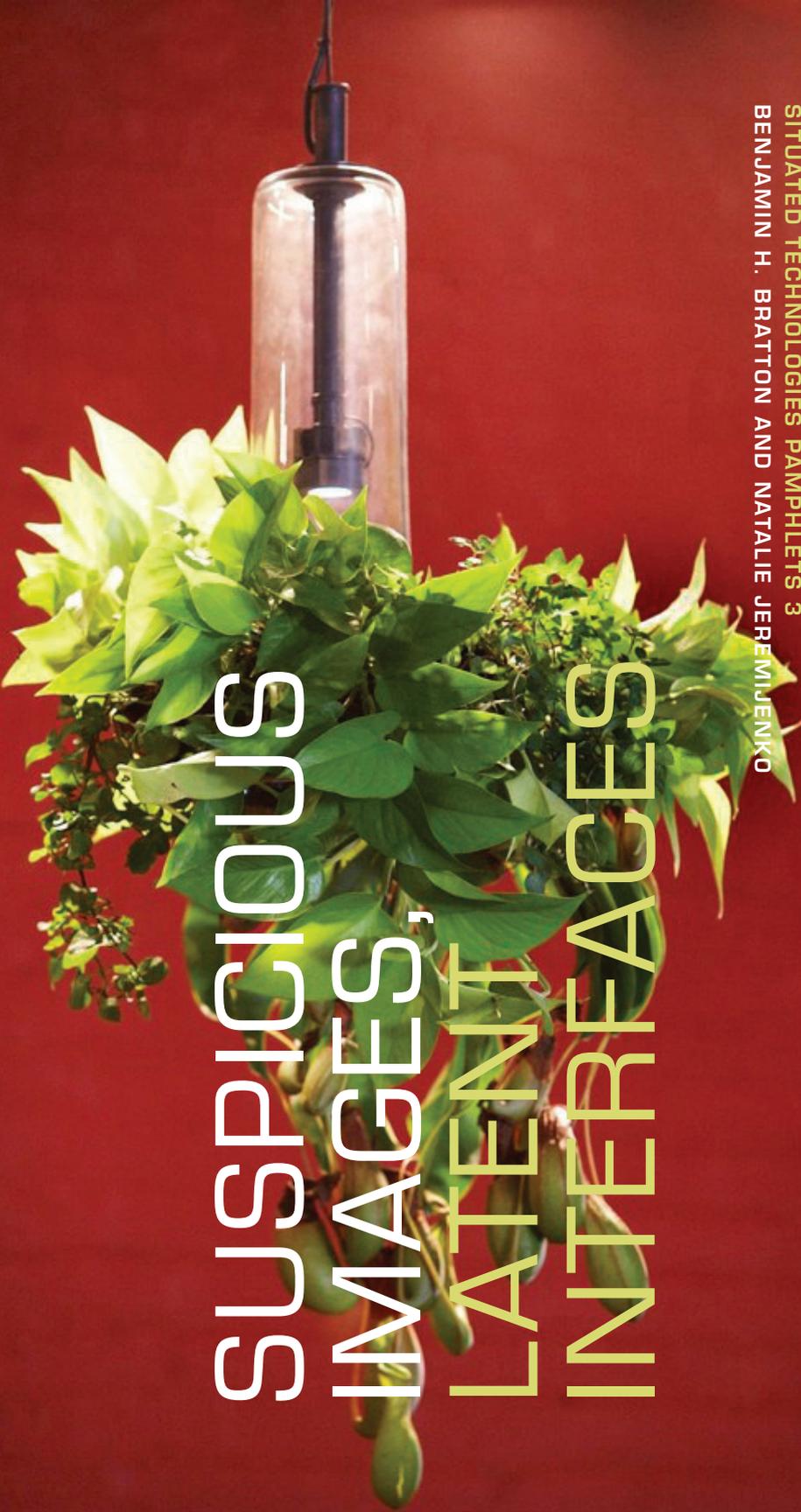


THE ARCHITECTURAL LEAGUE OF NEW YORK
SITUATED TECHNOLOGIES PAMPHLETS 3
BENJAMIN H. BRATTON AND NATALIE JEREMIJENKO



INTERFACES
LATENT
IMAGES,
SUSPICIOUS

SUSPICIOUS IMAGES, LATENT INTERFACES

Situated Technologies Pamphlets 3: Suspicious Images, Latent Interfaces

Benjamin H. Bratton and Natalie Jeremijenko

(With the editorial assistance of Jordan Kanter)

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ABOUT THE SERIES

The Situated Technologies Pamphlet Series extends a discourse initiated in the summer of 2006 by a three-month-long discussion on the Institute for Distributed Creativity (iDC) mailing list that culminated in the Architecture and Situated Technologies symposium at the Urban Center and Eyebeam in New York, co-produced by the Center for Virtual Architecture (CVA), the Architectural League of New York and the iDC. The series explores the implications of ubiquitous computing for architecture and urbanism: how our experience of space and the choices we make within it are affected by a range of mobile, pervasive, embedded, or otherwise “situated” technologies. Published three times a year over three years, the series is structured as a succession of nine “conversations” between researchers, writers, and other practitioners from architecture, art, philosophy of technology, comparative media studies, performance studies, and engineering.

www.situatedtechnologies.net

Advocacy is the act of arguing on behalf of a particular issue, idea or person, and addresses issues including self-advocacy, environmental-protection, the rights of women, youth and minorities, social justice, the re-structured digital divide and political reform. In this special-double issue—the result of an open call for submissions—we have invited contributions from two pairs of authors considering how Situated Technologies have been mobilized to change and/or influence social or political policies, practices, and beliefs. In our call for submissions, we asked: What new forms of advocacy are enabled by contemporary location-based or context-aware media and information systems? How might they lend tactical support to the process of managing information flows and disseminating strategic knowledge that influences individual behavior or opinion, corporate conduct or public policy and law?

“Suspicious Images, Latent Interfaces,” by Benjamin H. Bratton and Natalie Jeremijenko, explores the theoretical implications of new forms of environmental monitoring enabled by pervasive computing. Asking what, if anything, current trends in the visualization of environmental data tell us, they introduce the notion of the “political image” as a foil by which to explore how networked assemblages of human and non-human actors might, when considered on a global scale, initiate a rethinking of how political institutions might work in environmental governance. Bratton and Jeremijenko suggest that their contribution can be read as both a design challenge as well as an experimental political theory for a social ecology configured through pervasive computational media.

Omar Khan, Trebor Scholz and Mark Shepard

Benjamin H. Bratton (UC San Diego, SCL_Arc) invents systems concepts and translates and transposes them into actual systems. This labor requires him to wear many hats for different occasions, including sociologist, design strategist, professor, software executive, and historian of exceptional violence. He has taught architects about double-bind ironies at SCL_Arc, media artists about topologies of logistics at UCLA, and enterprise product strategists about the social specification of emergent data channels at Yahoo!.

Natalie Jeremijenko (NYU Environmental Health Clinic) is a polymath design technologist and political affectician, working within the wormholes connecting experimental art and global science policy. She has taught at the world's august institutions, been shown in the toniest arts festivals, received the most competitive awards, and annoyed the most miscast authoritarians.

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This conversation grew out of a paper that Natalie and I co-wrote for Pervasive 2008, Sixth International Conference on Pervasive Computing in Sydney, “Notes on the Political Image: Pervasive Computing, Modeling Assemblage, and Ecological Governance.”

It stems from our mutual interest in the potential of pervasive computing to change how ecological systems can be monitored and visualized, and perhaps more importantly, how doing so on a global scale holds promise for rethinking very deep assumptions about how political institutions can work, and indeed what their very architecture might be.

What kinds of new territories of participation are opened up when cycles of everyday action and the representation of collective sovereignty are bound so much more closely within planetary information networks, now responsive to a molecular level? Does representative democracy evolve into a democracy of representation, and if so, what does that mean when every inch of the world comes online, becomes awake to express its informational existence to us and for us? Would that expression come as a din of voices we are incapable of listening to, let alone governing through: a churning cacophony of signals?

Today we are learning to listen by learning to see the data, to render it visually as colorful diagrams that look like graphical user interfaces,



but usually in fact are not. To that end, Natalie and I start by questioning the status and ambition of information visualization as a format of the “political image”: a potential interface for a potential technology of a potential networked governance. This is critical. Their power is as an image of potential assemblage, human and non-human, and in this they are already “political” in the possibilities of agency that they project. But now, how can they be activated? How can monitoring become redesign of what it monitors? How does the image become an image-instrument?

In essence, this is both a design challenge and challenge for an experimental political theory for a socio-ecology configurable through pervasive computational media. It is design that becomes, in its expression of an experimental political theory, also a re-design of what political forms, spaces, and technologies even are. In ways that we hope are uniquely productive, one becomes the other.

In the lively spirit of this pamphlet series, the conversation is far from conclusive, and at best we’ve contributed a list of to-do’s to be taken up by different projects in different ways. We welcome your feedback and activation of what we’ve sketched here.

Benjamin H. Bratton
Los Angeles, June 2008

BB Let me start by saying that a lot of the issues that have been bubbling and cooking in the last ten, fifteen, twenty, even fifty years around ambient computation are seemingly all coming to a head; they are mainstreaming very quickly. You could say the future happened this year for pervasive computing.

You can't walk through a design graduate program anywhere in the first world, whether in architecture, interaction design, or media arts, without seeing at least half a dozen beautiful "data smog" projects modeling ambient urban-environmental information in one way or another. A lot of the best projects of this type are being published very quickly and put directly into museums upon final file export.

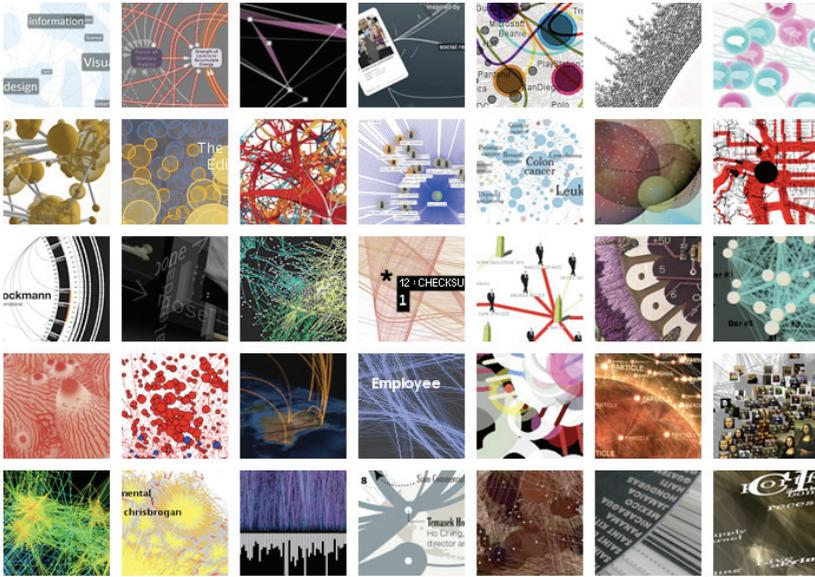
There is something great about this, but also something troubling. The danger is that in their spectacularization of information, they in fact distance people—now "audiences" for data—even further from their abilities and responsibilities to understand relationships between the multiple ecologies in which they live, and the possibilities for action that they have.

They look like interfaces, but they are not interfaces. They are diagrams or maps at best. They appear to be interfaces and in this appearance they imply there must be an expert—an expert system—somewhere making use of this information in a way that is somehow having some effect. But mostly there is none. Outside of hanging on a museum wall or being blogged about, I'm not sure what they do.

NJ Nothing.

BB Nothing?

NJ To define what it is they might do, and what they have the ambition of doing, and what they fail to do, is one of the things that is particularly interesting for me. Certainly there are these perverse people—who may now be the majority—who see these technologies by themselves as an opportunity for change. With the collision in the public imagination of the environmental climate destabilization and environmental concerns more generally, there is suddenly a utopian idea that we can use these new technologies and sensors and visualization techniques to address pervasive environmental issues with pervasive computation.



The home page of visual complexity dot com (retrieved August 4, 2008) But why now? Why and how has InfoViz become the ubiquitous face of ubiquitous computing? Manuel Lima, the editor, notes three factors making this emergence possible now: Storage (more data than we have time to make sense of), Open Databases (data extensibility and availability), and Online Social Networks (which make information about human networks available as both source and medium of visualization.) Data Visualization Panel at OFFF, Lisbon. May, 2008. See Kazys Varnelis and Leah Meisterlin, 2008, for another summary of other exemplary projects.

On the face of it, I suppose that is a reasonable assumption: we've got these new technologies and some pressing environmental issues, let's throw them at each other. But what is really interesting is that these ubiquitous sensing and inexpensive microprocessing devices suggest the capacity to ask some fundamental and persistent questions.

And so, do these projects change who is asking the questions? Are these designers now asking the question of how this pollutant is made, who made it, where is it coming from, where is it going, what do we do about it, or not? And what I have observed is that the designers of these types of projects use extant data sets from the EPA, from the toxic relief inventory, federal databases, and do so without criticism, without asking how the data is generated, who collected it and under what conditions. That is, what does the data actually represent? The criticism of how the data is produced is left out; unless this criticism is engaged, it doesn't make for a meaningful visualization. If we don't question how the data is made, we cannot make sense of it. Producing a nice diagram is not all that is required in making sense of something.

Take the particular example of air quality, which is something I've been very interested in for a long time. I have tried to use air quality data from federal sources. The first thing to understand is that environmental data is mainly collected in response to regulatory compliance issues. This means the data is being collected by hired engineering firms or staff, not by people who have a professional reputation invested in what that data means or why it is being collected. This is different from academic research, under the scientific regime, where if you don't collect good data, your reputation is at stake. If you are an environmental engineer working for a nuclear regulatory agency or subcontracted from the EPA or from Con Edison, you just have to do your job. It has to be done reasonably well, but you just have to follow the legislated formulas defining what data should be collected and how.

We know this is not cutting edge knowledge production and as a result cannot drive interesting questions. We get this soup of data, which in many cases is not even statistically cleaned up, all under this regime in this country where it is not actually illegal to pollute in any way—it is illegal to not report that you have polluted. So you report all this pollution, but the critical question of why you would collect this data is not asked. Whereas trying to figure out how much you are emitting

because you are interested in how you can change, or because you are trying to understand the health impacts, is decoupled from the data collection. If you have that as your starting point, these federal databases of environmental data, then the visualizations that might be graphically legible are not asking the questions that the data didn't ask in the first place.

