

Alyx Baldwin



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Overview

Wireless mesh networks provide low-cost, shared Internet access to communities. Socially engaged users on these interconnected devices are also more resilient against threats that cripple centralized communication infrastructures, like censorship and natural disaster. However, for long term use, community networks need ritualized, face to face interaction between residents, and localized incentives.

Working with the Red Hook Initiative and OTI at New America Foundation, TidePools is tailoring custom social software. This project is based on local needs and interests of the Red Hook Housing Projects – a community located in a remote area of Brooklyn, with little public WiFi and a portion of Internet access through Android phones and public computer stations.¹

Visually inspired by local artwork, this “Ushahidi” meets “The Sims” hyper-local mapping web app is delivered to mobile and desktop devices through meshed WiFi routers. In this way, TidePools augment communication and civic awareness from the ground up, through modular, user-generated population of maps.

TidePools evolved over months of community meetings, brainstorming sessions and feedback through a message forum on the WiFi network. Creating and sharing custom maps emerged from the desire to plot Alerts of where police “stop and frisks” were occurring. Broken building signs led to integration of Open311 civic issue tracking. Bus arrival alerts came from the sparse, inconsistent public transportation in the area. Spreading awareness of locations and times of Upcoming Meetings & Events soon followed.

For sustained networks, API aggregation onto a global map and a community app marketplace would stimulate a pan-regional, ecosystem of sharing. In order to counteract the instability of wireless grassroots networks past the community level, metropolitan and policy involvement are necessary.

¹ Anthony Schloss, interview by author, digital recording, Outpost Cafe, Brooklyn, New York, October 25, 2011.



Impetus

I dove into the world of mesh following the Arab Spring, in response to the communication shutdowns in Egypt¹. Other threats of Internet censorship and outages, such as SOPA, ACTA, “Internet Kill Switches,” as well as natural disasters, further fueled my focus. I wasn’t the only one motivated by this dystopian vision of what the Internet could become. Although many distributed networks existed before the Arab Spring, an overwhelming number of efforts, such as Commotion Wireless, The Free Network Foundation, Mondonet (Rutgers University), Project Meshnet (Reddit), Project Byzantium, and The Berkman Center at Harvard Mesh Workshop, developed in the aftermath.

Mesh is messy and hectic. Mesh networks are structured horizontally, allowing all devices to talk to each other without a centralized infrastructure (like a cellphone tower). Mesh is political. “It’s emotional...,” as Becky Kazansky once said. Pockets of mesh building efforts are scattered around the world, fueled by a variety of academic, hacker-activist, economic and sociological motives. Few efforts overlap, as language, politics and technical barriers obstruct collaboration. When they do merge, the people involved tend to know each other through mutual friendships and related organizations.

MeshKit Prototype

The images on the left are from a mobile mesh game and build-your-own WiFi hardware instructional I developed first year of the master’s program, after the Internet outages in Egypt. It used peer to peer sharing and social capital (coins and gems) to theoretically drive network building. Raph Koster’s deconstruction of social gaming mechanics² in Farmville-style games (how to addict players to a game), as well as “Community Building Over Wireless Mesh Networks,” on the social layer of mesh³ influenced this direction.

In the summer, I presented initial research at Forskningsavdelningen hackerspace in Malmö, Sweden, during a Hacknight event. Afterwards, I attended Chaos Communication Camp (CCC) outside Berlin, Germany, at an old army base nestled deep in a rainy forest. A lot of people I would work with later in my research were unknowingly in attendance as well, at

¹ Dean Takahashi, “Egypt’s internet shutdown sparks a communications battle,” Venture Beat, January 28, 2011, accessed April 16, 2012, <http://venturebeat.com/2011/01/28/egypts-internet-shutdown-sparks-a-communications-battle/>.

² Raph Koster, “Social Mechanics, The Engines Behind Everything Multiplayer” (slides presented at the Game Developers Conference, San Francisco, California, February 28-March 4, 2011).

³ Panayotis Antoniadis et al, “Community Building over Neighborhood Wireless Mesh Networks,” (Draft accepted for publication at IEEE Technology and Society, Special Issue on Potentials and Limits of Cooperation in Wireless Communications, March 2008).



this week long camping-oriented convention – an European Burning Man. A spectrum of hackers, activists and scholars attend this hectic festival every four years. There's a constant feed of hacking teach-ins, presentations, flying quadcopters and music swirling through the grounds.

I came to the camp to learn more about the technical work already covered in wireless network community efforts, specifically those of FunkFeuer and Freifunk (Austrian and German networks, respectively). I befriended a group of hackers that ran the Milliways (*The Restaurant at the End of the Universe*) village, where I camped out in a discount sporting tent and helped to cook huge meals for hundreds of others from around CCC – a Milliways tradition. The campsite, seated near an abandoned airplane, was equipped with a kitchen tent, a brick pizza oven, a huge, yellow geodesic dome, and several hacking tents emitting a constant hum from the huge power supplies and LAN switches. Another tent housed an endless supply of German beer kegs. One night, the Italian Cyber Police Chief and his extended family drove a car full of ingredients from Italy to cook for us a divine pasta dish loaded with pancetta. It is still unclear what the ulterior motive of this offering was, but it tasted fantastic.

