and embedded computing should thus be of considerable interest to cognition researchers. Where does the augmented city amplify the advantages of embodiment, and where does it cancel them out? When mediation such as GPS increasingly assists externalization, what happens to internalization? How do social navigation and more overt declaration of interests and preferences reshape street-level serendipity? If, after a decade of street-level urban informatics, everyone were to put their technology away, would their city skills be higher or lower than they had been before the technology? Or does the infusion of space with so many media simply erase all spatial mental models? Does the covering of high-resolution intrinsic information with lower-resolution processed information reduce affordances or affinities for embodied cognition overall, and thus reduce the image of the city as well?

You might expect that personal choices about maintaining a sensibility to surroundings figure in this. The influence of technology on urban experience might depend on your attitude toward environment, information as a material, or perceptions of overload. All of which makes universalist media and their sociologies suspect.

You might also read the paradigm shift from virtual world-building to urban informatics as an optimistic indicator of continuing spatial affinities. The exercise of embodied cognition can be restorative. It can feel more natural than purely abstract symbol-processing skills. Urban informatics can tap latent spatial abilities. To Carlo Ratti, this makes it “more Spacebook than Facebook.”²³

In the principles of embodied cognition, participation itself is situated. Street computing doesn’t simply add a layer of portals to someplace else, but instead adds to cognition of the present place. It doesn’t command attention on one channel at a time, but instead interleaves media objects among themselves and with unmediated objects, and in effect becomes ambient. Sites, props, social contexts, and interpersonal protocols of conduct produce a sense of engagement, which surpasses solitary use of a handheld device on a universal network at providing a sense of belonging, learning, or craft. According to philosophers from many different ages, those habits of skilled, purposeful engagement make better citizens.²⁴

The casual, provisional arrangements of everyday life in the megacity remain elusive, however. Although the major builders of mobile and embedded technology have doubtless undertaken private studies of these arrangements, published studies such as the biennial working papers of Sri Lanka-based LIRNEasia on mobile technology practices at the bottom of the pyramid are few and far between.²⁵ A comprehensive street-level ethnography of media practices in the new megacities has yet to emerge. Because it would be difficult to find overarching unity in the currently sparse literature, for now, simply consider a few contrasting cases, particularly from the perspective of attention.

Wayshowing

When you combine a smartphone used as cursor with a positioning system such as GPS to look up nearby features, you get a “reality browser.” To browse is to discover possibilities along the way; to browse reality is to combine the use of labels and links with presence in the physical spaces they describe. That can’t happen in virtual spaces because a sense of presence depends on embodiment in haptic orientation and the inner ear. Now street-level media are available to help in the exercise of those. For someone who grew up being driven everywhere, street-level media may provide a necessary externalization, to be followed by internalization, of some basic city skills. This advances the centuries-old agenda of inscribing the city for incidental visitors.

Socially acceptable augmentations do exist. First off, most digital navigation is not to commercial offerings, but to friends. Social navigation now adds checking in to its moves. To declare your location on a social reality browser such as Foursquare lets unplanned encounters occur. To share tags and applications generates social life around particular activities and *dérives*, whether the active gaming of Parkour, the field identifications of plants or birds by naturalists, or the eccentric quests of collectors. Because a better wayshowing app makes systems of tags and labels available only to those who are interested, it helps urban explorers with filtering. The more that tags work as digital augmentations, the less they clutter physical spaces. On the other hand, such filtering serves to fragment the social sphere and creates new forms of digital divides.

Most people regard unfiltered, passive augmentations as little more than surveillance, which helps explain the generally negative view of pervasive computing. However, concern about

an Orwellian Big Brother may overlook a more real concern about just how many thousands of little brothers are skimming personal data. Consumer analytics have moved beyond your desktop click stream to your physical movements in the built environment. Retail planning was already a science of positioning; and now advertising, the discipline most adept at media placement, may use proximity and spatial movement pattern recognition to deliver messages into contexts where they are more likely to be noticed. Tracking may also employ sensors, even face-interpreting software, embedded into aisles and shelves. Thus the Quividi audience measurement service uses visual analytics to document how long you look at a particular display.²⁶ Target audio beam technologies allow a spoken message to be delivered to a precise location when triggered by a motion sensor.²⁷ Abuses of attention rights may have only just begun. In other words, the prevailing early trends of urban informatics as wayshowing do not bode well for a tangible information commons.