BB In fact, parameters of facticity are further mystified by the visualization. Part of the progressive narrative for pervasive computation and ecological governance is of a world in which every square inch is in some way constantly outpouring infinitely communicable information about itself, and that this would overwhelm inherited layers of expert systems—certain people in certain circumstances that collect data from certain instrumental means—enabling the world to declare itself as a functionally open “data continent.” From this new basic infrastructure a new kind of political institutionality could emerge.

NJ I think that is the idea, yes, and there is a kind of eco-literacy that might be increased. So if, instead of having trees growing, we have trees with precipitation sensors and soil moisture sensors and particulate matter sensors making explicit some of the environmental variables to which they are exposed, we would therefore somehow be able to make better sense of those trees.

BB The thinking is that by rendering those variables visible and transmissible, those trees become things about which decisions can be made more systematically. But of course the possibility of the decision exists exactly in the natural display of their normal growth as organisms. Which brings us already back to the problem of the spectacularization of the information, and refocuses the question of what digitalization actually does and does not accomplish for us.

NJ In my OneTrees project, for instance, the trees are there in the first place, are already self-reporting, and there is a certain eco-literacy built in. You can look at the growth responses, the particulate layers on the leaves, weather history recorded in tree rings, etc. and gain a direct understanding of tree growth as a material record. The tree in itself is a self-reporting dynamic adaptive system of tre-



Urban Eco-Informatics: A variation on Jeremijenko's OneTrees Project. Here an analogue sensor displays the relative growth rates of two genetically identical trees, grown in different locations. See <http://www.nyu.edu/projects/xdesign/onetrees>

mendous value for certain scientific inquiries. So the idea that putting sensors around trees would only then open them up to participating in the political economy, or help us make sense of environmental variability, further obscures what is already available in the trees themselves.

BB If we read those trees themselves as interfaces, as your project suggests we do. Through this we can speak on their behalf, or even better, they could participate in some new “parliament” that would include trees (Latour, 2007).

NJ Yes, and there is the question of why they haven’t been included to begin with. They are visible, they are present, they are active dynamical systems, and they do have these very visible growth responses. Why is this not already governance?

Certainly in the OneTrees project there is an invitation to ask people why the trees look different, and what different environmental exposure they are having. The difficulty there is not in making that data explicit; the project presents two clones in almost identical environmental contexts. Why is one 50% bigger than the other? This is a very direct material question in sense-making. The issue is who feels the permission to speculate that one is closer to the road and might be exposed to more road borne pollutants? Who actually feels authorized to ask those questions? I have found that people are tremendously reluctant to speculate in these terms. They don’t feel like they can ask a scientific question and draw on the material evidence before them.

I question whether or not this reluctance would be reduced if they received environmental data from these trees via text-message to their cell phone.

Would they then feel more licensed, given that they don’t in the first place, to ask questions and interrogate and make sense of the situation?

BB It is possible that they might. That entails a direct personalization of the information in and of itself, and then perhaps of that which the information informs us about. Also, the information presents itself as potentially instrumental. That is, the popular instrumentality of such information is framed by how it is presented.

Perhaps we've all read Bruno Latour, and see the strong parallels between his notion of a "parliament of things" and potential realizations of an "internet of things." He suggests that a recognition of the inherently politicized nature of objects and what he calls quasi-objects forces us to rethink historical distinctions between nature and society, and therefore the political institutions that have artificially excluded material and non-human historical actors. If objects come alive with information in new ways, the possibility of their very public voice seems not only possible but in some ways inevitable.

I know that you and I both are empathetic to this interest. We are trying to imagine the possibility of extrapolating new forms of political institutionalization on the basis of computational technologies that we both discover and invent, including computers that look like trees. I believe that the narrative of ecologically comprehensive computational media and the idea of a planetary sensing system, is also tied in a way to the notion that the world itself is fundamentally already "digital," a soft or hard computational ontology. We learn from thinkers as diverse as Wolfram and Badiou about the formal discreteness of things. This becomes simplified as "the world is a computer and the best way to listen to that computer is with other computers." For the planetary pervasive computing narrative, this computational layer that we would smear across the world is simply a way to get closer to the primordial digital unfolding of all things. As Friedrich Kittler says, "silicon is nature! Silicon is nature calculating itself. If you leave out the part of engineers who write little structures on silicon you see one part of matter calculating the rest of matter." (Gane and Sale, 2007)

NJ But I think that is a contestable claim—that life is computation. It certainly is a popular idea, that life is in fact formal. There is a certain amount of history of the formality of life, that it can be described and even produced with explicit formal algorithms or data structures. There is a school that believes there is no difference between life in silica, that is virtual or simulated life, and a carbon-based

life, that the same formal rules apply, and that if we tweak the rules we will get the same thing in a silicon-based life and in the biological life we inhabit. It is a kind of essentialist claim that life is describable by algorithms. Of course there is not much to support this claim. It is a tantalizing idea and seductive, but it is just not robustly descriptive. It certainly helps to build explicit formal models of complex systems to help us to understand that, but in no way do they become the same thing.

BB But the more sophisticated contemporary exponents of this position offer more a procedural claim than a formal one, and politics is itself procedural. In imagining a new political space that might emerge from listening better to the world, however that might be achieved, the question for some is whether it suggests some kinds of ontological moves, some basis of a definition of life that is continuous or digital, computational or non-computational, if not to ground it then to move it forward from an over-reliance on social constructivism. (De Landa, 2006)

NJ In some senses, it doesn't matter. You don't have to have believed in the project of Artificial Intelligence and the conceits of that project to have found some of the algorithms that computational linguistics produced, for instance, to be useful and important. They can be tremendously useful independent of the ontological framing in a pragmatic world of what works and what is useful. But then it does matter in terms of the political structure controlling who gets to ask the questions! Why are some questions thought to be important? What knowledge gets generated and how?

BB And what is done with it and how that knowledge becomes needed, yes, of course. But to risk further "essentialism," these conditions and constructions do not change the processes by which knowledge knows. This does not, however, resolve how those assemblages themselves, such as science, become broadly established political forms.

NJ Right. So of course with Artificial Intelligence—if we take that as a previous, large paradigm that motivated a great deal of popular interest and certainly funding dollars, both private and public, military and non-military—what we see is that because Artificial Intelligence was framed in particular ways, it had a sense of bounded

control in the idea that you could simulate intelligence that had similarities to the interests of control and domination held by the military. It was an ideology well matched to the military aims through which it was supported. The consequence was that “intelligence”—artificial or not—became in a sense militarized, even if the algorithms it produced were not explicitly tied to the military, or even to thinking as such.

BB Today security is paired with ecology as meta-emergencies to drive research. But regardless of how research plans for Artificial Intelligence arrived at its discoveries, are they relevant to whether it works or not? If in some ways the substance of the world is already “computational”—but not exclusively so—it was so or was not so before humans arrived. And for the regimentation of this, bad people do discover good things. That is, military science can be true.

NJ Sure, bad people can discover good things and good people can discover bad things. But concerning participatory democracy, the production of knowledge is the commons we are concerned about: what kind of knowledge gets supported, for whom, by whom? This really is the political question. So we can have (and have had) environmental data collection, and we have a regime where most of the data collection has been done under these regulatory compliance protocols. And now we have the capacity to have this collection occur under alternate protocols or through a different institutional framework, operating with different models of participation.

I think the new collection regime that is so tantalizing consists of citizens actively generating and interpreting environmental data that is everywhere and available openly, which is very different from, for instance, the Nuclear Regulatory Commission saying you must collect data on how many million organisms per week are sacrificed, and then you must report it. For me or you to take that data and try to understand the impact on an ecosystem becomes very difficult because that data was gathered for regulatory compliance and not for understanding complex dynamic adaptive ecology! You would need to collect different data. So there are a lot of resources and a lot of data for us to use and interpret in this context, but I question the extent to which it is emblematic of the kind of possibilities the parliament of things suggests.

BB I presume that there is a there there: that there is a relationship between the parliament of things, the *dingpolitik* (Latour’s “politics of, for, and by ‘things’”) and this collective of bottom-up non-linear producers and consumers of information that you call for. It implies a flatter, a less authoritarian, a less anonymous and perhaps even less “designed” political space, or perhaps instead another modality and methodology for its design. It is a further decentralization of a popular scientific method that itself becomes formalized as a politics.



Things (and "the thing") are temporally-fragile, relational contingencies. "Construction Materials of the Exhibition Room," Lara Almarcegui, 2003. Installation view, FRAC Bourgogne.

NJ I think it is worth elaborating on that, because what I see and in many senses try to instantiate in particular examples is the capacity to change the structure of participation: who is producing the data, who is interpreting that data, and who can do something with that data. So in a participatory democracy that means restructuring participation from the production of scientific or authoritative data and knowledge to this structured participation.

There are a couple of ways of regarding environmental issues that are particularly well matched. Environmental issues by definition are in the shared commons. We all bear the risks and the bodily burdens of pollutants and contaminants and so we are invested as a wide and diverse citizenry in environmental knowledge production. This is different from other kinds of scientific knowledge production in which you, I, or anyone else may not have a direct relationship with the understanding produced. Our own health may not be directly affected by big science questions of a different time. General relativity, for instance, is interesting but does not have a direct, everyday impact on our lives in the same way.

The second thing that I think is characteristic about this whole area of knowledge that makes it suitable for investigation and interpretation by diverse, active participants is that ecology is inherently complex. Environmental systems are by definition multiparametered, unwieldy, uncontrolled, and contingent. Partially because of this, the science of urban ecology and urban systems has stayed in these little ecology departments and has never been a big science. The previous tools of scientific investigation have not been able to take on these kinds of questions. In a way it's too big and too social and too specific.

The third thing is that we have to do something about them. There is a popular urgency to re-imagine our relationship to natural systems. This is not about reading the great books for your intellectual edification. This is a situation where the urban systems we have created are failing, and the global climate is changing, and so what are we going to do? It is critical to have access to the kind of knowledge around complex adaptive environmental systems and socio-economic systems if there is going to be a sufficiently effective change. These three aspects make it suitable and in fact urgent that environmental issues are investigated by a diverse citizenry, particularly because, not in spite of the fact that it does not fit into a clear scientific or academic discipline.

BB Nor does it fit in a clear political geography. It is not clear at what scale political action can best be motivated to enact this kind of change. Let's imagine a situation where the citizen-scientist is tracing and modeling localized events, thereby coming into a more reflexive relationship with how those localized events are linked to non-local events, and is able to make claims for them that are confident and informed, and shared and communitarian. How does it scale? What and where is the institutionalization necessary for the sufficiently effective change? Is there an emergent political geography that is as big as the issue, that is regional, planetary? Or as some would argue, is such thinking exactly the wrong path to go down, and that this needs to remain very tactical and liquid, resolutely unglobal? For you when and where does institutionalization take place? When does the insight and participation become a new kind of governance? Or economy? Or supply-chain? Can it scale, or is it a micropolitics only? Can we design how it scales, or is that impulse also exactly the problem?

I am ambivalent about this, and even about how I've framed the problem. It is a truism (or cliché) on both the political left and right that a network topology represents the future of political formation, displacing Enlightenment-era centralized models. But even in assuming this, it is a parable, not a program. (Sassen, 2008)

NJ That’s wonderful. No doubt the relationship of design to political reformulation is tied to the question of institutionalization. Designers themselves can produce instances of alternate forms or structures of participation, snapshots of possibilities, but until they enmesh into an institutional continuity they remain atomized. In my case, I have been experimenting with new approaches of institutionalization with the Environmental Health Clinic.

It takes a familiar institutional model of a health clinic and broadens the idea of health from one that is paradigmatically very closely related to the medical system and centered with an internal, biological, atomized individual. Health normally is thought of as this individualized thing, treated by these massive institutional structures of hospitals, clinics, HMO’s, etc. on one body at a time. The Environmental Health Clinic operates in many ways like a health clinic, where people can make appointments under very familiar regimes. You don’t have to be an environmental activist or a media artist. You bring in particular environmental health concerns and walk out with prescriptions for design interventions and monitoring protocols that you can do to understand, interrogate, act on, and improve your local environmental health.

So that is the conceit: that we formulate health not in individual, medicalized, pharmaceutical, and internal terms, but as something external and shared and that we can act on and change. Of course there is very real public health evidence to show that these external ideas of health have very real merit. The best example is pediatricians. They are trained in diseases and nutrition and growth charts, but the top five things they spend their time doing, in terms of their office hours, are: 1. asthma; 2. development issues and delays, autism spectrum; 3. childhood cancers, the occurrence of which has been greatly amplified in the last fifteen to twenty years; 4. childhood diabetes; 5. other issues associated with obesity. The environment is heavily implicated in all of these issues.

BB So the Environmental Health Clinic has a similar assignment in certain ways, but instead of looking at the insertion of medicines into subjective bodies, it has to do with changes in adaptive behavior and in personal microenvironments that would work to eliminate the beginnings of un-health.



Dr. Natalie Jeremijenko, of the New York University Environmental Health Clinic, in her lab, examining purposefully the relevant data.

NJ Yes. Take lead levels or elemental carbon diesel pollution in the air, for instance. You can pump kids up with asthma medications or you can try to improve the air quality in their schools, parks, and neighborhoods. These are very different regimes.

BB And to do those things is the agency of a clinic?

NJ The useful thing about the clinic and the clinic script is its familiarity and how you can get people to participate. Unlike with collecting art!

BB Ha! You are using the clinic to drive participation in this broader definition of health and healthcare design. Can you expand on the clinic as a “script”?

NJ The reason it is a useful script in terms of political organization is these one-on-one, indelible meetings. In what other institutional context do you have this kind of direct engagement? It is really about very local, very personal and particular concerns. It is very much about your issues.

It is not Amazonian rain forests, it is not polar bears in the Arctic. It is about how air quality and water quality is affecting your health. It is about translating the environmental movement into a very self-interested one, not a kind of charitable, luxury item, where we have bleeding heart white liberals who are going to tell you not to cut your trees down. It is about how does it affect you and your health and what can you do to improve your local health.

So medicine takes on an objectivity and a sort of translation of authority that is less partisan than politics and therefore more trustworthy and more personal including assumptions of doctor patient confidentiality, etc.