Jeetu Golani and Erle Pereira, developing the mesh application “eBrainPool,” are fantastic cooks of Keema Masala and other Indian dishes. They suggested I locate Corinna “Elektra” Aichele, who had worked with the popular OLSR mesh protocol in the past, and currently with Village Telco – bringing low-cost, community based meshed telephone networks to developing countries.¹

Meeting with Elektra was an enlightening and sobering experience to the gritty realities of working on mesh networks. We laid down on a sunny patch of grass near Milliways, and discussed the social and technical problems related to mesh communities:

Mesh networks will never replace the Internet (the Internet is inherently a mesh until the “last mile”), HD pornographic videos consistently bog down community networks, it’s grueling work to update routers with new firmware in people’s homes, bandwidth speed cuts in half with every mesh hop, networks need backbones, etc.

My assumptions and blind optimism around mesh were ripped out of me, and I was set on a new course – social and community development in this very technical space.

¹ Village Telco, accessed October 14, 2011, <http://villagetelco.org/about/>.



A summer storm rolled in and we crouched under the geodesic dome, where she wrote down a list of all the trendy, inexpensive routers and antennas I should be using in my work – TP-Link and Ubiquiti brands, which it turns out, everyone, from Free Network Foundation to Commotion Wireless, uses today.

I tagged along with some young hackers (including x.muc.ccc.de) from the Freifunk network in Frankfurt to setup a Ubiquiti powered mesh network (using the B.A.T.M.A.N. Advance protocol). We wore bright yellow emergency jackets and climbed up a slippery, grass slope, blanketed over an old aircraft hanger. They taught me the essentials of setting up a mesh, or “illuminating the field,” by plugging in and angling directional antennas towards other antennas. I learned a lot at CCC, and was prepared to take on the social layer of mesh networking, from a community perspective, in the next semester.

This survey is for research on the social layer in community wireless networks. Please send to all others involved in community networks.

What is the name of your community network? Where is it located?

How many people are part of the community network?

- Less than 20 people
 Less than 100 people
 Less than 250 people
 Less than 500 people
 Less than 1000 people
 Less than 2000 people
 More than 2000 people
 Don't Know

How do you contribute to the network, what is your role?

How do you feel about your community network?

- Proud
 Disappointed
 Hopeful
 Hopeless
 Indifferent

Has the community network developed or strengthened relationships you have with other members? In what ways?

- Yes
 No
 Weakened the relationships
 Don't Know

Translator



Oh...

Hey, this is my Research/production blog for MFA thesis in Design + Technology dept. at Parsons, on the social layers of wireless mesh communities.

[thesis summary](#) →

Thanks for hanging out! ♥

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Where are the networks?

Why aren't more wireless mesh network communities prevalent in the world? What social and technical factors lead to successful community and municipal networks? These questions led me to find that mesh networks pop up most often and live the longest in harsh topographical, socio-economic and/or political conditions.

The Athens Wireless Network, is one of the largest community networks in the world, with over 3,000 members. It was built by techies in 2002, when Athens didn't have high speed Internet access. The geographical scattering of the Greek Islands made mesh topology an ideal solution. ¹

The Freifunk network in Berlin, Germany, was very prevalent, until the socio-economic situation improved and some people moved away from this community-owned option. The "network wasn't offering additional content or services or something of value that would keep [one] there,"² Laura Forlano, an expert on social community networks, said in an interview.

Tibetan exiles, living in steep villages up in the Himalayan Mountains, teamed with members of the Cult of the Dead Cow hacking group. Together, they built an ad hoc mesh network between villages to connect residents together and to the rest of the Internet.³

To gain a better understanding of the social environment inside these pockets of wireless community networks, a qualitative, survey was developed. There were questions on reciprocity between members, individual roles in the network, dealing with malicious users, how often the mesh building team met in real life, and personal optimism about the mesh network itself. The survey auto-translated into a variety of languages, and I sent out survey requests to many community wireless mailing lists – the primary form of communication for a majority of these networks.

Based off survey results and interviews with social and technical mesh experts, Laura Forlano, Alison Powell, Panayotis Antoniadis, and Rui Aguiar, a primary social need for

¹ Laura Forlano et al., "From the Digital Divide to Digital Excellence: Global best practices to aid development of municipal and community wireless networks in the United States" (New America Foundation, 2011), 41-42.

² Laura Forlano, interview by author, digital recording, Joe The Art of Coffee, New York City, October 03, 2011.