New Epigraphy

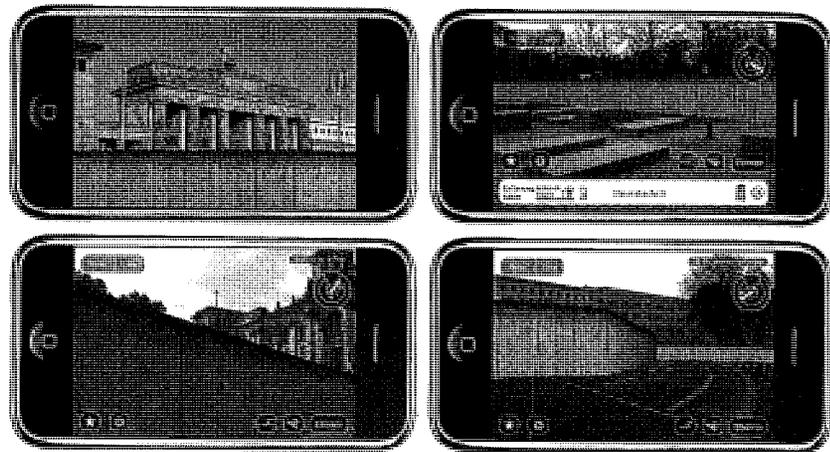
Researchers and critics alike advance an urban informatics based on participation. As explored in the chapter on tagging, a new middle ground emerges between official inscriptions and transgressive graffiti, which could be called the “new epigraphy.” New forms of annotation invite membership organizations, curation, and study.

Previous forms of signage have increased the usability of the city for the casual or unfamiliar visitor. But, for the resident, they are presumably unnecessary, and possibly an annoyance. The resident takes pride in awareness of changes to neighborhood

amenities and the everyday routes they establish. The resident makes more use of intrinsic information and takes many more objects and events as signs. These are often of neighbors, of the encroachment of unwanted developers (who tend to trample on unquantified forms of local value), or of the need for civic services. Thus the highly successful maintenance wish list site SeeClickFix, which uses “citizen” prominently in its mission statement, rallies residents: that one resident expresses concern about an amenity lets another care, too. Other hyperlocal aggregators work across a variety of interests; outside.in, a pioneering hyperlocal news service, aggregates bloggers by location, and establishes a mood of curating local lore.²⁸

Sound mapping works as urban storytelling, too. Tactical Sound Garden (TSG), another oft-cited project, demonstrated this process for the favored hotspot of Bryant Park, the birthplace of wireless Internet civics in New York City. Using three-dimensional positional technology, participants install a zone of audio overlays for browsing by anyone with headphones and a Wi-Fi device. Many such sound gardens develop on particular themes, such as local history, tagger culture, signspotting, or remembrance. TSG is currently an open-source toolkit for planning and “pruning” (modifying playback parameters) of sound gardens anywhere with good Wi-Fi coverage. A similar process works for images, incidentally. One famous Layar app lets you see images of the Berlin Wall in the context where it once stood, as shown in figure 9.2.

Much as networking has long allowed amateurs to become aggregators and producers of music and images, so now it allows them to gather environmental data. Thus, Living Light (figure 9.3) let participants text data to and from a park pavilion display



9.2 Reality browser: “Berlin Wall 3D” for Layar, Hoppala Agency, 2010.
Photo: Marc René Gardeya, Hoppala.

of accumulated energy usage data, which compared the present year to the previous one across the Seoul region. Projects like this raise a very good question: how do cultural curators of participatory urban annotation systems see their work in relation to traditional or physical aspects of a commons?

In the recent compilation *From Social Butterfly to Engaged Citizen*, which includes cases on food, traffic, gardens, radio, crowds, and membership organizations, several leading scholars have offered positions on the ethics of urban social computing.²⁹ Many of the participatory qualities of Web 2.0 become more significant when coupled with the activities of daily life. For, just as the attention costs of passive media and autonomous annoyances are greater when you can't click away from them, so the



9.3 Open-source ecofeedback: Living Light, Seoul, The Living, 2008.
Photo: Soo-in Yang.

benefits of active media and social networks feel greater when you apply them to shared physical environments.