BB I’m imagining where this leads. You have the clinic at NYU now, but what we are to imagine is one on every street corner. All the 7-11s will be replaced with Environmental Health Clinics. They are everywhere and perhaps there are competing chains of clinics, competing movements, competing discourses-scripts for these health design clinics.

Let me just note that you have used the script of a top-down, authoritative medical institution. I assume you would wear a lab coat while you are in there, you've got a clip board, charts and all the rest of the accoutrements. You are "dragging" medical authority, a political/institutional transvestite. Have you unmasked Bruno Latour and found Judith Butler?!

(laughs)

NJ Sure! Let's consider this: how do you get something through the airport security X-ray machine? You can't take toothpaste through, you can't take robotics through, but you can take medical equipment through! It has a practical authority.

BB An objectivity, a disinterestedness. The Red Cross and the Red Crescent can walk through a political apocalypse of total devastation, but because they are literally waving the flag of medicine they are totally above, beyond, or to the side of politics or political goals, and therefore have protected passage.

NJ Exactly! And that is a very useful thing: "Doctor's orders." If you are digging up your road to put in a No-Park project (for filtering road-borne pollution on your block) you have to be able to transcend the Department of Transportation and the Community Board. You have to have some larger claim. And environmental health, medicine, is what gives you that authority.



One example of a No-Park intervention, providing lung-level clearance of airborne particulate matter.

NJ A block association that is implementing a No-Park project based on the Clinic's prescribing it to them can compare their experiences with other groups doing the same thing. It works differently in different cases, but the institutional context sets up a way for projects to be compared and contrasted and to become available for application and adaptation into other contexts. As an academic, my job is not to do these particular instances—that is very much the role of the self-interested parties—but to try to generalize around and across instances to make larger truth claims about what works and what doesn't work, how we can respond, and how we cannot respond. The academic institutions are useful in this context because the standards of evidence that exist in these institutions are higher than in political realms. Ours is a reputation economy.

BB The clinic is small but officious. It models itself on a system of information transmission. The clinic is set up not just as a place to disseminate design information about particular problems, but also as a channel for academia to gather information. And so your patients are also test subjects. . .

NJ . . . No, they are “impatients,” and this is a very important point. This is where the authoritative model falls down. The impatient are people who are impatient, they have formulated the question, they have come to the clinic, and in this way they are authorized to act.

BB The clinic is set up in such a way that people go to receive personalized prescriptions. Their actions are in some way designed for them, but in fact in the performance of those scripts they are also generating local sample information that the clinic then reabsorbs, summarizes, and synthesizes into something that might become knowledge, strategy, or even policy within the larger context of the academic community.

For you academic institutions become a place where bottom up information is gathered, in what is also a laboratory model as much as anything else, and this becomes the basis by which this information is given legitimacy with respect to policy. Yet issues remain, such as whether clinics can absorb and distribute enough knowledge, and how it is that this collectivity of actors could concertize this knowledge into

a sufficiently far-reaching re-industrialization of the world that I think we agree needs to take place. How precisely the knowledge gets turned into design, in other words, is not necessarily part of the clinic script per se, or is it?

NJ It is most definitely part of the script. It is the co-production and the localization of knowledge, and the situated-ness of that knowledge. There are six different groups of people working on the No-Parks projects at the moment, each of them implementing it in really very different ways, funding them in different ways, invested in different questions. There is similarity between them that allows comparison, but comparable information is not enough. The whole Enlightenment concept that knowledge leads to action has failed drastically!

BB Or worse, that information leads to action, and still worse is that a picture of information leads to action or a that picture of information in a museum leads to action!

NJ (*Laughs*) It is through design that we can re-authorize who can act materially. This is what goes on in the Clinic script. It is no longer the Department of Transportation who is determining who digs up the road, it is the block association on Ninth Street, or the Community Boards from Spring Street. They are changing who can dig up a road, who owns the so-called public space of the street, who can determine what the function of it is, and if we put in the No-Park, who maintains it, who implements it, who invests in it. It is no longer central government, it is these very different local groups.

This leads to bigger questions regarding the translation into institutionalization, which I am very interested in. Given what we've just said, how do you take information and translate it into local actions that people can actually do, feel confident doing, get feedback after doing and continue to improve and develop as they implement them? That is the nexus that is not well addressed in the global circulation of Internet knowledge. How do you translate knowledge into action and then authorize that action? That is something very different from the Knowledge Society.

BB Implicit in the conversation we are having around design and monitoring and the rest of it, is that a diagram of a more appro-

priate political architecture can be deduced or designed. In the local aggregations of eco-political knowledge and application, there is a way for these instances to pluralize, to assemble into networks of different scales, so that they can in fact become more durable forms of both information and knowledge and are properly empowered to make very large design gestures and in this way become parliamentary.

In other words, an intensification of governmentality at the local level does not necessarily mean smallness. There is a “wealth” presumed for these network effects, and we are asking the necessary next questions: how can they create worlds in their image and take on the force of law?

NJ Yes, because they do relocate the authority, and who has the authority to act. It is not just writing to your local representative in the hope that they might do something that improves air quality around the airport, for instance.

BB Which is a mediation that is also an abdication. The act of voting in itself becomes an act of transferring of one’s own sovereignty. You are mailing your capacity to act politically to someone else. Whereas in the processes of pluralization you describe, the productions of truth become productions of design. It is in these processes of mediation and translation from one scale to another scale and back again that the story resides and the action is. What I am trying to get at is how we might imagine those mediations beyond individual activism, however self-interested.

The present cliché holds that we have, on the one hand, hegemonic neo-liberal globalization organized around bio-political maintenance of large and small scale event-systems, and on the other, a more delinked, yet networked space of heterological, multitudinal agencies working from the bottom up to bring a new day. Like you, I am dissatisfied with this framework as an appropriate description of the problem, let alone a program of action.

Let me ask you this: you said you are not a politician; in what way are you, through your theory-object engineering, really a political scientist?

NJ Politics is a very hard word to use. I use this idea of “structuring participation,” where micropolitics directly engaged in

the material context turns into something that we recognize as social institutions. This is of course the older question that Latour is responding to with the “parliament of things”: do things have politics? And we are now asking this of these ubiquitous computational elements. Do they have politics, and if so, what are those politics? These are hard questions to answer and not necessarily useful for practical design responses. To tell impatient that they are “doing political work” or that they are now “political activists” can be counterproductive. In the Environmental Health Clinics, we have sidestepped the whole label of politics by framing the project in terms of health, detaching environmental issues from what people recognize as being big “P” Politics, in the same way that technology is politics by another means. I think it is useful to avoid that association.

BB That is right. Inherited political-geographic models seem inadequate, and at a point the retrofitting stops, no more layering new code on top of what is essentially an unscalable architecture.

NJ Toward this, for me it is critical to appeal to the sense-making of the everyman. We are trying to translate these technoscientific, industrial and political resource allocation issues to be self-evident to the everyman, such that they could act as if they were self-evident.

BB That is, to an extent, what the information visualization projects imagine that they do, no? Rendering everything into a visual common sense.

But let me qualify “the political” here. What is limiting with the notions of a cosmopolitanization of the global agora is that they presume eventually that default or ideal political conditions are essentially consensual, or at the least mutually compatible. But the political image of consensus covers up or marginalizes the reality of the political as essentially an antagonistic space, one that is always competitive, one that is always irreducible, a never ending battle, and even more importantly, one dominated by incommensurate claims, and that is its purpose, not its problem. It is not just that we will split the middle but that, quite specifically, we are speaking different languages, and that there is no middle because we are and should be using different alphabets. (Mouffe, 2005)

For me it is this ethos of political irresolvability that must be respected by any program for the next phase of what global political institutions need to become. But it seems to me that a lot of the political rhetoric around ecology and the understanding of how environmental conflicts need to be politicized tend to make use of the same rhetoric of consensus, whether as a lifeboat ethics—that we are all in this together—or as a shared space that might as well be rationally communitarian. Ecology extends older theoretical problems of Totality, especially when paired with planetary computation.

I am interested in your thoughts on this, because you are talking about the capacity of people to make truth claims about and through their participation in this ecology that by necessity, because they are design prescriptions, involve claims that could be totally incompatible, or even cancel each other out.

NJ Well, it certainly is descriptive of what is particular about environmental monitoring and modeling. The air quality is shared, the water quality is shared, but how do we describe that quality? Do we use the dumb EPA set standards to organize a consensus about what we do about air/water quality? Do we use the forcing functions and CO₂ measurements as the parameters to model global climate change? There are problems in all of that. There are many different ways to think about what counts as air quality. We don't even know most of the contaminants. Certainly we don't know the health effects and the interaction effects of the fifty thousand synthetic compounds that we have released widely into every corner of the world. There are around two hundred in any given site. It is difficult to imagine being able to agree on what is air quality, and then to measure it, and then text it to everybody's phone, assuring them that there is good air quality in San Francisco today!

What matters is the material context of what counts as a healthy environment. How do you frame those sorts of questions? The idea of environmental health is a loose bucket around which you can open a dialogue but that you don't necessarily need to resolve or produce consensus. There is no credible checklist to describe (as the EPA and other federal, state, local agencies have tried to do), in a functional way, what constitutes a healthy environment for everyone, all the time, in every context.

It is a very difficult realm in which to produce consensus, and that consensus, if ever produced, is very frail. The Feral Robotics projects, for instance, measures volatile organic compounds on a brownfield that is also a ballpark and Starlight Park in the Bronx. How you demonstrate contamination in order to get remediation is tied into how you negotiate whether public money should be spent on remediation when it could be spent on a literacy program.

Anything like political action requires persuasive methods. This is where these technologies of ubiquitous computational devices become very important actors, because they do have an authority and a persuasiveness. Con Edison engineers that are hired can say there isn't any contamination in this area, that their data shows this from these subsoil measurements that were taken fifteen years ago. Who is going to critique those? The community groups who are concerned about contamination were not able to critique that data, until, in the case of the Starlight Park situation, they had produced other evidence that allowed them to participate in contesting.

The capacity to contest, to be in the position to have an opinion, to question the evidence, is where these ubiquitous computation devices can really contribute.

BB Let's go back to the maximal image of pervasive computation—the 2nd Planetary Computer—smearing the planet with an objective computational film that would construct a public database, an infinite stream of information about the performance of our shared socio-natural spaces around which these decisions are being made. Often pervasive computing is described as a diagnosis model, providing us with a way to detect what might be thought of as a disease, essentially. We detect pollution in one way or another and then render it. It is a way to visualize the invisible evil, drawing a picture of evil, so we can see where it goes and where it is at and in one way or another prevent it from happening.

NJ I am very interested in this “missing expert” issue that you brought up earlier. I think it is a really interesting problem. As you know I have always defended both the amateur and the role of the artist in complex technical phenomena, in biotech, in distributed wireless sensing, in ubiquitous computing. The artist stands in as the everyman, the layman, the non-expert, marking out the capacity of the civilian to participate in the technological future and its possibilities. I see a unique role for artists in their very status as non-experts.

BB Do you think that the scientists you collaborate with have similar reasons for wanting to bring artists into design collaboration process?

NJ No! (*laughs*)

BB As the “missing expert,” what is the role of the artist for creating politically legitimate forms of knowledge as minor sciences? “The artist” could be understood in terms of a profession, a methodology, or the economic art-object that would be created, and that any one of these in and of itself may be understood by itself as the condition for that participation. Could you talk about how you see the position of the artist specifically in the creation and governance of what you call the “material public?” What do mean by the “material public”? What do you see as the position of the artist as politician within that?

NJ Let us take a step back and look again at the promise suggested by ubiquitous computing in relation to the climate crisis and other

environmental concerns, the assumption that these can be solved by blanketing the world with sensors, and that we would somehow address environmental issues at the largest scale directly and effectively.

I would argue that essentially there is a different kind of politics involved here, precisely because we are dealing with the environmental commons, with air quality, water quality, and public spaces affected by these qualities. The thing that has made it so easy to degrade, external to market conditions, is that it plays out in these commons. It is not subject, in a sense, to market forces that are geared toward the governance of private property. What characterizes a political engagement with environmental issues is this idea of acting on or with the stuff of the world. It is not a discursive engagement, it is not about debating equality or freedoms, etc. For example, the eco-home becomes a site for political engagement with environmental issues, potentially privatizing them, whether you have photovoltaics on your roof, or smart metering, or do your systematic recycling. This is one idea of the politics of the material public. The interesting role of the artist in this context, as a kind of politician in the framework of the material public, is one where the artist stands in as the non-expert, the everyman, counter to the institutions of expertise (of the scientist, the engineer, the architect).

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BB So the role of the artist is as a model citizen and a naïve scientist at the same time, who is able to produce public images that work to construct both the material public and a minor science created for that material public.

Within some version of a material public that is based upon an infrastructure of ubiquitous computing, the political formations that would emerge from those relationships would be largely based on the aggregation of these intensely intelligent, hyper-local encounters between persons, things, and material events, including those in which people are not necessarily involved. Part of the question, then, for the artist as missing expert has to do with *the status of the image that is created*, and is related directly to the problem of the data cloud or data dashboard, and the status of the missing expert within those rhetorics as well.

Let me expand on this. To me, ubiquitous computing is understood far too much as a problem of a dense urban landscape, in the way in which

the human encounter is always organized around a “*flâneur* model,” of a person walking through New York City interacting with parking meters with his cell phone. It seems to me that with the model of the material public and the scenario of a kind of second planetary computer, the real issue has to do not only with non-market interfaces but also with the interrelationship of *non-human actors*. (Friere, 2008)

In this sense, the images that the artist has the capacity to produce has as much to do with giving representational agency to organizations within a material public matrix that otherwise would not have a parliamentary presentation. I am very interested in the status of the non-human in relation to the artist, considered in terms of the emergent political models we are talking about.

NJ That’s great. My view of the artist is based on the notion of the artist as idiosyncratic, as outside of spheres of regulation or authority. Outside of these frameworks, the artist representation becomes the only form of persuasion. In particular this ideal of the attention that can be paid to environmental phenomena is about this constancy of, for example, a temperature sensor pinging 24,000 times a second. And so who is making sense of this system, and what kind of image-maker are we talking about? And for what? I am very interested obviously in how the non-human and the non-market intersect.

BB This also conjoins sensing, sense-making and image-making into one? The ambient infrastructure itself: sensors, databases, displays, code, etc., that material system itself becomes the image-maker.