³ Xenji Jardin, "Wireless Binds Tibetan Exiles," Wired, August, 17, 2006, accessed May 4, 2011, <http://www.wired.com/science/discoveries/news/2006/08/71608>.



networks to thrive are weekly or monthly community meetings that lead to face to face interactions between mesh builders and community organizers. From this need, goals emerge to augment this interaction:

Social Software Goals:

- Civic and community engagement, by addressing local needs, interests and culture.
- Foster Trust, Interdependence, and Reciprocity from within communities.¹
- Merge digital and physical community spaces.
- Ensure people know about mesh / have software installed before a communication outage.

¹ Panayotis Antoniadis et al, "Community Building over Neighborhood Wireless Mesh Networks," (Draft accepted for publication at IEEE Technology and Society, Special Issue on Potentials and Limits of Cooperation in Wireless Communications, March 2008).

Social Software

Bookshelves & Refrigerators

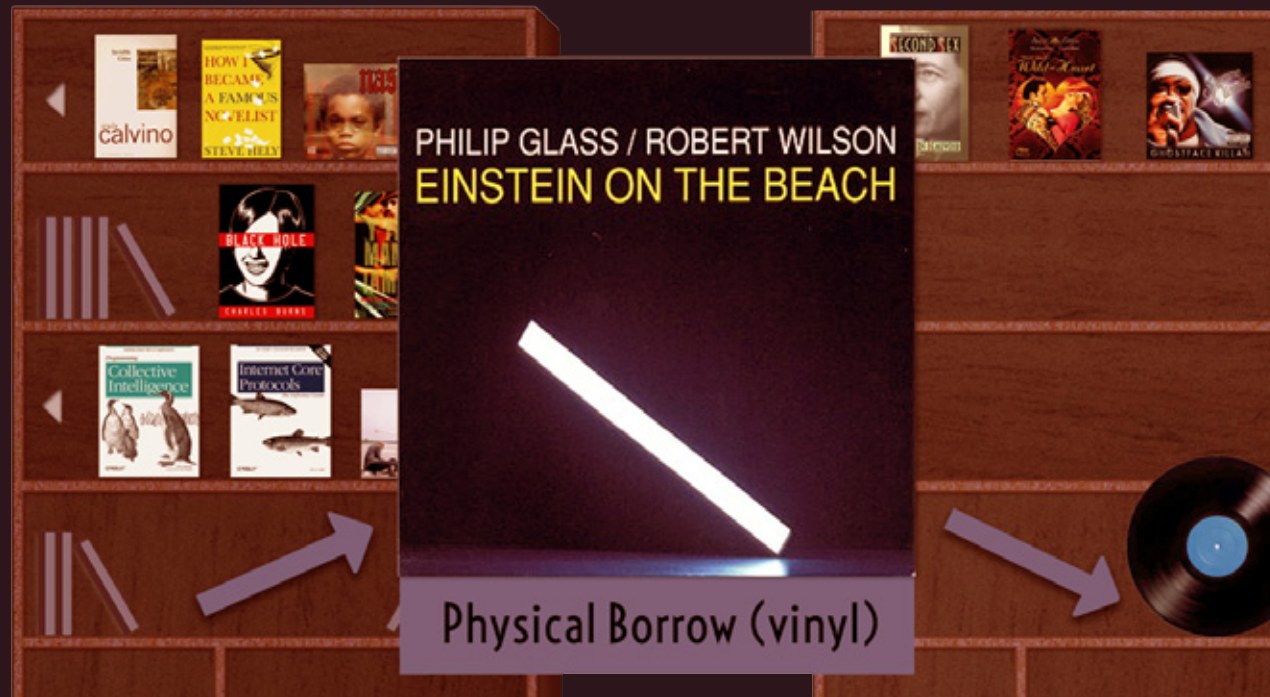
“Can wireless technology, peer-to-peer systems and social software help to build sustainable and convivial neighborhood communities?” Nethood, a collaboration by social scientists, urban planners, and computer scientists, asks this question in one of their research papers, “Places on the Net.”¹

Nethood’s overarching theme is the concept of hybrid space – a merger of digital and physical space in a community setting. Intrigued by this concept, I prototyped interfaces that blended analog and digital.²

Digital and physical media merged together, such as hardcover books and e-books, and LP records and MP3s, into personal, networked media-shelves. A user can show off their media shelf of “stuff” to friends, like having a bookshelf in the living room showing off your favorite titles. This is important for underlying communication between users.³ When guests visit and glance at your shelf, conversations about similar interests in the author, director, genre, etc. arise.

A neighbor could walk to your home and borrow a physical LP record. Or, they could download the digital MP3s from you over the community network. Borrowing physical items increases face to face interactions between neighbors – a necessary step to build trust in community networks. Borrowing digital items further incentivizes the need for a reliable and fast community network to exist.

Another prototype, a hybrid fridge, merged all physical fridges in a community, into one digital fridge. Items in this fridge interface would include shared items, such as eggs or sugar, yesterday’s leftovers, or the latest produce from community gardens / food co-ops. “[S]ignaling to people their similarities, and their differences...”⁴ in tastes and cuisines, could build an underlying awareness of others in the community, Laura Forlano said, about the fridge.