Active participation in situated technology has most often taken the form of do-it-yourself (DIY) environmental monitoring. Participants sample, upload, map, and share data on pollutants such as carbon monoxide, surveillance cameras, invasive species, and noise. The Copenhagen Wheel project mapped levels of noise or air pollution by assembling geotagged data sampled by bicyclists as they moved around town. In an earlier instance of distributed sensing, Pigeon Blog (2006), took air samples from gas sensors and GPS readers attached, like paper messages of yore, to the legs of carrier pigeons.³⁰ Many such DIY monitoring projects now exist. “Turn your mobile phone into

an environmental sensor and participate to the monitoring of noise pollution,” invites NoiseTube, a Paris-based initiative sponsored by Sony.³¹

The use of personal communication devices to monitor, mix, and redistribute environmental data has a better name than “urban informatics,” namely “citizen science.” Eric Paulos, Ben Hooker, and R. J. Honicky introduced this term as an expression of empowerment.³² Phones become data instruments; streets become platforms; aggregations become open-source communities, such as the data infrastructure platform Pachubé (now Cosm). Reports and displays become public embellishments, often in ambient format, such as the data murals of water and energy usage in the Arup Bangaroo project in New South Wales, Australia, that Dan Hill helped produce. Citizen science, then, is a use of technology for tuning in rather than out. Urban computing becomes alertness, perhaps even resilience, and not mere entertainment. Paulos and colleagues assert what this is not: “Urban computing is not a disconnected personal phone application, a domestic networked appliance, a mobile route planning application, an office-scheduling tool, or a social networking service.”³³ Thus it is also not just for casual outsiders, such as tourists and advertisers. It is not personalized, nor is it as usable for beginners as it is for masters. With citizen science, new genres of urban data curation such as urban computing become a significant cultural domain.

U-City

Alas, too much occurs from the top down. Much of the rapidly urbanizing world is not so historic, civic, and complexly layered as a New York- or London-based flaneur or citizen scientist

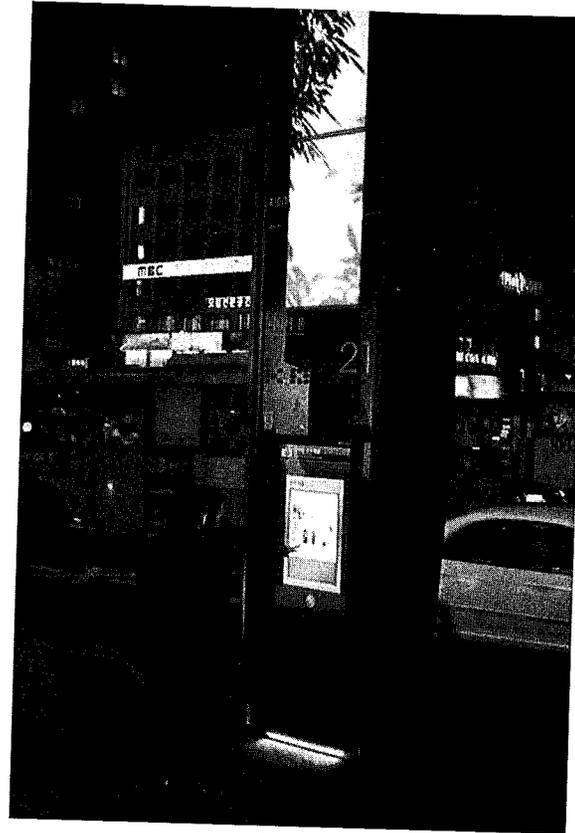
might wish. In most any metropolis, the walkable core that attracts global business and tourism is surrounded by a far larger ring of less centralized conditions. For example, many of the huge estates going up outside Beijing are designed to manage as many of their own infrastructural needs as possible. Many of the smart cities that get so much airplay from their corporate stakeholders constitute a case as different from core-city wayshowing and neighborhood citizen science as these are from one another. Layering means less in places where nothing preexists and where the technological emphasis is on ubiquity instead of augmentation. Hardly the sites of postmodern cultural juxtaposition, these smart cities are exercises in late modernist cybernetics: digital nervous systems of command and control. Resource economics dictates this more than any drive toward political aggrandizement. A truly smart city would reduce some of the biggest logistical sources of carbon emissions, material waste, time delays, and emergency unpreparedness.