NJ Right, and in that, the artist is reduced to the role of the illustrator, choosing what four colors to use and how to make the lines glow just-so in Flash. But there is another even more important demand of sense-making: who or what is making the sense, who or what does it make sense to and why? This is what my colleagues and I and others who are engaging this kind of issue are saying: if we can’t be the ones who make sense of all this, then we as artists, citizens and scientists are all in real trouble. So again, there is a unique stupidity about us as artists that can be incredibly useful in this context, that makes the artist a sort of lowest common denominator in relation to the institutions of science and technical fields. But as you say, the real

focus is on non-human communication and agency, the actants and agents, of responsive environmental systems.

BB As for me, once again, I see the data-cloud model as an image that employs the rhetoric and authority of the interface to produce a diagram of some projective potential relationship between agents within this interfacial system. In this system, a public's ability to recognize and consume the image, and thereby the projection of a potential set of governable relationships between the variables within that interface, takes on an *iconic* and indexical value in its affective *intensity*. But in this iconicity or intensity, there is another kind of projection or proposition being made. It asks how it is that we may sense the world, or how *the sensibility of the world might be distributed* (in Jacques Rancière's terms) or organized, instrumentalized, and activated to become a part of the way the commons understands and narrates itself. It is not only an image, like a propaganda poster, it is a tool for a politics that doesn't yet exist. (Rancière, 2007)

NJ And for me, where, and how, and if the artist intervenes becomes the question, given as we've said that now the system can make its own images and diagrams. Also important is how these images do become an interface. That is where this issue of agency comes in. And I like to speak to how we might understand agency in this context.

There is a crisis of agency that may or may not be resolved by and/or attributed to the technologies of ubiquitous computing and sensing. Certainly we have to acknowledge that in mainstream environmental activism, agency is conflated with consumer dollars, with the responsibility of your consumption, organic, fair trade, energy star, etc. Within this rubric, human agency is understood as equivalent to purchasing power.

BB And in that scenario, the image of the future is for data clouds to render on the sides of cereal boxes, where, for example, the transparency of their conditions of assemblage and "carbon footprints" become the discourse through which these objects display themselves to us as interfaces into a vast supply-chain.

NJ But obviously there are problems with that view of agency. It becomes tied to wealth, such that those with less purchasing

power have less agency to affect the public space and act upon environmental issues that are immediately important to them. Income disparities being what they are, the environmental commons is then unchanged. The deeper issue is how and by whom the information on the side of that cereal box is produced, whether it is a marketing agency, trade organization, or even the environmental organization. This is a question of the transparency of the institutions behind the production of this imagery.

It is not necessarily an opportunity for social change if you can get more information about a product by waving your cell phone near it. The same marketing firms will produce more information of the same type, even if it is produced by ubiquitous computing. If the marketing company is putting the CO₂ sensor on the chimney, this is very different from the local community group or environmental justice organization placing sensors near the outflow of the buildings. The sensors are the same, but the information is of a different value.

BB And that is part of the work that the popular idea of “SPIME” accomplishes.

But when the disclosure of transparency of production and consumption goes “all the way down” the supply and demand chain to the sourcing points, it does not become socially instrumentalized until there is some process of narration enabling that information to feedback into the system itself. This is not unlike your How Things Are Made project. (See <http://howstuffismade.org>.)

In the SPIME parable, as with How Things Are Made, there is an opening up of the biography of assembly of the objects in the world and giving these biographies an agency and a voice within this process, so that the possibility of interaction with those biographies extends through the supply chain to points of origin and back again, such that the socio-ecological relations that exist between a consumer and a producer or between a landscape and an object—which are already there—become part of that object’s public representation. The SPIME model in its most optimistic sense is a way in which first and foremost the system describes itself to itself. If access to the raw data of its sensing capacity is open, then capacity to narrate those chains of connection is also open. (Sterling, 2004)

NJ Certainly, but it is important to contrast the kind of agency that comes from independent individuals or groups placing sensors and monitoring regimes with the more traditional forms of environmental agency, which are dependent on data from the EPA derived from existing sensors. If I do a story using my own independent data, it is a different story, open to a different sort of interpretation.

It is essential that the individual have access to these sensors and be able to independently deploy them. In New York, for instance, there was an attempt at legislation that would prevent individuals and community groups from doing environmental monitoring. We think we have that defeated, but there remains this dangerous idea that people can't handle this information, that it creates hysteria, and that this hysteria, which must be managed, is a problem over and above individual agency.

Because in truth there is not a missing expert. My students and I are by no means experts, but in so far as we have been able to trace through the production cycle of one contemporary good, there is sufficient information to suggest a viable innovation. That moves the image towards the interface. This information is being generated in order to change the conditions of that production.

BB If I can, let me restate and summarize these ideas on the table. By the disclosure and display of events that assemble themselves in the production of the material public and the organization of the chains of connection between those events into diagrams, the production of the image of those connections in and of itself suggests a potential reorganization or reconfiguration of those relations themselves. By employing the visual rhetoric of the interface, these images invite a counter-deployment of the variables that they are mapping.

There is a difference between some of the data smog projects that involve throwing up balloons and looking at air quality and producing maps of cities resulting in little more than “wow, cool” wonderment. They produce the effect of a “missing expert,” the implicit presumption that somewhere along the line, whether inside a mountain in Wyoming, at the EPA, or through an activist on her bicycle, somewhere someone must be using this *interface* to actually modulate these things. In this they further distance people from their own ability to look, hypothesize and act.

But in their own way, they are projective images of a parliament of the material public that doesn’t yet exist. The question is, as such do they provoke the possible emergence of this new form of political engagement, or do they provide an alibi for it never happening because they make it appear that the parliament is already there?

I wonder whether or not that problem exists when we are dealing with interfaces that don’t use the rhetoric of the GUI. Take for example the Hudson Glow Fish project or the One Tree project, which are both ways in which the events of assemblage themselves are organized and offered as interfacial information, but don’t use a dashboard or the traditional rhetoric of the GUI. But I wonder if you see the same problem at work in this type of project or if they point in a different direction?

NJ They are different in that they are a critique of existing interface models. The Glow Fish Interface is a 10×10 series of buoys in the Hudson River that sense fish as they swim by and light up and wiggle. It essentially amounts to a low resolution screen display on the river. To whom the information is displayed and what reactions can be taken from that is scripted, but it is scripted differently, and that difference matters.

The fish eventually learn when the lights go on food is likely to appear, and people learn that when the lights go on, fish are likely to be near and so start throwing—as they do everywhere else—stale Wonder bread or bagels in that direction. And there is the opportunity to change that interaction: the fish food I have developed and deployed at the site has embedded chelating agents that, when ingested by the fish, will remove the body burden of heavy metals, helping to take it out of the ecological system of the river. That loop is enabled by producing an image of what is present (the lights indicating fish proximity), but the actions that can be taken and the individual stratum are scripted so they can be aggregated to achieve significant mediation.

This taps into our persistent desire to interact—the kids who can't resist tapping on the glass at the aquarium—but it scripts this interaction in a way that produces real, measurable environmental mediation. It closes the mediation loop and changes who is responsible for that mediation.

It is a very different model from the traditional remediation approach of doing a massive study of fish populations and the hydrodynamics and then putting out an RFP to the Army Core of Engineers or a multinational environmental engineering firm who comes along and dredges the Hudson River and ships off barge loads of toxic sludge to Pennsylvania or the nearest location that will accept it. . . . It is a different kind of loop—and the speed and scale of it matters: it took thirty years to get an agreement to dredge the Hudson River, through dedicated lobbying in the traditional model of political agency, a lot of really good work.

And yet there is a real immediacy to these kinds of issues. I find it incredibly haunting, to give just one example, that the PCM value of the river is about the same as the PCM value of the breast milk of the people in New York City. The challenge and opportunity of ubiquitous computing is the way in which it can make doing something, making change possible, through the direct action of people, and in this way give that capacity to act an immediacy not possible in the traditional models of political agency. However, there is so much emphasis on the data fetishism, how much data can we get from everywhere, etc. In contrast, in the Hudson Glow Fish project, we have a very low resolution, 10×10 pixel display that I would argue can have a real meaningful effect on the situation.

BB Absolutely. An emphasis on high degrees of visual resolution is always suspicious. I would add that the compunction to produce information visualization diagrams or images of the conditions of interrelations between events of assemblage is also a desire to interact. It tries to understand the processes of the world as they come to us, its constituent parts and how they can be worked with, even and especially if we can't see them at first.

I want to talk a bit more about governance. You talked about aggregation. There is a desire as you say to aggregate the most information about which a portraiture could be drawn, in order to produce the highest resolution image, whereas the real issue of aggregation has less to do with the resolution of the portrait at any given instance than it has to do with the aggregation of actions taken in relationship to those images and the aggregation of those relationships to each other.

In other words, how do every one of these micro-political acts of agency constitute in themselves, as they themselves aggregate, the possibility to institutionalize, congregate, or become more systemic in such a way that they form the basis of a new kind of political and social mediation?

As you said quite clearly, the traditional models of agency around these issues are dependent upon models of representation that are incredibly slow in comparison to the capacity and necessity of action. Consider for example the representation of public will through a vote in a parliamentary system that produces itself in the representation of a policy or a law, which in turn replicates itself in an action, etc. and etc. down the line. These chains of representation are too slow, and part of closing the loop is the disintermediation of these so as to allow for an acceleration of possible reconfigurations. But again, is this, by itself, a model that is too bottom up, one that doesn't provide a direct way for macro-institutional organizations to be formed or re-formed?

One way we might frame this question is through the idea of *law*. What becomes law in the context of bottom-up micro-political aggregation, particularly when we consider law as guaranteeing the replication of certain desirable behaviors? We might consider this in terms of *protocol*, how a force of law becomes embedded in inflexible, even stupid systems. It is actually the inflexibility of such systems that provide the most social flexibility to bloom. (Galloway, 2004) So how can we consider

the model beyond a naïve, volunteerist micro-politics? What forms of institutionalization or what Latour calls “parliaments” emerge from this? How do these closed loops aggregate themselves into new kinds of enforcements, if not laws?

NJ That certainly is an open question, but it’s the right one. What is underprivileged then is the capacity to automate, as you say “to guarantee repetition.” To set up local instances that immediately invite comparison: if this is the case here, what is the case there? It seems to me that finding those opportunities for comparison or aggregation is not easy or obvious. Do we aggregate these things about nested community structures that we traditionally use to scale up to a macro-politics? Or do we work through comparison and have an aggregation of comparison that might lead to a politically effective coupling?

In fact, I am not sure that you could pre-architect those relationships, because then you might lose the responsiveness of these systems or their local integrity. To be able to design at a macro-political level is where much of the political energy has been directed, and wasted, like the kid on the street collecting signatures for Greenpeace, etc.

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BB But if the tactical volunteers are satisfied to be always working at a hyper-local scale, when and at what point are they able to change the protocols of a system, such that we can go beyond remediation (reactive efforts) and actually begin to restructure the larger systems, to be “sufficiently effective” as you said, such that the sludge doesn’t show up in the first place?

NJ This is the important question, but non-governmental material politics have a durability and a constancy that is surprisingly less than the laws and the traditional political structures. A zoning law, for example, is often more durable than the bricks and mortar it contains. But nonetheless, in this idea of the material public there is a durability in ongoing problem-solving that constantly invites or demands monitoring and sense-making. If we design these ubiquitous distributed sensing systems so that they are accountable to an ongoing problem-solving, maybe we can affect the emergence of systemic reconfiguration. Given that we have a context in which the initial design infrastructure is set up, in which there is an ongoing process of

innovation, and sense-making is possible and is privileged, then it can and will happen.

But if we design these distributed sensing systems in the image of militarized paranoia post-September 11th—monitoring bioterrorism, the paternalist “we are looking after this” posture, which is of course the dominant mode—there will be much less chance of innovation and of drawing on the diverse intelligence of many people to make sense of very complex interacting systems.

Designers who work in this material realm have this enormous opportunity to demonstrate a new form of knowledge production. The law that you are looking for is in this knowledge production and its capacity to reach a point of consensus, a truth point, becoming a persuasive enough representation to act on again and again.

BB As you just articulated it, the model would rely on the rationality and good will and “communicative rationality” of activists: presented with reasonable information, reasonable means to gather more information, share it, and to act reasonably on behalf of it, reasonable people will do so. It’s far from clear then how continental-scale industrial pollution, for example, is engaged systematically.

Would this work as a model for the *polis* under ubiquitous computing and sensing more than it would for any other technical regime?

The other cautionary issue for the overemphasis on local activism and local mutability comes from the way in which the logic of the protocol as a control system works precisely because protocols are fixed. The protocols are stupid or immutable—think of TCP/IP, the Apache kernel, or the grid system of New York City. Or if they are mutable, it is only by incremental variation within them. Again, it is precisely the rigidity or stupidity of it that allows for the free flow of information within them.

We want the aggregation of local action to become “law,” in the sense that there is a concretization of these bottom-up closed circuits, such that they are able to enforce themselves and that they become force, that they become the force of law, if not formally codified. For local action within the 2nd Planetary Computer scenario to come to operate

as larger-scale protocols, they have to have a similar kind of capacity to become rigid and therefore allow flexibility to work in relation to them. If they remain too liquid, they are less able to in fact close circuits in any kind of pluralistic way, they remain singular events, and they don't aggregate and become plural. Do you disagree?

NJ Actually, I couldn't agree more.

BB From Durkheim’s early work on social representation to Rancière’s on the political aesthetic in art, the affective intensity of the *image of the collective* is not just a narrative of a political body but is in fact *constitutive of that* body. Whereas Durkheim saw the collective representation as a central, singular form that represented a contiguous body called the “society,” our contemporary condition has been characterized by many as a “post-social” condition, where the borders of contiguous social forms dissipate, where flows move in and out of geographies, where territories are occupied by multiple collectives at once, and where the procedures, networks, and assemblages of objects and things are vastly distanced from our own capacities to perceive them.

It is precisely for this reason—the dissolution, dematerialization or deterritorialization of the experience of social connection—that images or diagrams of dynamic assembly such as the information visualization projects we began with become politically important because they are also affectively resonant. They are political images, and forms of “post-social” collective representation. They provide diagrams of possible connections between things and people and forms and information, which because of our post-social condition are otherwise unimaginable or unsurveyable, and therefore unaccountable.