1 Ileana Apostol, Panayotis Antoniadis, and Tridib Banerjee, “Places on the Net” (University Pierre and Marie Curie, University of Southern California, 2009), 1-2.

2 NetHood, accessed October 19, 2011, <http://nethood.eu/studio/index.php/>.

3 Amy Jo. Kim, “Putting the Fun in Functional: Applying Game Mechanics to Functional Software” (slides presented at a Google Tech Talk, Mountain View, California, January 30, 2009), <http://www.youtube.com/watch?v=ihUt-163gZl>.

4 Laura Forlano, interview by author.



Beaches & Tide pools

Tide pools are sheltered microcosms scattered along beaches. Tiny worlds grow in each one, with similarities between neighboring pools, but always something distinct. When the tide comes in due to our orbiting Moon, the pools mix, the soups gets redivided, some stuff stays, other things leave to the greater ocean. A cross-pollination occurs, cultures mix, gentrification, de-gentrification, a fish migrates from the very first pool to somewhere near the end of the chain. The Internet is an ocean. Communities are tide pools.

“What would be it to offer a technology that make space legible in radically different ways?” Dourish and Bell question in *Divining a Digital Future*, to “maintain an essential identity while adapting to local conditions.”¹ They propose a shift in mobile interfaces that move away from Cartesian grid coordinates (regular maps) to instead focus on the relationships and histories of people in relevance to each other, the spaces they inhabit, and move through.

Considering this fluidity, and Yochai Benkler’s emphasis on granularity of control at the user level², an initial interface concept for TidePools made it possible to add more landmarks to the community space that may not represent an exact area. This modularity would allow the “map” or another representation of the community to shift with the ebb and flow of culture at the community level. For example, in Red Hook, through geographic nicknames informally assigned to areas in the community, such as “Sly Town” and “Paradise.”

Additionally, Will Wright, the creator of Sim City and The Sims, emphasized the need for designers to “give players a large possibility space,” by creating open systems for maximum personal customization, which leads to a community of “player created content.”³ This notion was carried through to the “loose” landmark plotting interface in TidePools and new map crafting.

Along with adding landmarks to this less defined space, allowing users to put additional landmarks inside other landmarks allows residents to dive deeper into the buildings and landmarks around the community (e.g. User < Community Group < Recreation Center < Coffey Park < Red Hook < Brooklyn < New York City). It is also a means to scale data, as these fractal social network patterns are observed throughout “...hierarchical mammalian societies” – when one zooms in or out of a network, the ratio between nodes remains

1 Paul Dourish and Genevieve Bell, “Divining a Digital Future: Mess and Mythology in Ubiquitous Computing” (Cambridge, Massachusetts, MIT Press, 2011), 135.

2 Yochai Benkler, “Wealth of Networks” (New Haven and London, Yale University Press, 2006), 103-113.

3 Will Wright, “Lessons from Game Design” (discussion at SD Forum, Computer History Museum, Mountain View, California, November, 20, 2003), <http://www.youtube.com/watch?v=CdgQyq3hEPo>.



consistent.¹

Circles inside circles as a design pattern throughout the project conveys fractal social circles, and reflects upon the “soap bubble” eternal inflation of multiverse in theoretical physics. Wherein, an infinite number of universes, represented as individual soap bubbles, contain varying laws of physics and time, while constantly expanding and contracting in and out of a fractaled existence.²

Collaborative Mapping

Working with the Red Hook Initiative and the Open Technology Initiative at New America Foundation, TidePools is tailoring a custom mapping platform, based on local needs and interests, for the Red Hook Housing Projects – a remote and unconnected area of Brooklyn. At the same time, it is bringing low cost wireless mesh Internet access to residents.

TidePools is an “Ushahidi” (crisis mapping) meets “The Sims” crowd-sourced mapping platform for the expression of culture and community needs at the local level. Users can add various landmarks to the local map or create their own custom maps. A Twitter-like feed of announcements and discussions from active landmarks are aggregated into a personal community news stream.

When a resident connects to a “Red Hook Initiative WiFi” hotspot, they are automatically sent to the TidePools interactive maps of Red Hook first, (a captive portal, or community toll booth) before they can leave for the rest of the Internet.

Landmarks

While some buildings and landmarks are permanent, such as schools and the Red Hook Initiative, residents can add their own Events, Memories, Friends, Groups, Alerts, Fix This, Food, and Others. Others can follow and comment on these landmarks. The visual aspects of the mapping platform were inspired by local mural artwork, the iconic brick building architecture, and native flora.

¹ Russell A Hill, “Network scaling reveals consistent fractal pattern in hierarchical mammalian societies” (Durham, United Kingdom, The Royal Society, 2008), 1.

² Andrei Linde, “The Self-Reproducing Inflationary Universe” (Scientific American Presents, Scientific American, 1998), 98-100.