South Korea regularly lays claim to being the most networked nation on earth, as measured in rates of usage, availability, and capacity of its communications infrastructure. Seoul has demonstrated many everyday situated technology practices already: it is a leader in the use of QRC tagging; its Galleria West facade (2004) was among the earliest instances of programmable media facades. In remarkable contrast to the Parisian kiosks of the Victorian era (figure 9.4a), Seoul’s Gangnam District “media poles” (2009; figure 9.4b) provide new instances of the sidewalk arts and events kiosk, now in LED technology, at obelisk scale, 12 meters (40 feet) tall. So it was reasonable for South Korea to be the first country to lay claim to the expression “u-City” (with “u” for “ubiquitous”). According to Jong-Sung Hwang of the

9.4 Street kiosks then and now.



(a) Paris, ca. 1880, in painting by Jean Beroud (Walter Art Museum/
Creative Commons).



(b) Gangnam District media poles, Seoul, seoulspace, 2009.
Photo: courtesy of seoulspace.

National Information Society, no less than twenty-two u-City projects were under way at the height of the boom in 2007.³⁴ Korea's leadership in infrastructure, its need to balance the boom of Seoul with development elsewhere in the country, and its centralized practices of construction consortiums combined to push ubiquity as an aspect of cultural identity. In "Living on a Platform," a survey of smart cities in 2010, the *Economist* led with New Songdo City, the most-cited instance of full-scale cybernetic city building to date. In a Shanghai World Expo exhibit that year, the networking giant Cisco demonstrated "all the digital plumbing" underlying Songdo. For example, in a mockup command center, "visitors were given a demonstration of how city managers would react to an accident on a city-centre bridge: cameras zoom in, an ambulance is dispatched, traffic is rerouted to other bridges—all automatically, within seconds."³⁵

Today, post-economic crash, Songdo sits less than halfway completed, a self-evident critique of top-down urbanism from the standpoint of bottom-up arts and sciences. The everyday online media are filled with outpourings on Songdo and its ilk. Masdar, the United Arab Emirates project for a top-down smart green city, is mocked for being built on oil revenue and surrounded with the shantytowns of those who built it but can't afford to live there.

To anyone without a stake, such digital utopias may seem like technology for technology's sake. Or worse, a smart city can be a perfect dystopian union of technology, capital, and distracted urban subjectivity. So, by contrast, consider the introduction of media bottom up, on the other side of the economic and cultural divide.

Telecenters

Much experience of infrastructural access occurs in circumstances directly opposite those of any u-City: bottom up, undercapitalized, mostly undocumented, relatively low tech. Although access in these circumstances receives less systematic study, it needs to be recognized for its potential.

In particular, the mobile phone has brought network experience to far more city dwellers than any other technology. The economic advantages of connectivity, findability, and location may be all the greater to those with no other information infrastructures at hand and with no prospects for top-down investment or appropriation. Anthropologist and photoblogger Jan Chipchase has explored how this new bottom-up layer, often the first information infrastructure in a locale, relates to other resource networks and how it can show privileged digerati ways to develop without imposing technology for the less wealthy.³⁶ The models of use are not those of consumption, hurriedness, ubiquitous service and support networks, or the presumed constant need for entertainment. And, in contrast to the dislocated experience of developed global cities by digital nomads such as Chipchase himself, these bottom-up patterns can only be situated in material circumstances and the intrinsic information of things.

Consider the case of "tap attendants," who wait by an intermittently active standpipe for the water to run, and then manage the queue of customers with buckets to be filled, charging each customer a small fee. Nabeel Hamdi, a leading voice on participatory urban development, has remarkable stories about these everyday infrastructure workers, who are often children. In a corrupt situation, an attendant might pay the city a certain

amount from the fees collected in order to receive water at this standpipe only on his or her watch, and then surcharge customers for a more predictable outcome. Another such tap attendant service on the rise is the recharging of mobile phones, for a fee payable in minutes of phone service.