NJ I agree very much, but the map is not the territory! I would hope that they can eventually provide a way to explore and intervene. The “post-social” also implies the activity of non-human actors. “Post-social” implies an *evacuated* condition, doesn’t it?

BB Let’s examine this a bit further. Any kind of participation or action, even at the most local level, in some way reflexively imagines and images itself to be operating within a particular geography and landscape. In that this landscape may be what is diagrammed and presented to the actor in the form of the interface, the role of the interface is partially to specify and constrain the terms of that geography and the terms of that landscape into a particular, actionable set of discursive operators. It “enframes” the horizon of action.

So in what ways does this interface-image, and the production of this image, give entry into that geography? You’ve suggested that there is something specific about the artist in her role as image-maker relative to this question. It seems to me that in the context of our discussion, this

ties directly to the problem of the image in relation to collective representation in a specific way, which we might call “the law.” Because of course the law can be thought of as another form of collective representation, a form by which the sovereign violence of the population is codified into a fixed protocol that ordines and organizes behavior and enforces that will in some way that is both autonomic and representative as well.

So as we talk about the aggregation of these minor sciences and these micrological interventions, where there are shorter and shorter circuits between an information referent (within an interface, for example) and an entry point into acting on that information in an ecology, the cycle of monitoring, imaging, interfacing, and acting is compressed. It turns active collective representations into direct collective techniques. These visualizations start as diagrams for isolated users, but their aggregation leads toward a plurality. They want to be constitutive of some new political space, but I’m afraid political theory is looking in the wrong places for emergent institutional media. I hope this can change quickly.

NJ I hope so too. When you say interface, I say “structuring participation.” But let me underscore a previous point. Like you said, many data visualization projects obscure how the data was produced, by whom, and in so doing they produce an aesthetic of disengagement and “gee whiz.” So with respect to distributed sensors in relation to the issue of politics, technology is always and already exclusive. Most people don’t feel the license to interpret, to rewire, to hack, and so the capacity to recode the code is vastly limited. People do not yet feel the license to do so. That is where the political theory needs to focus.

BB And again, how is it that the micropolitical logic of individual license does not become one of atomization, of one-off instances, but actually can become a plurality, and in this plurality can become replicable and in this replication can become institutionalized and that institutionalization can have the force of law? To simply refer to the magic of networks again and again is remedial.

NJ Right. I don’t know how, but I know one condition is giving people the license to interpret. This becomes the role of the artist, giving people the capacity to interpret and a license to have an opinion on a complex technical issue. This is a hard challenge. In so much as the image provides a license to do that, the permission

to see the underlying issues, the legibility, the aggregation is possible. The idea is that the legibility of the data, in terms of its source and the rationale of its production, and who is responsible to interpret this data, are the critical elements. It is a precondition of the kind of repetition that has the force of law. It is necessary but not sufficient, but I think experiments in institutionalization will come out of this.

BB It is necessary but not sufficient that the conditions of the production of the data are visible and transparent, and therefore addressable as a condition of the data's truth claims, but what is missing is the idea that what is produced is a more direct access or circuit to those conditions of production itself! Such images not only display what is going on, but the display becomes a means to change what is happening. So the transparency itself is not sufficient, transparency that allows for modification is required, but because transparency is always narrated, always staged to some extent, there is no such thing as a non-spectacularized transparency. Is there?

NJ No, which is why "transparency" is an unfortunate term. It suggests a spontaneity that is unreal. This notion that you are looking through glass and someone is going to draw back the curtains and provide you with an immediate transparency.

BB What supply-chain architects call the "glass pipeline." How would you differentiate that from our need to get into the data, to see the data and see who is making it and how it is made?

NJ I think it is just as important to understand the network structure of where the data is coming from, because that network is what structures any participation in the first place. "Structures of participation" is the term I use to understand the network structure of accountability, the network structure of participation, the network structure of sense-making (as opposed to "sensor networks").

Certain structures of participation project an ideal we call transparency and other structures of participation do not. However, we are living under an increasing demand for structures of participation that are in the image of militarized information production, in which we have an authoritative interpreter somewhere, an expert. Your notion of the "missing expert" can play out in a non-visual way.

For example, in my Anti-Terror Line project, a distributed data collection system that exploits the fact that many people carry a recording capacity in their cell phones, which allows people to upload their recording or reports of civil-liberties violations in the name of anti-terrorism. I have this open database that every recording uploads anonymously to a website with a time-stamp which you can annotate or not, keeping it open to interpretation. If you contrast this project to what I call the terror lines—NYSafe or the distributed collection systems which employ the people as insidious sensors, “if you see something, say something”—you see a very different structure of participation at work. All of their data (in the case of New York) goes to the NYPD, the CIA, etc. And so the sense-making here is relegated to the 1,944 people who saw something and said something last year, and some supposed experts somewhere who filter it.

BB Your version is an open data capturing system, where the viability of access to the commons of relevant information around this topic is itself available.

NJ In which anyone can contribute and anyone can interpret.

BB And from which an authority could be drawn but has not. Clearly, each system is its own analogue for the structure of public participation that each imagines for the public city at large.

Though I wonder if that is too pat. Do you know Jaron Lanier’s essay “Digital Maoism,” his contrarian critique of user-generated culture and the uncritical presumption that the direct judgment of the masses will *a priori* produce better results, better systems? (Lanier, 2006)

NJ But if not “everyone” then who does make sense of it? And again, this is the role of the artist. What different sense can be made under these different structures of participation and does it matter?

Can one make a different sense of the “See Something, Say Something” responses than the CIA and the 1,944 people who said something and called in to their line? Is there a different sense to be made and does it matter? My intuition is that there is, that there is a better sense to be made, one that is more robust, one that can be challenged. Not just better sensors but better sense-making.

And yet I am struggling with what that means, particularly given the fact that these open systems, as much as they have the potential to provide new vehicles of sense-making, can also diffuse the responsibility and accountability for making sense into nothingness.

To me this is also a problem with many of the information visualization projects with which we began; they throw up a lot of data and suggest that the sense is self-evident! It's not!

BB Yes. In the best cases, in the data-cloud diagram-interface, there is a sense-making that takes this challenge head on. Sometimes this is through a strategy of “advocacy,” like Laura Kurgan’s maps of dollar expenditures on prison incarceration rendered Manhattan block by Manhattan block. There is a way to understand these projects purely as contemporary images, like political icons, posters, icons or paintings. (See <http://www.arch.columbia.edu/index.php?pageData=46955>)

But to repeat, when such projects deploy the visual rhetorics of the interface, there is for them the latent aspiration that these are not only images but also technologies through which the condition that is being represented can also be entered into and reconfigured or remade in some way. Here and now through these image-instruments, and if not now, soon.

You talk about the militarization of such information. In even the most apparently progressive of such projects, through the command, control and communication aesthetic, the biomass of cities is cut, cleaved, and color coded as in a battlefield operation. This is the bargain to be made in understanding these conditions. But for the bargain to work, these images have to function with an instrumentality that is something more than just iconicity. Its aspiration to become a parliamentary medium and not just evidence, a declaration of scandal, should be supported.

NJ This is exactly the crisis of representation that we are facing with these ubiquitous distributed sensing systems.

NJ How we structure non-human agency in this is an interesting opportunity. I think it is important to frame it in terms of what you yourself call “the death of the user;” how non-humans are at the instigation point of distributed interactions where the otherwise sacrosanct “user” used to be.

If we can pay a certain attention to and diversify who is represented, then with ubiquitous sensing systems we can begin to account for non-human agents, whether living or non-living. There is an opportunity for a more diverse structure of representation. There is a real call to interrogate this technology to enable this kind of representation. Instead of inherited structures, we can take non-human agents, as we recognize them in agricultural contexts or in urban, suburban contexts, etc.

As some have done, using infrared cameras about the house, we can begin to account for the non-human actors who coinhabit our spaces with us. We can reconsider structures of ownership, including private property and how it extends to these non-human agents in the environmental commons. Are there opportunities in RFID and similar tagging and sensing systems where the branding and closure methodologies used to manage our relationship to non-human actors can be reinvented? Absolutely.

For example, can my Feral Dog project, deployed throughout the suburban Northeast, become a model for new relationships? Would or could ubiquitous distributed sensors enable us to imagine what biodiversity might be here regionally and locally? This whole idea that biodiversity is some kind of global “count,” that there is a figure that is measurable and actable, that there is a worldwide count that ticks down with every extinct species, is really inadequate. It must be possible to understand biodiversity as a condition of the backyard, represented as such, and this might be a better way to understand, narrate and engage these issues.

BB This is exemplary of “the death of the user,” because it puts at stake not how a human might react ethically or unethically towards a situation from her central position in local or smaller systems, but the way in which the ubiquitous, pervasive systems comprise an ecology where parts of the natural system relate and co-govern directly with other parts at a distance without requiring the agency of the human

to intervene or mediate. The techno-ecology works without users. We are designing our own abdication!

NJ Yes, and through these systems, we can also begin to recognize a non-human-centric world. But this is also good for us. I started the conversation by saying that through acting with our own self-interest, and re-framing environmental issues like global warming as local environmental health, we can begin to see a non-human point of view and incorporate that into the ways in which we act upon our surroundings, and providing better solutions.

BB Elsewhere you have used the phrase “lines of desire” to name the way in which a planned space is used by a public as if it was an open smooth space, and in doing so, inscribes new striations onto that landscape. I’ve used similar language in describing pervasive computing as a landscape effect: how it striates the smooth, and smoothes the striated. Can we end with you talking a bit about what you see as the implications of that sort of back and forth process in terms of our pervasive computing scenarios we’ve touched on? It is tempting to imagine pervasive computing as a deterritorializing process that opens up the world to new liquidities, more than a new medium of inscription, naming and fixing, but clearly it is both. (Deleuze and Guattari, 1987)

NJ Dirt paths worn across a lawn in front of a library is the classic example. My image of “lines of desire” are those tracks that people form across grass that become over time a very visible representation in themselves, and yet also a reference to the existing paths. They are both in defiance of but in reference to the existing pathways. It is structured as both an open system, and one that produces emergent forms of consensus through aggregation, in its reference back to other adjacent forms of governance and codification, such as the official paved but less useful walkway.

BB They are the perfect example of a persistent inscription that guarantees the repetition of similar action and thereby takes on the essential force of law.

NJ Exactly.

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COMMUNITY
WIRELESS
NETWORKS
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Situated Technologies Pamphlets 3:

Community Wireless Networks as Situated Advocacy

Laura Forlano and Dharma Dailey

Series Editors: Omar Khan, Trebor Scholz, and Mark Shepard

www.situatedtechnologies.net

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COMMUNITY
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THE ARCHITECTURAL LEAGUE OF NEW YORK
SITUATED TECHNOLOGIES PAMPHLETS 3
LAURA FORLANO AND DHARMA DAILEY

ABOUT THE SERIES

The Situated Technologies Pamphlet Series extends a discourse initiated in the summer of 2006 by a three-month-long discussion on the Institute for Distributed Creativity (iDC) mailing list that culminated in the Architecture and Situated Technologies symposium at the Urban Center and Eyebeam in New York, co-produced by the Center for Virtual Architecture (CVA), the Architectural League of New York and the iDC. The series explores the implications of ubiquitous computing for architecture and urbanism: how our experience of space and the choices we make within it are affected by a range of mobile, pervasive, embedded, or otherwise “situated” technologies. Published three times a year over three years, the series is structured as a succession of nine “conversations” between researchers, writers, and other practitioners from architecture, art, philosophy of technology, comparative media studies, performance studies, and engineering.

www.situatedtechnologies.net

Advocacy is the act of arguing on behalf of a particular issue, idea or person, and addresses issues including self-advocacy, environmental protection, the rights of women, youth and minorities, social justice, the re-structured digital divide and political reform. In this special double issue—the result of an open call for submissions—we have invited contributions from two pairs of authors considering how Situated Technologies have been mobilized to change and/or influence social or political policies, practices, and beliefs. In our call for submissions, we asked: What new forms of advocacy are enabled by contemporary location-based or context-aware media and information systems? How might they lend tactical support to the process of managing information flows and disseminating strategic knowledge that influences individual behavior or opinion, corporate conduct or public policy and law?

In their contribution, “Community Wireless Networks as Situated Advocacy,” Laura Forlano and Dharma Dailey trace an ethnography of community wireless networks (CWNS) beginning in the late 1990s. They illustrate, through a series of specific examples drawn from their experience as activists and field researchers, the *terrain vague* that exists between purely local, bottom-up, community-based networks and more centrally organized ones supported by local municipalities. Ultimately, they suggest that despite shared beliefs and values, these groups vary considerably in size, membership and activities from country to country based on political, economic, legal, and socio-cultural factors, highlighting the ways in which the identities and activities of CWNS are linked with global causes and concerns while at the same time situated in their local communities.

Omar Khan, Trebor Scholz and Mark Shepard

Laura Forlano is a Kauffman Fellow in Law at the Information Society Project at Yale Law School. Her dissertation, “When Code Meets Place: Collaboration and Innovation at WiFi Hotspots,” explores the intersection between organizations, technology (in particular, mobile and wireless technology) and the role of place in communication, collaboration and innovation. Forlano is an Adjunct Faculty member in the Design and Management department at Parsons and the Graduate Programs in International Affairs and Media Studies at The New School. She serves as a board member of NYCwireless and the New York City Computer Human Interaction Association. Forlano received a Ph.D. in Communications and a Master’s in International Affairs from Columbia University, a Diploma in International Relations from The Johns Hopkins University and a Bachelor’s in Asian Studies from Skidmore College.

Dharma Dailey has over a decade of experience as a community media activist and researcher. Her research on the purported risks to public safety of Low Power FM (LPFM) broadcasting, as claimed by large commercial broadcasters, played a timely role in the FCC’s decision to begin re-issuing LPFM licenses. Dharma was the principal author of Prometheus Radio Project’s official reply comments to the FCC on the 12 Media Ownership Studies that were meant to launch another wave of media ownership consolidation. From Hackers on Planet Earth to the Ford Foundation, she provides expert testimony on many topics, including smart radios, FCC licensing regimes, appropriate technology, and community media to audiences across North America. She is regularly sought out for input by a variety of media reform groups and researchers and is a member of the New America Foundation’s Wireless Futures Advisory Board.