Design Narrative

While our plan could have been to build as many nodes as possible within Red Hook, from December 2011 to May 2012, I took a different approach than what has been done, often unsuccessfully, in the past. I wasn't as interested in whether a mesh network could be technically constructed – instead, I wanted to reverberate my past research and discussions with experts in the social aspects of community networks. It's not about the technology, the technology works and isn't going anywhere. Communities, on the other hand, fluctuate immensely over time. I wanted to capture the Red Hook community in flux, and build a platform from the ground up with the community members. An interface that would be modular and open enough to fluctuate as the community grows and changes. Only then would the platform be brought to a technical mesh network.

October 2, 2011

An analysis on networked community roles at Occupy Wall Street, I wrote during the first week of the occupation of Zuccotti Park, was published on the DC politico gossip blog Wonkette.com. I received an email from Joshua Breitbart at the Open Technology Initiative, New America Foundation (they are working in Detroit and Philadelphia on community mesh development with their Commotion wireless platform). He had found my thesis research through that article, and was particularly intrigued by the social layer of mesh community networks I was advocating. After a phone meeting, he put me in touch with Tony Schloss at the Red Hook Initiative, a community center for the Red Hook Housing Projects in Brooklyn. Tony was hoping to bring a community wireless network to the Red Hook community. It was a perfect fit, as I was looking for a community to work with on my thesis.

November 1, 2011

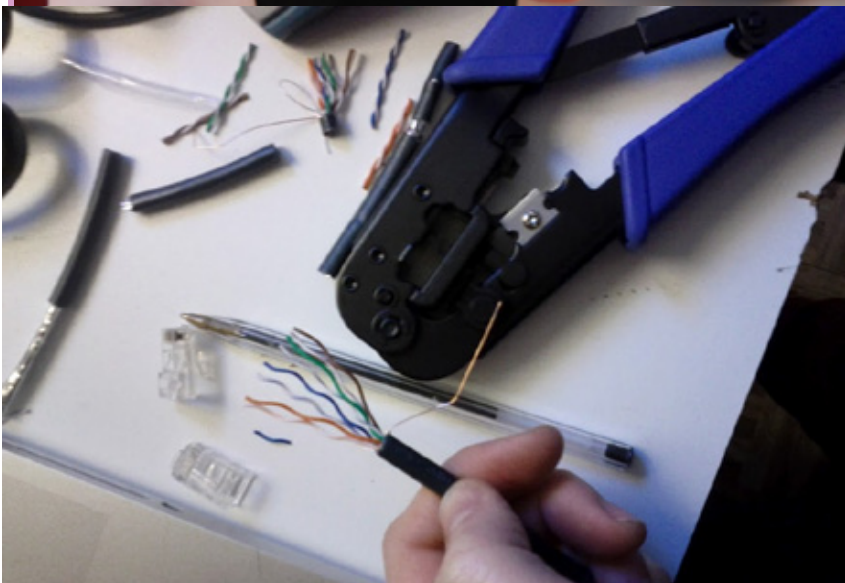
After an initial coffee meeting with Tony at Outpost Café (the best), wherein we mapped out rough plans on where to set up mesh nodes, I rode my bike the next week, from Clinton Hill/Bed Stuy to Tony's place near Coffey Park, in Red Hook.

Red Hook is a unique area of Brooklyn. The majority of New Yorkers, and, in particular, Manhattanites who take the water taxi over here, know the area as where Ikea, Fairway market and artists seeking urban isolation in giant lofts hide out. But the Red Hook Houses, more inland than the well known ocean-lined area, is where I was biking to.

This area, considered part of South Brooklyn, is one of the most isolated regions of New York City, due to a significant lack of consistent public transportation within a mile (1.6km) plus







radius. In a city known for its nearly ubiquitous transit system, Red Hook remains known as one of the last urban deserts in the area.

The Red Hooking Housing Projects are the largest housing development in Brooklyn, with over 8,000 residents.¹ There is little public WiFi access, while a portion of the residents access the Internet through Android smart phones and computer stations.² A special vibe blankets the Red Hook area. The comparative isolation, mixed with the industrial and nautical landscape, and endless zig-zagged walls of red brick buildings leads to a socially vibrant and buzzing atmosphere.

As the winter months set in, I gave up biking and resorted to the subway (the B61 bus schedule is a running joke in the area, as it hardly ever shows up at all). For the past year and a half, the nearest stop (Smith-Ninth Street) off the F & G has been closed for repairs, so the next closest, Carroll St. is the only option. Walking the twenty minutes from Carroll Gardens to Red Hook reveals the socio-economic contrast between the two neighborhoods physically bunched up next to each other. The inevitable crawl of gentrification in Carroll Gardens stops sharply with the massive, double-wide freeway that cuts Red Hook off from the rest of Brooklyn.

Back to November 1st, 2011

After arriving at Tony's place, we walked our bikes to the rectangular Coffey Park, a scattered tree-lined expanse on the northwest end of the Red Hook Houses. While making our way into the grass-lined pathways cutting through the towering red brick housing buildings overhead, we discussed where potential nodes could go. Eventually ending up at the Red Hook Initiative (RHI), Tony introduced the community center as a promising home base for the community wireless project.