One way to avoid such gatekeeping is to put the infrastructure access in the open, usually through what are called “telecenters,” with governance bottom up among existing neighborhood or village councils, as in a commons. India began to install such telecenters around 2000, under an initiative named “Gyandoot,” in which a pilot project set up about forty of them, some as storefronts and some as roadside kiosks, each designed to serve a dozen or more nearby villages. The project received democracy-and-technology awards internationally. Soon the market took the kiosk telecenter format to a larger constituency. By 2007, there were some 6,000 e-Choupal telecenters in India. Whereas the state centers served mainly to get government information out to the villages, the private centers were more often operated business to business, sometimes as commons, especially for the benefit of farmers.

Operations and practices of the telecenters reflected the status and practices of appointed villagers. Terms of engagement differed from place to place and often improvised metaphors and tokens of use that were quite outside technologists’ expectations. For, as Paul Dourish and Genevieve Bell have observed, this fresh “experience of infrastructure” reveals patterns of culture: “We refer not simply to physical infrastructures but more broadly to infrastructures as fundamental elements of the ways in which we encounter spaces—infrastructures of naming, infrastructures of mobility, infrastructures of separation, infrastructures of interaction, and so

on.”³⁷ The telecenters revealed the complementary nature of technical and social patterning.

When it comes to the economics of attention, megacity resource networks behave quite differently from more familiar patterns of media consumption. For one thing, there must be intrinsic information in an urban resource commons, as well as social sensemaking and physical *mise-en-scène*. Neighborhoods that are undercapitalized fiscally may use new networking technologies to apply other, nonfiscal kinds of capital, such as cultural customs of access and use. Thus the kiosk telecenter format has been put to use by larger organizations such as the housing rights coalition Slum and Shack Dwellers International (SSDI), which now operates in thirty-three countries. In contrast to the “bottom of the pyramid” metaphor used by market analysts, which presumes that higher outside forces will be the main instigators and beneficiaries of resource schemes, this networked commons metaphor presumes that millions of local organizations will uphold locally intrinsic value better, and thus provide advantages that larger, more remote markets and states simply can’t.

Well-meaning outsiders need to research such topics in greater depth, but they also need to proceed with caution. The cultural workings of attention may reveal which technology appears advantageous, and which is merely a contrivance. Whereas, in the most highly developed cities, there is a danger of romanticizing the technology, in the less developed ones, there is a danger of romanticizing the anthropology.

Urban Resource Partnerships

Can urban computing lay the cultural groundwork for other tangible information commons? What would it take to spread best

practices into more cities, across more social divides, and into more resource pools? Even the small set of cases here suggests a larger prospect. Urban resource partnerships take on aspects of commons. As the economist Elinor Ostrom explained: “The key to a more effective [commons] model is to encourage self-organized contracts between local participants in context.”³⁸ As the street-level media pioneers Julian Bleecker and Nicholas Nova have explained, the patterns of use that gather around shared streams of public environmental data make them into tangible social objects that are more accessible to casual social attention.³⁹

Cases already exist in water quality, biodiversity, energy leaks, and the right to see the dark night sky.⁴⁰ Economists of networked social production have shown how nonmarket, non-governmental organizations can help realize the value, and not just the fiscal value, of hyperlocal resources, and not just material resources, but also the kinds measured by the Human Development Index.⁴¹ The dynamics of housing, water, power, transit, currency, opportunity, expertise, public health, and environmental health—these have become the agenda in urban computing.

How the ambient truly becomes a commons may take a lifetime to discover. Some already apparent aspects of the way forward, including changing notions of commons itself, deserve more inquiry in the chapter ahead. But before turning to that, another, perhaps even more fundamental aspect of urban computing as psychogeography deserves emphasis here. After all, media do not simply annotate a preexisting city but also help create new understandings, uses, and tacit geographies of the city. So this is really a question of attention to surroundings, and that is a fundamental theme in urbanism.