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LF Having just returned from the Wireless Visionaries workshop at the New America Foundation and the fourth annual International Summit for Community Wireless Networks at the American Academy for the Advancement of Science in Washington, DC, we really have a lot to discuss. It is such an exciting time for community wireless networks (CWNS). I always leave the Summits feeling re-energized and optimistic about what CWNS have achieved and return to New York with a new sense of purpose in my work.

DD I agree. What are the most interesting things that you learned at this year's Summit?

LF I think that there are three really interesting developments. The first is that this year, for the first time, CWNS were linked to critical issues of communications rights and human rights. The participation of the human rights community was interesting because human rights are so clearly about "situated advocacy." The second is that we are finally moving beyond conversations about access to the Internet and towards issues of adoption and use. This includes the usability of the technologies and interfaces, which are vital to engaging a wider public. Finally, there have been some really important advances in the integration of the software and hardware that CWNS around the world are using.

DD In your dissertation, you discuss the use of mobile and wireless technology, the emergence of social formats (forms of organizing) and the role of place and space. When you started your work, very few people were exploring the socialities of local networks. And no one I can think of was looking at the role of place in the development of these networks.

LF My dissertation, "When Code Meets Place: Collaboration and Innovation at WiFi Hotspots," is about the role of lead users or user entrepreneurs in two kinds of innovation. This is also commonly referred to as user-driven innovation. First, I look at the ways in which community CWNS are innovators of hardware (including routers and antennas), software, and applications. Second, I look at the emergence of a socio-technical format in which digital networks, information, and interfaces are integrated in the physical spaces of our homes, offices, and public or semi-public spaces. This form of organizing is best exem-

plified by coworking groups—individuals who are self-organizing their own work environments. Finally, I create the concept codescapes to help capture the integration of digital and physical realms, and the sociality, collaboration, and innovation that occurs at the seams of these realms.

DD “When Code Meets Place” is poetic. How did you come up with that title?

LF I teach a graduate course called Access to Knowledge in the International Affairs program at The New School. I cover new media and information technology policy and the ways of harnessing new technology for social, political, and economic change. As I prepared for the class, I re-read Lawrence Lessig’s prescient book *Code* (Lessig, 1999), which argues that software is similar to architecture in the manner in which it regulates human behavior. Social norms, laws and legislation, the market, and architecture are posited as the four main forms of regulation according to Lessig. However, more recent legal scholarship by Tim Wu (2003) and James Grimmelman (2003) responds to Lessig by saying that software, while similar to architecture in some ways, requires its own separate category. This becomes more complicated when digital networks, information, and interfaces are actually incorporated into architecture itself. This is because there are likely to be conflicts in the ways in which digital networks and physical structures regulate social behavior. For example, I might be able to enter a door but not access the digital network, or I might be able to access the digital network but not open the door. Think about the movie *Minority Report* where Tom Cruise enters The Gap and is offered a plethora of discounts by an interactive screen that welcomes him into the store. That is how I got the idea for the title.

There’s a very good article called “Pervasive Computing” by Jerry Kang and Dana Cuff (Kang & Cuff, 2005) in which they propose future scenarios for a shopping mall. In one scenario, the “friction mall,” mobile technologies are used by shoppers in order to learn about the social, political, or economic implications of the products that they are buying. For example, by scanning a product’s bar code—in the future, it is more likely to be a radio frequency identification chip (RFID)—with a mobile phone, a political shopping application might allow one to find out that a product was manufactured in a sweat shop or produced with toxic chemicals. This is one kind of Situated Advocacy that might be possible in the near future.

DD You are one of a handful of women who are prominent among CWNS. How did you first get interested in them?

LF I was working in Washington, DC in August 2002 when I read in the *New York Times* that Bryant Park (on 42nd Street behind the New York Public Library) had a WiFi hotspot, which was built by NYCwireless, a community wireless group in New York, in partnership with the Bryant Park Restoration Corporation. The hotspot was sponsored by Intel and cost \$10,000 for equipment and \$1000 per month for the high-speed Internet connection. At that time, I was writing a monthly technology column for the Gotham Gazette, a non-profit news and politics web site. I wrote an article about the network. In the article, entitled “New York City Goes Wireless,” I describe Bryant Park as “New York’s newest Internet cafe.” At the time, New York had only 70 hotspots according to a map on the NYCwireless website. There was a belief that WiFi would be the next public utility like water, streetlights and public parks themselves.

In 2003, I was a researcher at the Center for Global Communications (GLOCOM) in Tokyo on a National Science Foundation grant. Anthony Townsend, an urban planner and the co-founder of NYCwireless, and Howard Rheingold, author of *Smart Mobs*, were invited to give keynote addresses at a workshop that GLOCOM was hosting. We traveled to Kyushu, the southernmost island of Japan, to attend a conference and, on the plane on the way back, I proposed to Townsend the idea of starting a special interest group (SIG) on the social implications of wireless networks.

The SIG was active for about a year, bringing together artists, architects, social scientists, technologists, businesspeople and policy experts. At the time, there was a lot of excitement about the potential of wireless networks, and there were so many issues that required our attention. For the most part, these issues have still not been worked out. There were issues of signage: How do you illustrate the presence of an invisible resource? There were policy debates: How do you argue that the Federal Communications Commission (FCC) should allocate more unlicensed electromagnetic spectrum? There were concerns about public outreach: How do you communicate the value of free, public wireless networks to a non-technical audience? There was a lack of understanding about the ways in which wireless networks were being used: How are people

using WiFi in ways that differ from the wired Internet? What are the affordances of wireless networks?

DD What do you mean by affordances?

LF Affordances can be thought of as the possibilities or potentialities of a technology. Donald Norman (1990) and J.J. Gibson (1977) introduced this concept, which has been frequently used in the fields of science and technology studies as well as communications. Affordances allow for both the opportunities as well as the constraints of a technology. For example, one of the affordances of WiFi is that it penetrates walls; another is that it demarcates a relatively small bounded geographic space of connectivity. A constraint might be that if you are too far from the router or antenna and get low signal strength, you are not able to connect to the network. Some affordances of a technology may be relatively straightforward whereas others might emerge only after being discovered by its users.

Over the course of the year, we generated ideas for logos, campaigns and surveys. NYC wireless partnered with a Hungarian arts association on a weeklong collaborative new media art project that linked passersby on St. Mark's Place in New York's East Village with concertgoers at Budapest's Sziget Festival via videoconference. I am extremely grateful to the people that participated in the SIG during those years. Our discussions were very important in my thinking about the social implications of wireless networks. It was exciting to have created something new, and as a woman, it was empowering to be able to educate others about wireless networking, a highly technical subject. Since it was so early in the adoption of WiFi, I found that I was able to make a difference by explaining to people how WiFi came to be, and how to use it. This was an important component of my identity as a scholar and activist.

The public debate around WiFi has changed considerably in recent years, in part due to aggressive lobbying by telecommunications and cable companies who feel that municipal wireless networks are unfair competition to their businesses. For example, in 2004, the city of Philadelphia announced that they wanted to build a municipal wireless network. Soon after the announcement, telecommunications and cable companies succeeded in passing legislation in approximately 13 states, which required that cities get approval from the very same companies



NYCwireless installation of Brooklyn Bridge Park network, May 2006

if they wanted to build their own networks. The companies argued that cities building communications infrastructure was unfair competition to their businesses. As a result, the concept of municipally owned and operated networks was dropped in favor of bringing in private sector companies—namely Earthlink in the case of Philadelphia and many other large cities—to build the networks. Most recently, Earthlink has abandoned these projects since they were unable to identify sustainable business models and a number of cities have been left without the networks that they hoped to implement.

LF You come to CWNs through your work as a Community Radio and Indymedia activist. Do you see any similarities or differences between those involved in CWNs and earlier wireless based groups such as Amateur Radio (HAM) enthusiasts and Pirate Radio Activists?

DD There are a couple of similarities that I see. Tinkering has fallen out of favor for a few decades, but it's making a comeback. When you dig a little, you find that the best professional programmers, engineers, and so forth are also tinkerers. These are people who are motivated beyond professional satisfaction. They're motivated by a sense of playfulness. People often complain that technology can alienate us, but folks who gravitate toward community technology are motivated by creating a sense of—or maybe even an excuse for—connection with other people. A professional antenna designer sits in front of a computer all day. It's very abstract and remote from what people want out of that antenna. Climbing up on a neighbor's roof and planting an antenna that you've made with an ad hoc group of volunteers gets you out of your rut. You get the immediate satisfaction of seeing how your cog fits into a bigger whole. Once you see the joy that you can bring people with these simple little gestures—helping them “get connected”—you get hooked. The high that comes from the sense of reciprocity and interdependence when everyone is contributing their part is addictive. You make connections with people in your neighborhood you wouldn't have a chance to know otherwise. And then you bring that holistic knowledge and sense of deeper purpose back to your day job. Companies like Google recognize some of this and encourage employees to take a bit of their company time to work on self-directed projects.

On the other hand, your day job may be making coffee at the gas station, but now you know how to solder a transmitter together. Engineers and designers who work side by side with community members as peers, not only give expertise, they facilitate a sense of ownership over the technology to those whom they share their skills with. It's amazing how much joy can be spread by making cross over cables when everyone comes together with the intention of community building. All parties walk away empowered.

If the project is organized in the right way, nearly any barrier can come down: race, class, gender, ideology, even language. I've worked on Spanish-Anglo projects with folks who have little English and I, as

a typical American, have very little Spanish. But you can walk away from these things with a real sense of mutual comradery and respect, in spite of these things. I've seen it happen.

In terms of differences, Amateur Radio—or HAM radio—is by far the longest in the tooth, going back to the end of the 19th century. It has played different roles along the way. Currently, I would say the community aspect of HAM radio is for the most part a virtual community of amateur radio enthusiasts. In the US, the amateur radio community is aging, male and white for the most part. I think it could be a lot more dynamic and vital, but for whatever reason, people aren't gravitating toward it in the numbers they used to. There are cultures that build up around technologies, and the culture of HAM seems anachronistic right now.

Analog radio is a very accessible technology that lends itself to wide use among many kinds of people. There isn't one kind of unlicensed broadcast operation any more than there is one type of community. In the 90s, I was involved in a movement of people who engaged in civil disobedience over the airwaves as a response to the media concentration that was taking place at that time. The sliver of "pirates" that you hear about are more of these types of folks, who were saying, "We are on the air without a license." "Pirate" is a loaded term. Many people engaged in these activities claim that they are exercising the right to free speech and that those who impose rules which disallow such activities are the "real pirates." Most community based projects have a scope that is fixed on serving the needs of the community they are situated in, not in protesting to the world at large. For this reason, wherever you have a large concentration of non-English speakers you're likely to find one or many unlicensed broadcasts. It's a commonsense answer to the problems new immigrants face.

Of the three spaces—HAM, CWNs, and Community Radio (licensed or unlicensed)—my experience has been that the community radio movement has the best gender balance. While engineering schools, computer science, and the so-called hard sciences have built up cultures around them in the States that lead to gender extremes, there are lots and lots of women who are very comfortable with building and deploying radio stations that serve communities.

I see community wireless networking folks as the current torchbearers for what amateur radio enthusiasts were in the early decades of analog radio. These are the people who are simultaneously trying to push radio based technology in directions that respond to cultural, civic, and economic needs and desires in new ways. Doors that have been closed for decades have suddenly swung open again with change possible on all fronts—technical, political, social, and economic. It seems sudden, but there have been people working on all those fronts all along to get the door to swing open. You just never know when it’s going to give.

Speaking of transitions, you made the transition from being an activist for CWNS to conducting research on these networks as a social scientist. How do you balance the competing interests of these two pursuits?

LF This is a very good question, and a difficult one to answer. Around the time that I became involved in community wireless, I was struggling with finding a topic for my dissertation research. I was interested in the social implications of wireless networks but was persuaded against it by more senior mentors and colleagues who said, “You can’t study something that doesn’t exist.” So, I focused my academic research on the use of mobile phones instead, and continued my involvement in NYC wireless primarily as an activist. In a way, I felt that I was living a dual existence. But I was always learning in both realms, learning differently as an academic than as an activist where knowledge was more hands-on and applied.

Little by little, WiFi came to exist in the mainstream imagination as well as in practical everyday contexts. A growing number of people got laptops and used WiFi at Bryant Park or a Starbucks. One advantage of studying lead users or early adopters is that you can often come to understand the ways in which social norms, behavior, and uses are changing before they really happen in a more mainstream setting.

DD There are many definitions for CWNS. How do you define them?

LF CWNS, like NYC wireless in New York, are wireless networks that are initiated, developed, and built by individuals rather than by companies or municipalities. Historically, it is evident that new communication technologies allow for new ways of communicating. This is perhaps best summed up by Marshall McLuhan’s famous phrase, “The

medium is the message.” The reality is much more complex. Communication technologies shape the ways that we communicate, which in turn shape the technologies that we create. So, the process is more like a circular, iterative, co-evolution rather than a one-way, linear transmission. It makes sense that this would be true with respect to WiFi as well, and I am interested in the ways in which this is true.

As more and more people are engaged in “knowledge work,” communicating with their colleagues online, there is a greater need to commune with others, even if in a limited way, by using WiFi in cafes, parks or other public places. This is part of the ritual behavior that accompanies the technology. In the WiFi use survey that I conducted as part of my dissertation research, I found that the varied reasons that people use WiFi were very, very interesting. For example, the majority of people surveyed—58% in New York—used WiFi in public or semi-public spaces because they wanted to get out of their home or office. Others—roughly 23% in New York—used WiFi in order to see familiar people or feel like they were part of a community in the places where they use it. WiFi allows people to address a social need, that of not feeling socially or physically isolated.

Communications scholar James Carey (1988), who founded the Ph.D. program at Columbia’s Journalism school, theorized about the difference between what he called the ritual approach to studying communications and the transmission approach. The transmission approach elevates what is being communicated through the media for the purposes of control. In contrast, the ritual approach takes a more cultural and anthropological orientation. For example, the experience of going to the movies (i.e., sitting in a dark auditorium alongside hundreds of strangers) is as important as the content of the movie being transmitted. Or, to put it another way, the ritual of waking up and reading the newspaper or watching the 6 o’clock news is an important part of what allows us to have an identity as a nation. Clearly, these rituals are rapidly being replaced by other rituals (like reading blogs or watching YouTube) but you get the idea.