The most distinctive aspect of RHI is the giant service garage door on the side of the two story building. The inside is filled with bright, open spaces, multi-colored walls, and glass paneling. There's a computer room; a kitchen, offices, and a large area in the middle for meetings and performances.

1 "Red Hook Justice: About Red Hook," PBS, accessed April 13, 2012, <http://www.pbs.org/independentlens/redhookjustice/redhook.html>.

2 Anthony Schloss, interview by author, digital recording, Outpost Cafe, Brooklyn, New York, October 25, 2011.



November 8, 2011

Initial technical tests using two Ubiquiti Nanostations and a Bullet were conducted in Coffey Park, which gave us a chance to become familiar with the equipment we would be deploying throughout the community in the coming months.

Dec 6, 2011

After much planning, the first node, a Ubiquiti Nanostation M2, was taped and zip-tied around a tripod affixed to a tire, on the roof of RHI. Since it's a directional antenna, the radio waves fan out like a peacock plume. As RHI is located on a corner, facing two adjacent streets of Red Hook Houses, this cheap and powerful antenna can beam all the way down to the ends of both streets, sharing WiFi access with residents along the way.

December 8, 2011

This night was extremely wet and windy – I was worried about our freshly installed antenna. Tony texted me. The setup had blown over, but was still functioning. “The moral is, we need sandbags,” he wrote.

The RHI Local Website - A Captive Portal

After the antenna had been running on the roof of RHI for a few weeks, the first iteration of a mobile community website was installed on the router (the same custom openWRT Linux router used to handle the Internet, a TP-Link WR1043nd). When someone connected to the open wireless entitled “Red Hook Initiative WiFi,” they were redirected to the local RHI website first, a captive portal, before they could go to the rest of the Internet (like the page that pops up when logging onto free WiFi at a store).

This was inspired by an earlier community network in Montreal, “Île Sans Fil,” which aims to socially engage users locally at WiFi enabled coffee shops by redirecting to a page showing other users on the network.¹ Île Sans Fil had developed WiFi Dog, the captive portal and authentication server, for use on their network, with morphed variants such as AuthPuppy, NoCat, NoCatSplash, etc. I chose to go with a “no frills” variant called NoDogSplash, which, in the end, didn't have anything to do with domesticated animals.

This initial RHI WiFi based website served as an interactive placeholder to gauge a level of interest among community members. The “R” banner graphic at the top is a collective symbolic identity for Red Hook residents. Along with admin controlled RHI announcements at the top of the page (including upcoming LGBTQ meeting times), an anonymous

¹ Alison Powell, “Co-productions of Technology, Culture and Policy in North America's Community Wireless Networking Movement” (Concordia University, 2008), 58-59.



Home About Internet

Red Hook Radio

WiFi Spot

Welcome to the Red Hook Initiative & Red Hook Radio WiFi project

Community Announcements

RHI Health
LGBTQ Meeting: Thursday Jan. 19th 7:30pm-9:00pm @Red Hook Initiative

Shoutbox

Your Name (or nickname)

What do you think of the project?

Shout!

shoutbox, or public forum, was installed to promote a free flowing discussion of the network itself. The first question was "What do you think of the project?" This garnered a large range of responses that evolved over the next few weeks.

Checked responses on Jan. 18th

In linear order, earliest post to latest, by "Name (or Nickname)" and "Shout!":

E.g. Name (or Nickname)

E.g. Shout! comment

Gjfyjfyujyfufyhjy

H ghjmjtyjmthnm

fvbgvggghh

it sucks

dat nigga

It blowz chunkz

Yukbkbuhuhj,be,John,UBS

Fuck you!!!!!!!

Kuyguyuyvkuhyvouyoukuhjhbkjhkhkjhgjhkhkhjonejhg

Fuck you!!!!!!!

smoove

cool

deadmule

interesting

Jan. 20th:

These responses were not unwarranted, as the interface at the time was not robust or completely functional across all mobile/desktop devices. I fixed a lot of interface problems with the captive portal and RHI website that I imagine made users frustrated. After the major problems were addressed, more thoughtful responses came in from the community network users.

Checked responses on Jan. 25th:

nunez

The project needs to be more attended as far as repairs.

June

want to know more about the actual initiative

w

Cool jus don't keep askin

joey

school

f

its good i just hate how it cuts to this screen

Jen

Good

message

Blow the big one

t

hope you work out the kinks

Checked responses on Feb. 1st:

Danny

interesting

carlosv493

Its OK...