Distraction Reconsidered

This inquiry into attention gains perspective from an environmental history of information. In an age of embodied information, seen here from the perspective of participatory urban computing, age-old expectations about distracted urban life may no longer seem quite so accurate. There has been a change in the nature of distraction.

Although it may always have existed, and by now the advertising industry has made it seem nearly universal, an attitude of distracted irreverence once was less usual, and the topic of a new sociology. Scholars of a mindful, resistant urbanism still recite Georg Simmel’s 1903 portrait of distraction, “The Metropolis and Mental Life,” in which “there is perhaps no psychic phenomenon which is so unconditionally reserved to the city as the blasé outlook.”⁴² Presciently, but not so uniquely, Simmel saw money steadily replacing all other forms of social exchange (a process that continues today in what social media tycoons now call “monetization”). Like other early sociologists, he saw a steady decline in everyday opportunities for spontaneous personal engagement, as city dwellers dealt more with strangers, identified less with groups, spent much more time alone, and worked as cogs in some giant machine.

For as postmodern critics so often protested, visual culture itself industrialized; and in the process, so did attention. The interplay of distraction and attention only took modern form in the last third of the nineteenth century. That is when William James began to explore it, for one. Industrialization had made attention into something to pay, not only when attending factory machines, but also with respect to visual culture. As art historian Jonathan Crary observed, “modern distraction was not a

disruption of stable or 'natural' kinds of sustained, value-laden perception that had existed for centuries but was [instead] an effect, and in many cases a constituent element, of the many attempts to produce attentiveness in human subjects."⁴³ Through careful reading of both early texts of the then-formative discipline of psychology and selected paintings from the period, Cray was able to identify attention as a new idea. "Not until the 1870s does one find attention consistently being attributed a central and formative role ..."⁴⁴

In what became his more lasting, unique contribution, Simmel reacted against this new sense of attention. Whereas "anomie," introduced by his more influential contemporary, Emile Durkheim, conveyed a general sense of disconnected outlook, "blasé" and its English equivalents "blunted" and "dulled" expressed it in more personal, perceptual terms. In a fittingly industrial metaphor, "blasé" means worn down through excess, not only from the labor or pollution that many sociologists protested, but also from unprecedented diversity of demands on attention, or as Simmel put it, "incapacity to react to new stimulations with the required amount of energy."⁴⁵

This incapacity arises from the need to shift attention quickly and often. In what may be the most famous passage from "The Metropolis and Mental Life," the fatigue that dulls and blunts comes from "the intensification of nervous stimulation, resulting from the rapid telescoping of changing images, pronounced differences in what is grasped at a single glance, and the unexpectedness of violent stimuli."⁴⁶ Or, in another translation, it results "from the rapid crowding of changing images, the sharp discontinuity in the grasp of a single glance, and the unexpectedness of onrushing impressions. These are the psychological conditions

which the metropolis creates." Long before handheld communications, outdoor video, or electronic ink, the flood of stimuli was enough to make distinctions among its elements vanish, giving rise to city dwellers' characteristic "blasé attitude," whose "essence" Simmel described as "an indifference to the distinctions between things."⁴⁷

Although Simmel's larger work on political economy has been largely forgotten, his particular focus on dulled subjectivity eventually resonated with the late twentieth-century critics, who revived him.⁴⁸ As consumerism reached unprecedented levels in the 1980s, Simmel seemed far ahead of his time on the experience of fragmented, decontextualized, desire-inducing media. Postmodernists found Simmel's essayistic, anticomprehensive style appealing.⁴⁹ For, as they would have put it, the blasé privileged the reader. They agreed how the response of city dwellers to the readymade life, its furnished worldviews, and its endless overstimulation, was to become highly arbitrary and distinct in one's tastes.⁵⁰ The unprecedented material benefits (electricity, sanitation, transit, communications) that modern cities provided their citizens made that possible.⁵¹ Although distraction and overload could occur in any culture, modernity offered more means to become comfortably numb. Or, in Simmel's words: "as a protection of the inner life against the domination of the metropolis, the reaction of the metropolitan person to those events is moved to a sphere of mental activity which is least sensitive and which is furthest removed from the depths of the personality."⁵²