Recently, there has been a lot of negative press about the failure of municipal wireless networks to find a sustainable business model. For example, Earthlink, the Internet Service Provider (ISP) that negotiated with a number of cities around the country, has decided to pull



NYCwireless Wireless Park Lab Days, September 2003 and New York Live Event, August 2004

out of the municipal wireless business. I would argue that there are a number of reasons that these projects are on hold. First, the percentage of people who use WiFi nationwide outside of their homes or offices is still relatively small. According to a 2007 survey by the Pew Internet and American Life Project, it is only about 25% of all Internet users. Second, these projects were designed and planned as top-down telecommunications infrastructure projects. Third, there is very little understanding of how and why people use WiFi, and, more specifically, how it is different from wired Internet access.

DD You brought up Municipal Wireless Networks. There is a lot of discourse that doesn't really distinguish between the bottom up projects that you and I are involved in and the ones where local government plays a role.

LF Well, what difference do you see between CWNs and Municipal Wireless Networks?

DD That's the question isn't it? "Community" is such a big word. It's a rallying word that gets everyone to the table. Whether you're an indigent or a Verizon VP, you support "community" whatever that is. Being fuzzy about terminology is not always a bad thing. If it gets us under the same tent long enough to see if we can share a common agenda, I can live with the fuzz.

Being a community-networking activist is not like organizing a canned food drive. It's often difficult to know if you are netting a positive difference for your neighbors. You are setting the tables and chairs, the napkins and silverware, but you aren't providing the main course. If I say to you "radio," what comes to mind? For most people the first thing that comes to mind is a DJ playing music and talking. The persona of the DJ and the power of the microphone is what "radio" means to most of us. Very few think of radio in terms of transceivers, transmitters, receivers, towers, frequencies, and so on. Packet networks haven't settled into a set of schemata that we can all get our minds around. Packet networks are as flexible as the alphabet. What the main course will be on one of these networks is a socio-political question.

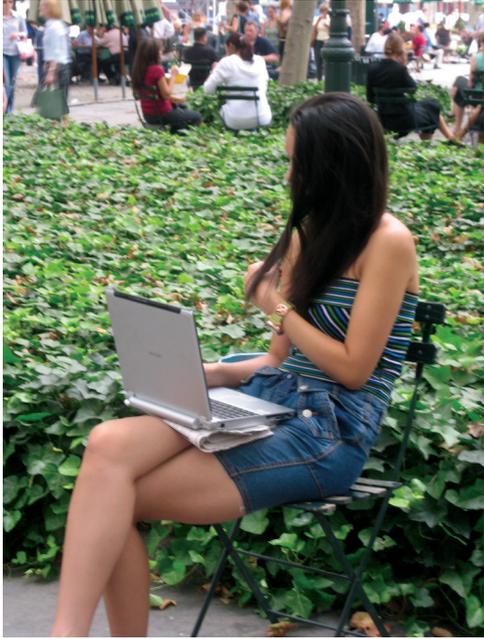
There is a slow, participatory evolution among those developers who have come together under the banner of community wireless networks to create the right implements to facilitate deeper community interaction using the networks they design. Île Sans Fil (see: <http://www.ilesansfil.org/>) was highly motivated to create a new platform for local artists in Montreal. To make that possible, they had to develop several layers of software, be willing to maintain a citywide network, and they have to go door-to-door to get local businesses to join the network, which in turn creates a venue for local artists that the public can then see. You then have to recruit artists to use the network as a venue. Like all the CWNs, Île Sans Fil is an all-volunteer group. They've got new

members coming, and old members leaving all the time. That's the nature of all-volunteer organizations. At any particular juncture, you may or may not have volunteers who are interested in tweaking the software, running the network, recruiting venues, working with artists, and so on.

The CuWin network that has evolved into a non-profit that does substantive technology around open source hardware and software for wireless networks has its origins in a community media project in Champaign-Urbana. The UC-IMC (Urbana-Champaign Independent Media Center) was looking for another venue to share media with their neighbors. Seattle Wireless, one of the first CWNs that got to be known also had overlap in volunteers with local community media groups. That's probably why they did such a good job documenting how their network worked. This encouraged a lot of other groups to try to build CWNs that were similar to the one in Seattle.

Of course, a lot of the people who tried to build a CWN like Seattle's got frustrated, because when you are building a network in a participatory way, using the resources you have on the ground, and motivated by the interests of the people who happen to show up, it isn't possible to take what's been canned for one community and serve it up in your own. Austin Wireless has created a network in locally owned coffee shops so that customers in those shops can hear the music of South by Southwest performers. That, in turn, patches some holes in the space that blankets Austin while the festival is happening.

A lot of people would ask, why bother creating a technology that is so localized when all that music could be shared with a world wide audience on the World Wide Web? Most people involved in CWNs are doers more than talkers, so I haven't had explicit discussions with many of them about this, but I surmise that the underlying axiom that motivates these projects is the belief in "Small is beautiful." I find it among the most active municipal networking proponents too. CWNs are just one flavor among a whole spectrum of motions that are venturing to create meaningful cultural, civic, and economic development in the context of place. And it has been difficult to do because free trade and neo-liberalism demand that all of the unique aspects of place be ironed out or ignored. Who wants to live in a place where economics, civic life, and culture are all disembodied? It's bad for the planet and bad for the psyche.



Bryant Park, New York, August 2006

In spite of the haphazard way that CWNS lurch along, they can play a role that no other constellation in ICT can. Post-Katrina, dozens of volunteers involved in CWNS across North America dropped what they were doing, organized equipment donations, and jumped in their cars and headed for the Gulf Coast. These are guys who are used to making funky old equipment work and improvising with what's on hand. Which was good because much of the communications system in the Gulf coast was completely destroyed. They were able to set up voice over Internet protocol (VOIP) phones and Internet connectivity in shelters so that people could find their loved ones and apply for government aid. This virtual community of geeks—which included volunteers from every active CWN including NYC wireless—was able to play a unique and helpful role in a situation of tremendous need. There has been talk of developing a more formal volunteer corps for putting up networks in disaster situations as already exists around HAM radio. CWNS are the perfect incubator for such efforts.

LF It is important to distinguish between the community of wireless networks—embodied in online chats, listservs, conferences and monthly meetings—and the communities that these networks aim to serve. Most CWNS believe that they are providing a valuable service to other people in their apartments buildings, offices, neighborhoods, towns, and cities, as well as, the larger networks they may be linked to, rhetorically or actually. As such, their actions are situated in their local, geographic communities.

However, the extent that this is true in practice is debatable. There are still a number of political, economic, technological, and other barriers to getting the general public to participate by using these networks or becoming actively involved. These include, for example, technology literacy and the availability of computer hardware such as laptops, as well as the common (and incorrect) perception that using someone's wireless network is akin to theft.

As for those who are served by the networks, we might call them a community of users but it is unclear whether they share anything other than their geographic location. Perhaps with further development of interfaces that might allow this community of users to interact with CWNS as well as with each other, we might be able to tease out some of the issues that bond these people together as well as those that divide them.

DD The terminology that we have to describe how people design and implement infrastructure doesn't really accommodate some of the ways that it actually happens at the micro level. If everyone in my hamlet gets together to build a barn for a neighbor, we don't need to start a non-profit NGO to do so. When you look at smaller projects, there is more informality, more flow. I'm working on a community radio project right now that the Mayor of Catskill is very excited about. We'll probably be working with him on some aspects of the project. That doesn't make it a municipal project. But some projects that are labeled municipal have little more than intangible involvement by the municipalities. People will claim or disclaim ownership over a project as a way to distance themselves from risk or move themselves closer to it.

Some use the term "community wireless networks" interchangeably with municipal networks. Sometimes, even I do that. Some use the term CWNS to indicate that it is a project which is driven by non-governmental actors. Some use the terms to indicate that a particular project has a degree of accountability to those it hopes to serve.

The term Municipal Networks is also not as straightforward as it may at first seem. When a municipality simply negotiates a good service agreement with a private operator, should we call that a "municipal network?" Some do. Others might restrict a municipal network to strictly those portions of a network that are owned by a municipality. Others refer only to network based applications that a municipality uses.

I haven't made my mind up about how important the distinction is between CWNS and municipal networks. Information and communication technologies are just a leg up. They play an assistive role in the larger goals that a group of people want to accomplish. The question is, whose goals is this network tweaked to assist? How do you create accountability to the intended beneficiaries of the network? It's easier to answer that question for the individual consumer than for aggregates of people who happen to live in proximity to each other. Communication can be the layer that turns mere proximity into community, but that isn't a given. What you call the network is less important to me than what it does.

LF You've recently surveyed academic researchers, policy analysts, and network practitioners across North America about the kinds of data that exist about CWNS for a Social Science Research Council (SSRC) grant. What have you learned from this project?

DD I am an activist studying participatory action researchers who study activists. I spent a lot of time talking to people who play different roles in these projects. I see some themes. We are a community that embraces an iterative participatory design model, some of us more intentionally than others. Some of us, like myself, have only realized on reflection and in hindsight that that's what we are doing. Another distinguishing characteristic of those who gravitate to this work is that we are all technical enthusiasts on a personal level, but we tend to be circumspect about the role that Information and Communication Technology can play in building and sustaining local civic, cultural, and economic development. We aren't the crowd who is going to tell you that ICT will make you multi-orgasmic and solve all social woes. But we are the people who get up every day and try to make that happen. We all tend to be highly critical of information communication technology (ICT), as we know it, but also of our own projects. We're also very action oriented. We critique, design, implement, critique. . . and so on.

I'd like us to talk more about the role of place in the development and use of CWNS. More so than with wired networks, networks that rely on wireless are going to be very context specific. Radio signals very much interact with the environment. Throwing the word community in front of "wireless network" implies that each network is going to be idiosyncratic. There is no right way or wrong way to build a network. Who do you want to communicate with? What do you want communicated? And where are they in relation to you? That determines the technology that you choose. What works on a desert plateau won't necessarily work in the hilly, tree-covered Catskills.

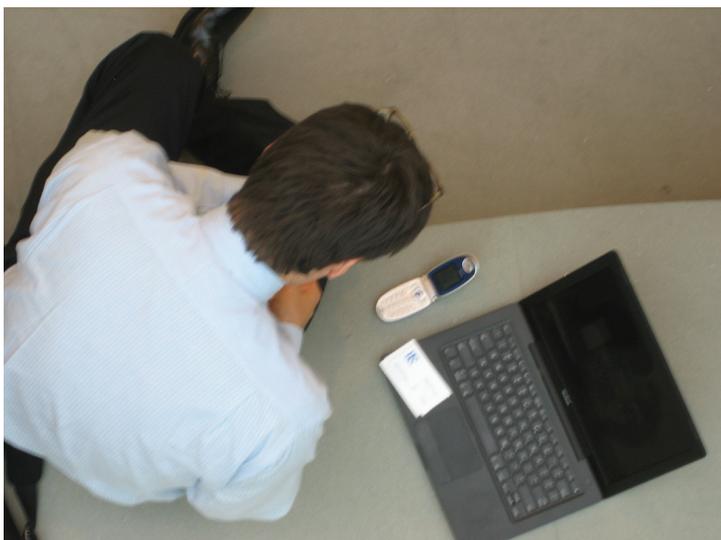
We can make some categorical generalizations about the *kinds* of technologies and the *kinds* of networks people create. People are playing with these technologies in many different contexts. Your idea of "code-scapes," the integration of the digital with the physical, and the fact that people interact differently with a network depending on where it is located, are first-order questions. Those who are looking to expand broadband into areas where broadband doesn't exist are looking to

build a primary network that is going to solve their first order communication needs. This is still a problem to be solved in remote areas. On the other extreme, in places like Montreal, Austin, and New York City, community wireless networking groups don't need to focus on that first layer of connectivity. They are working more on applications that are site specific and community specific. For example the Little Tokyo Service Center in Los Angeles runs a community network where kids create a lot of traffic *within* the network playing games together. They've put kiosks throughout Little Tokyo that allow people to directly access the community network to get local news and information." In networking parlance, those type of projects are innovations at the application layer.

Can you talk about the role of place and situated advocacy in relation to CWNS?

LF CWNS are situated in their local communities. In this sense, "community" might be defined as one's apartment building, one's neighborhood or one's city. This is because WiFi networks demarcate relatively small, bounded geographic areas—ranging from 300 to 1000 feet. Yet, the digital networks do not map directly onto physical architectures and spaces as I mentioned earlier. So, in this way, WiFi networks reconfigure the spaces, that might be considered part of the community.

For example, for the past several years, I've been sharing my network—My Little WiFi—with my neighbors. I took a standard router that you can buy anywhere and changed the software that runs it. People can join my network by becoming members of it through a web browser. They see on their web browser that they are joining a NYCwireless node. At one point, I had over 35 people who had created NYCwireless login names and passwords so that they could use the network. While I didn't know exactly who the people were or where precisely they lived, I knew that they were in my immediate geographic area. They could be next door, downstairs, or even across the courtyard. I developed a familiarity with their names (or, more accurately, their login names) and knew when we were likely to be online at the same time. Usually, there were five to ten people logged in at any given time. Sometimes if I was online late at night, I would think to myself, "There's tjones (a pseudonymous login name) again. . . I wonder what she is doing up so late." Anyway, this is just to illustrate the ways in which I felt a sense of community and connection—even if it was



Using WiFi at the Apple Store in New York, July 2007

a relatively lightweight sense of community—with those whom I shared the network.

Another way in which I was able to gain a sense of the community's use of the network was when I was not online but saw the lights on my router flickering away, which signaled that the network was being used. I learned to interpret the speed of the flickers in order to get a sense of what kind of communications were flowing over the network, i.e. very slow is probably e-mail and very fast is probably audio, video or large files being transmitted. It was great to have some kind of visual feedback that indicated that the network was being used.

DD It's interesting to me that you consider yourself an ethnographer, but you are sophisticated in your use of wireless technologies to inform your understanding of the socialities of these networks. Yet you don't identify yourself as a technologist. What kinds of emergent content, services, and applications are being designed for CWNS that will make it easier for people to gain a sense of community from these networks other than learning to interpret the flicker patterns on their router?

LF Many CWNS have been working on making it easy for people logged onto the same wireless network to communicate with one another easily. For example, Île Sans Fil⁹ integrates a discussion board, events listings, and chat onto their "splash" page for independent cafes throughout Montreal. Similarly, Austin Wireless is at the forefront of social networking applications for wireless networks. Their login page enables WiFi users at cafes throughout Austin to chat with one another. The development and further integration of communication applications such as these have the potential to greatly enhance the value of CWNS.