Kamz

is a great project

Shy

Good so far, at least some one cares enough to open resources for those who don't have. Those who use this hotspot should appreciate RHI and for what they are doing.

victoria

Listen, thanks for the internet and all, but this site fucking sucks! Im constantly losing work im doing online because of this project and its really fucking annoying. Fix it please!!

jordan

You need to fix the problem cuz it keeps kicking everyone off grr

The conversation grows in complexity over time, announcing specific problems with longer descriptions. I was told that Victoria, who was a very dedicated network user, had actually called Red Hook Initiative to complain about the service problems with the network. After this round of feedback, combined with the previous one, Tony and I deduced that it was a problem with the authentication timeout of the NoDogSplash captive portal. Essentially, if someone on the network wasn't loading new websites for 20 minutes, it would redirect back to the RHI website.

I adjusted the timeout to over an hour. Afterwards, there were no more complaints on the shout box about this problem. A few weeks later, more feedback came in by word of mouth that the antenna on top of RHI wasn't working (which made using the shoutbox to report the problem impossible).

Although there was criticism from the Youth Radio Group that an anonymous shoutbox was not a good idea (detailed in the next section), benefits to having a feedback system in place allowed us to make incremental adjustments and fixes to the network. While the main interaction has adjusted to populating maps, the twitter-like waterfall interface of these tests have been carried over, while favoring logged in profiles for posting. Retaining a backchannel of semi-anonymous twitter feed for unfiltered critique is theoretically essential for long term technical and social network sustainability.

January 18, 2012: Youth Radio Group (Brainstorming)

Red Hook Initiative employs teenaged Red Hook residents as interns, to help develop their own online radio station – RHI Radio. They “learn the history of radio, develop technical skills, and learn how to conduct interviews.” The impetus for the project is to encourage “young people to express and share their ideas and views of the issues that impact their lives.”¹

The Youth Radio Group (YRG) is the first group I was able to brainstorm community software with. This included: Nykia Williams, Shakima Hayes, Jocelyn Rivera, Charlene Pratt, Jazz-hane Wade, Tabitha Roman, and Mohammed Martinez.

It was a fitting start, as January 18th was the day that a majority of the U.S. Internet blacked out their websites in some fashion to protest the bill, Stop Online Piracy Act (SOPA)². This very tangible example of censorship and communication disruption, which SOPA might have led to, was a perfect segue into discussing a special Red Hook run Intranet, not necessarily connected to the rest of the Internet – a network that wasn't directly threatened by SOPA, PIPA, ACTA or other mutations of these Internet-control bills.

We kicked off talking about “media access as a right,” as Tony referred to it. The teens were mostly interested in whether or not the current WiFi on top of RHI would reach their house

¹ “RHI Radio 2012,” Red Hook Initiative, accessed April 2, 2012, <http://rhicenter.org/rhiradio.html>.

² David A. Fahrenthold, “SOPA protests shut down Web sites,” The Washington Post, January 18, 2012, accessed April 3, 2012, http://www.washingtonpost.com/politics/sopa-protests-to-shut-down-web-sites/2012/01/17/gIQA4WYl6P_story.html.

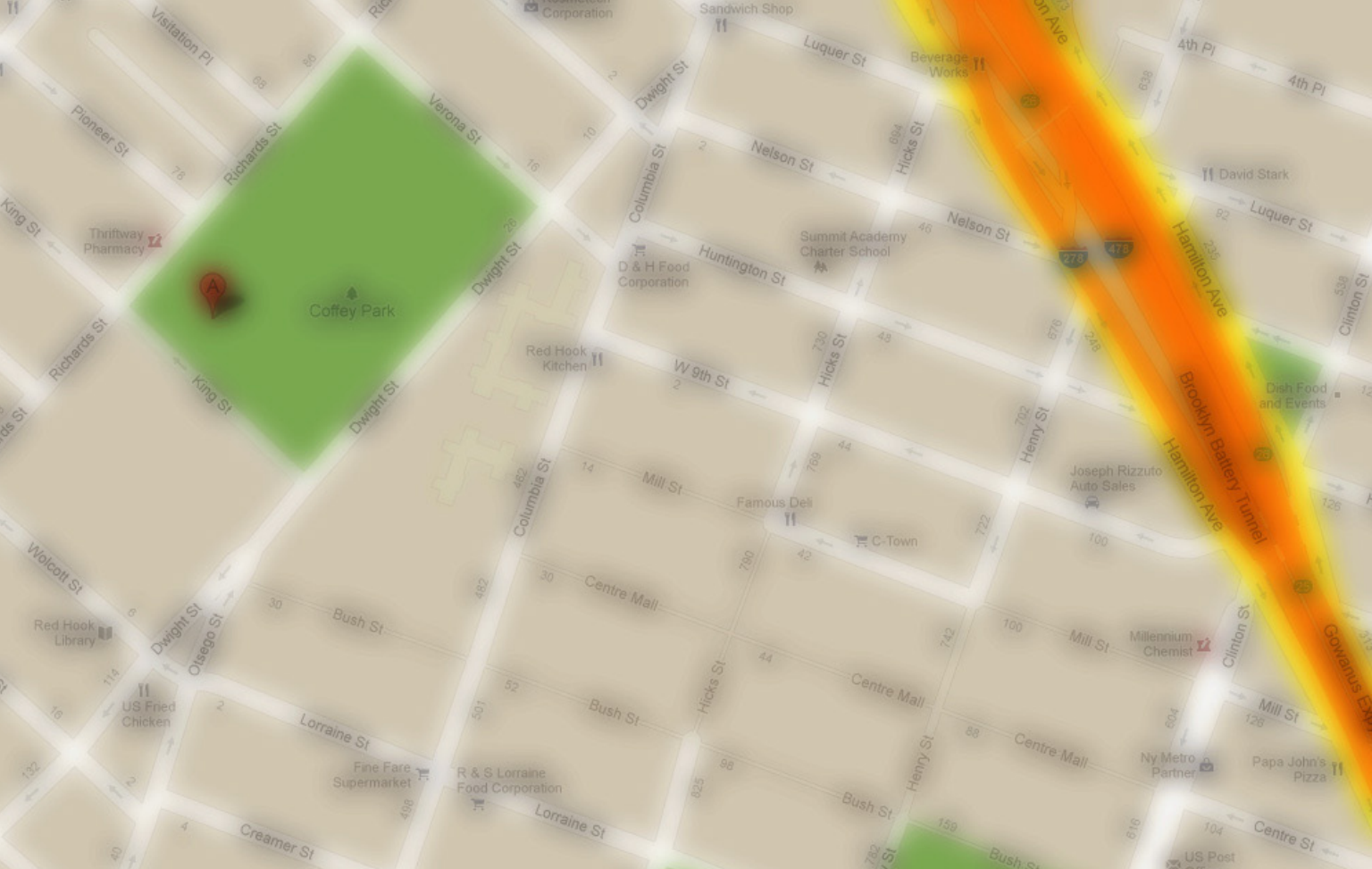
– if not, when and how that would happen. I explained the difference between directional (WiFi that beams longer distances in one way), versus omnidirectional (going all ways in a shorter distance). They asked me about costs (I was juggling a mess of routers, antennas and cables in my arms at this point), and they were fairly psyched that it was so cheap to share WiFi with the Ubiquiti and TP-Link equipment I use.