Today, the onrushing impressions have become more numerous, more subtle, and more widely distributed than in Simmel's time. This is the usual qualification that twenty-first-century critics make to the argument that people have always

experienced overload. Yes of course they have, but not so often, not in so many different aspects of everyday life as now, and not by such easy means. The harsh industrial distractions of city life have waned; there are fewer things belching steam, soot, and noise at such intensity. Today, much more in the flood of stimuli takes the form of intentionally produced, subtly appealing or entertaining, widely distributed media productions. You may experience ever more of these productions involuntarily, in part because they so pervade the activities of your lives that despite all diligence you cannot keep up with the filtering. But then, more significant to this inquiry, the flood of stimuli also occurs at street level, where it is even more difficult to escape.

In short, never has distraction had such capacity to become total. Enclosed in cars, often in headphones, seldom in places where encounters are left to chance, often opting out of face-to-face meetings, and ever pursuing and being pursued by designed experiences, postmodern posturban city dwellers don't become dulled into retreat from public life; they grow up that way. The challenge is to reconnect.

Meanwhile, the experience of information overconsumption has developed a much more participatory, social infrastructure. Simmel was witnessing the rise of one-to-many commercial media, albeit before electronic broadcast technologies brought them to the center of everyday life. The postmodernists who revived Simmel were witnessing the absurd extremes at the end of one-to-many media dominance—the 1980s were the last decade of television monoculture. And the urban computing pioneers who today translate an interest in Simmel forward to the age of personal street-level media are witnessing the rise of many-to-many, or what some call “read/write” urbanism. Where

an ethics of street computing engenders citizen science and notions of commons, the microstructure of engagement stands in dramatic contrast to the disengagement of city dwellers dulled by mass media.

In sum, a different sense of overload seems inevitable at each different stage in the history of environment, information, and technology. To someone displaced from traditional rustic life, where that tradition seems recent and memorable enough for constant comparison, urbanism amplifies the sense of displacement, or anomie. To someone who grew up in postindustrial sprawl, with disembodied friendships, nonstop media feeds, and informational empty calories, urbanism represents a prospect for relative sanity, or at least a richer mix of perceptual options, and a better balance among information about, for, and as the world.

This voluntarily urban citizen prizes attention skills, defends attention rights, and takes time for attention restoration. And that seems quite different from sitting alone, grazing on favorite feeds, and hoping not to miss any messages. It also seems different from Simmel's shock at the newly electrified Berlin. Overstimulation may be more subtle, widespread, and appealing than before, but blasé has become less of an option. Those who go blank become only more vulnerable to thoughtless overconsumption, even attention theft. Instead, the best defense is to choose to take interest, and to help your sensibilities slowly evolve.

How newer megacities now urbanize will have more impact than what the existing metropolises do next. This process is much more difficult to study, to capture with art installations, or to read or write books about. Millions of people now network their local resources, organize governance where markets and

states have missed doing so, uphold nonfiscal capital in nontraditional ways, use embodied media to form their images of the city, and so recast their workings of attention.

9. MEGACITY RESOURCES

Main idea: Urban computing inevitably transforms attention to context

Counterargument: Don't impose technology
Key terms: Urban informatics, psychogeography, resource networks

What has changed: Bottom-up economics of rapid urbanization

Catalyst: More kinds of resource organizations

Related field: Smart cities

Open debate: Non-market networked production?

Environmental History

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Information deserves its own environmentalism. The more that information technology permeates everyday life, the more inescapably it alters personal and cultural sensibilities. Of course, the physical patterns of everyday life can be just as telling as a culture's art or politics. Thus, one culture, whose citizens variously walk, ride bicycles, drive cars, and take streetcars to get from place to place, might assume they need little instruction to share the streets, whereas another, whose citizens almost always move around in cars, might need plenty of signage, and might sometimes use parking restrictions to avoid unanticipated social mixing. To understand such cultural differences, it can help to see their many usage patterns as a landscape. It can also help to see cultural landscapes in historical perspective. It can help to see such larger patterns as "cultural landscape." In a widely-read definition of landscape, the design critic Paul Shephard once advised that "the big moves in [a cultural] landscape happen very rarely. You will be lucky to see one during your lifetime