For the past fifteen years, discussions about the Internet have primarily been dominated by notions of virtual, networked communities. More recently, there has been a shift back towards material, face-to-face communities with new developments in mapping, social networking and blogging. Steven Johnson's *outside.in*¹⁰, a blog that aggregates local content, is a good example of this trend.

People who are active in CWNS comprise a deeply networked virtual community amongst themselves. As part of a relatively small number

of experts interested in wireless networking that are based in New York, NYC wireless is often the first to hear about and test new hardware, software, and applications. Over the years, our monthly meeting has been a forum for presenting new business ideas.

One summer, in 2006, I was in Berlin for a few days between conferences meeting with Freifunk¹¹, a community wireless organization that was founded by Juergen Neumann, a technologist and entrepreneur. Neumann moved to Friedrichshain (a neighborhood in the eastern part of Berlin) in 2002 and found that there was no broadband access. He learned that he could share an Internet connection wirelessly from a building nearby. Since then, Freifunk has grown into an international organization with affiliated groups in many cities throughout Germany, Switzerland, and Austria.

During my visit, we decided to test solar power panels on Juergen's rooftop. We coordinated a videoconference with Dana Spiegel, the Executive Director of NYC wireless, so that he could join in the testing. We are always out there at the forefront experimenting with new technologies.

DD There is a very strong affinity among individuals involved in these projects across the globe that fuels these collaborations. Do you see CWNs as a movement?

LF I'm not sure whether or not it is accurate to call community wireless a global social movement. I think that it is too early to claim that it is. Milton Mueller¹² (Mueller, Page & Kuerbis, 2004) has done a lot of research on the emergence of social movements in communications policy, and he found that only open source software can be accurately classified as a social movement. At the same time, each year, excitement around CWNs grows and touches a wider audience. For example, in 2005, at the World Summit for Free Information Infrastructure in London, there was a conscious effort to bring in activists from open mapping and alternative media groups. And, as I mentioned earlier, this year, the International Summit for Community Wireless Networking in Washington, DC attracted a strong human rights contingent. To me, these are signs that we have the beginnings of a social movement, but we're not quite there yet.

DD There are a number of questions I'm holding in my mind. First, what role can technology play in social movements? Can technology-centric projects form the basis for a social movement? I do think that many people had the same or similar ideas in response to the current generation of wireless technologies. And many of them have gone out of their way to find each other and work together. I have a sense that we are part of a movement, but I can't get a handle on what that movement is. Something in me bristles at defining a movement around technology, even if technology is seen as a key means of creating the motion. I have more faith in people than I do in machines. I think there are latent values that we share but haven't expressed verbally. Maybe we are part of the "Small is Beautiful Movement" or the "All Networks are Local Movement" or the "Brighten the Corner Where You Are Movement."

And where is our movement going? I think a big motivator is restoring a balance of power between people at the local level. Helping locally owned businesses to be viable, creating channels for local artists and musicians, facilitating forums for civic information that is meaningful and participatory. I think these are the things that we need to amplify in the larger context of big box stores, vertically integrated media and communication giants, and people's sense that decision making power

about local resources has moved out of their hands and into the hands of the national policy makers. I think we're a movement against gigantism.

I haven't had conversations about bigger values or bigger social goals with very many of the people I know who are involved in CWNS, so I am surmising about the big picture movement issues. We have more doers than talkers, which is unusual in many of the arenas that people call movements. However, I think the values are strong motivators for those involved in these projects that also keeps us working across projects.

In practical terms, CWNS have a lot of cross pollination not just nationally but internationally. They collaborate on the technology, share networking practices and applications. We have a yearly international summit. Even for technophiles, face-to-face is still important for building trust, planning projects together and so on.

DD You've visited a number of CWNS in person. How are CWNS similar or different depending on their location?

LF I've been fortunate to visit many CWNS around the world over the past four years since attending some of the earliest wireless networking summits in the United States and Europe in 2004. One of the most interesting things about CWNS is how they differ from community to community. While, for the most part, they agree on a core set of socioeconomic and political values (though there are many debates about these as well), their energies are focused differently depending on the individuals involved and the communities that they serve.

I first learned about mesh networking at the National Community Wireless Summit in Champaign-Urbana. A few months later, I was living in Berlin witnessing the excitement at the epicenter of one of the world's largest mesh networks. In short, a mesh network allows every node to connect to each other through the closest nodes. One of the advantages of this network configuration is that every node can communicate with every other node regardless of whether or not it is connected to the Internet. This means that one person could communicate with the other by e-mail, instant messaging, voice over IP (VoIP) or any Internet communication protocol without paying for access to the Internet itself. One Laptop Per Child (OLPC) already incorporates

mesh-networking technologies. And, if one node is connected to the Internet, it can support a hundred additional nodes.

In Freifunk's network, an actual person supports each node. In order to participate, it is necessary to download the open source mesh networking software onto their computer. This lends true meaning to the notion of a people-powered, bottom-up Internet. This is perhaps best described by FunkFeuer, the Austrian community wireless network's slogan, "Statt ich will ins netz—wir sind das netz," which means "Don't log into the net—be the net!"

What strikes me most is the ways in which CWNs respond to their unique cultural, environmental, and social needs. Specifically, while NYC wireless builds networks primarily in parks and public spaces in New York (this is most certainly what we are best known for, since deploying outdoor hotspots introduces a new set of challenges, including how to get a broadband connection in a city park), Île Sans Fil focuses on independent coffee shops throughout Montreal, and Freifunk connects apartment buildings in Berlin (as well as across Germany, Austria, and Switzerland).

DD It strikes me that even the community wireless groups that are focused most heavily on the deep technology of making the networks work—like Funkfeuer—see their projects as a service to their communities. All of them, by definition, are working with groups or individuals within their communities. Each project grows out of the constraints and opportunities presented by existing communications infrastructure. Why would we expect them to be the same?

I think the people who gravitate to this work are very interested in creating a sense of community within a specific place. "Localism" is a word that reverberates through all communications policy in the US. It's seen as a public good. People who work on local networks are hyper-local. They aren't just interested in making sure that every place in the US has broadband. They want to make sure that that broadband has civic, cultural, and economic benefits within a specific area of the universe. They want to make sure that the locally owned coffee shop can compete with Starbucks. They are trying to find a way to use code-space to create venues for local music. For example, musics from a live local band in one venue can be shared with another neighborhood venue that doesn't have live music. The Metropolitan Opera is doing

it, but how can we do it for the musicians around the corner from our house? I see lurking somewhere under this affinity for trying to make ICT useful for communications networks *within* a community, an ideology which isn't fully expressed in our discourse. Working backwards though, I think it shows a concern over how resources are appropriately used in an area.

The fight for localism is about preserving the peculiar particularities of place. Letting Cajun music play on the air in Cajun Country—as happens only on community radio. Having TV shows about Pennsylvania Dutch culture in PA Dutch country—as happens only on public access television. And perhaps letting kids run riot in the streets playing games that use wireless networks.

In the US, the Federal Communications Commission (FCC) is responsible for regulating the communications industry. The FCC was created by the same act of Congress that created the monopoly Ma Bell and the monopoly use of radio to sell audience to advertisers. We have 70 years of layer after layer of regulation that favors monopoly control of communications technology. This implies that you are going to iron out the differences between “market areas” by normalizing them. Media Reform, Media Justice, IndyMedia, Indy Music, Indy Films, Alternative Media and so on are all reactions against the processes that the consolidation of media and communications have created. Those of us focusing our work on enabling locally influenced communication projects are celebrating the aberrations of a particular place. Those very things that need to be ironed out in order to find the lowest common denominator in a Designated Market Area.

LF You've brought up the role of the FCC. What kinds of public policies would support the work of CWNS?

DD Innovation implies risk. But infrastructure development is a very risk averse business. No one wants to build the bridge to nowhere. I think that these micro projects are the best incubators for innovation. I'm especially fond of the ones that are by and for people within a particular community. Somehow we need to hold the space for emergence. Let's give communities a chance to try new technologies, new socialities, and new business models for communication. We have to make it safe for things to evolve and transform.



Testing solar panels on the rooftop with Freifunk in Friedrichshain, Berlin, July 2006

I hope that we can learn from the lessons of the past. Incumbents in any sector are likely to see the opportunities coming before anyone else does. Just as the computer revolution was beginning to allow more intensive use of the airwaves in the early 1980s, incumbent broadcasters successfully lobbied the FCC to stop issuing licenses to low watt stations. Those of us who have been fighting for more intensive use by the public of the public airwaves have rejoiced in the innovations of community wireless because it points to what's possible. Just as you can re-envision local utilities as individuals creating and sharing clean energy, it's easy to imagine networks that are community driven which compete with or complement incumbent communication service providers.

DD What kinds of alternative futures might be imagined if CWNs were able to flourish?

LF CWNs hint at an alternative future where communications infrastructure is a lightweight, collaborative and shared, bottom-up, hyper-local resource rather than a heavy, proprietary, top-down structure that requires millions of dollars to build and maintain. In this model, the role of government is to encourage the formation of collaborations among businesses, non-profits, and community groups, as well as individuals. Government can also play a role by removing barriers to collaboration and innovation among the various stakeholders. The majority of government policies in the area of telecom and technology support large private-sector players—namely, the telecom and cable companies—with very little consideration of the ways in which individual citizens actually use these networks or their social needs. We need to rethink these policies in light of emergent technologies and forms of organizing.

Government is just one of the stakeholders who shape these networks. CWNs are particularly interesting for design practitioners, including architects and urban planners. Many such designers are lead users of WiFi technology; they are at the forefront in re-conceptualizing the ways in which digital networks interact with physical space. We are already witnessing the ways in which technologies of mobility are allowing for different uses of space. For example, the ways we use cell phones and laptop computers have eroded the concept of an office as a fixed physical space where communications infrastructure is located.

WiFi networks further erode the idea of what an office is. For some people, the office is Starbucks. Designers are already experimenting with hybrid spaces, those that blur private and public, work and play.

LF Do you see a community based communications infrastructure playing a role in bolstering the democracy?

DD I've come to the conclusion that the Founding Fathers were a bunch of geniuses. They had this idea about creating checks and balances. They understood that communication had to flow to and from every community. Right after they passed the Bill of Rights, they created the Postal Service. They subsidized the state of the art communications network of its day, the Postal Service, to implement their enlightenment vision for communications. They were explicit about the need for communication to flow unfettered among all parts of the country in order for democracy and commerce to flourish. Paul Starr¹³ has done some great work documenting this. Through the entire telecommunications age we've been moving away from the Founding Fathers, blueprint for implementing enlightenment ideals.

Local communications infrastructure is one way to resolve the problem of the terrible imbalance of power that is created by the market hegemony of a handful of incumbent communication providers. It's much easier to turn around a dingy than to turn around a Titanic. CWNS are dramatically more accountable to the communities they serve than traditional incumbent providers are. Imagine having the home phone number of someone at your cell company who you could call when your cell phone wasn't working the way you expected it to. This happens when CWNS don't work as people expect them too. So there is high accountability in these little pockets, but the pockets are very tiny right now. I hope that CWNS will help to change people's expectations of what is possible. This will demonstrate that there is more than one right way to deploy a network.

A lot of policy makers and policy experts are still talking about the digital divide in terms of "stimulating demand" among individual "consumers." This is an oxymoron. How can an individual "communicate"? Communication technologies don't magically transform our biological need and desire to be connected to each other. There are all of these communication gaps that exist, a sense of connection to the place and



International Summit for Community Wireless Networks, Washington, DC, May 2008

the people around us that we all crave. Communities don't just happen. In my mind the digital divide is more about *how* to use ICT to build and sustain a sense of connectedness and interdependence among the aggregates of people who just happen to be in proximity with each other.

LF Do you have any thoughts on how we can get more people involved in building cwns?

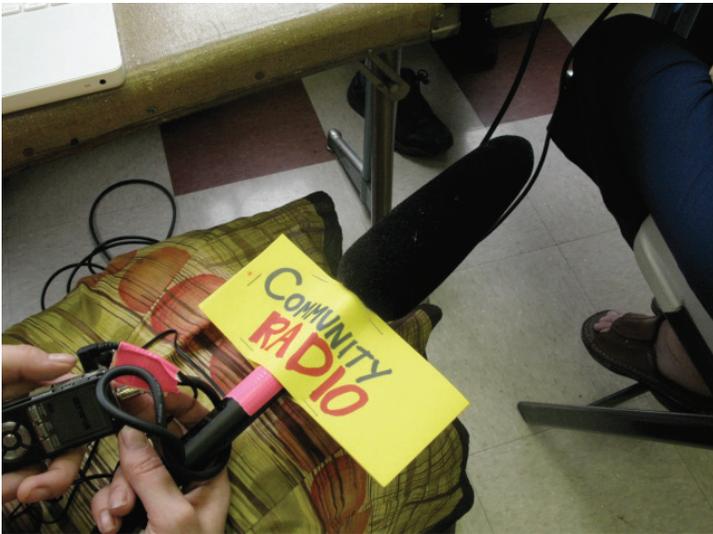
DD Recently I think people have been scared off from sharing connections with their neighbor by vague fears of roaming cyber attackers who will steal your identity like a pod people invasion. Recently, I was at the local community center. They have a wireless connection that is password protected. Guess what? No one, not the staff, not the board, not anyone that comes in can use it, because no one knows what the password is. It's pretty typical of the "hard security" methodology. People don't understand what the threat is or how to protect themselves, so they just walk away from the whole thing. All of this plays into the hands of the incumbent business models, which discourage people from pooling resources. Pooling resources alone can be a foundation for creating a sense of interdependence and mutual aid, which in turn is what I think most people mean when they say community.

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Probably the best model for building out community-based infrastructures involves technologists partnering with existing groups such as housing co-ops, parks, public venues, and small business owners, and local artists. Though sometimes the technologists do the outreach. That's okay. But if you have the opportunity to partner with known and trusted groups in an area, things usually go a lot better and a lot faster.

In closing, I'd like to paraphrase Funkfeuer's mantra that rather than logging onto the Internet, we need to educate communities that they can, in fact, be the Internet. This is the best way I know to illustrate the notion of situated advocacy when it comes to communications rights.



Dharma Dailey building community radio projects

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