We moved on to talking about the current captive portal RHI website, which, upon logging into the network and viewing on her phone, caused Jocelyn to react vehemently against it. “Who is this ‘deadmule,’” she asked of a commenter on the website, “no no it shouldn't be anonymous – people will say some wild stuff on here.” The others in the group seemed to agree (or, at least not voice opposition). While user profiles were always planned, I had never heard an argument against anonymous users on a network before – previous encounters with DIY WiFi hackers had always been shrouded in pseudo-names and anonymous handles. It seemed that rule number one in this field was always anonymity, but perhaps I was immensely unaware of how non-hackerish individuals react on a community level, and how this related to passive, long term trust relationships.

As the discussion into this concept continued, Jocelyn reinforced her argument: “...[you] need to know who said [this] bad stuff, so you can do something about it...people are more brave and likely to say something negative.” This is quite true, looking at the countless stories of anonymous web pages set up to demean select people at schools, workplaces, etc. Perhaps accountability is a form of trust. But, there's still a place for anonymity, even at the community level.

Weighing in the feedback collected from the anonymous RHI shout box webpage on the WiFi network, there were tangible benefits to enabling a back chatter channel to relieve social tensions and provide technical support. The balancing of trust might be more difficult than I had originally assumed. Having to sign in to contribute to the network was received well by the YRG teens, especially when I assured them that myself or someone in charge, like an admin, could ban trouble makers from the website.

We moved on to discussing potential uses for a Red Hook website. “It would be cool to tell people what's going on in Red Hook,” but nobody wanted to meet new people or keep up with friends over the network: “that's what Facebook is for.” Tony asked what would keep people intrigued with Red Hook – the group responded: “people don't care [about Red Hook],” while the idea of a game about Red Hook would get people to pay attention. Also, “... jobs, jobs in Red Hook,” Jocelyn said.



The idea for “a map of Red Hook, that is not like a Google Map...” was introduced. What could be put on the map? “...only stuff that Red Hook people would know” – what kind of stuff would that be? “The weed spots,” “No, you can’t put that on there,” “Then the cops would know...” A short discussion ensued on creating private maps for friends to share these spots. Although we were half-joking around, the idea of creating and sharing custom maps of anything, amongst trusted friends or the public, resonated further into the project.

We moved on to discussing the nicknames of areas around Red Hook that exist in a kind of *fuzzy geography*, such as Trip Towers, Paradise, The Circle, Flagpole, Sly Town, etc., and whether putting these areas on a map would be useful (in a much later meeting with the Community Change Workers, this did prove to be beneficial). These names aren’t all consistent on a multi-generational perspective, which makes it all the more interesting and useful for community mapping on a hyper-local, time-based level.

“You could make a map just for local businesses,” Mohammed said, “and put some of these [WiFi] towers on top of the businesses...and they can list their times, hours, and whatever they sell.” Working with businesses in the area to mount network antennas, while providing local information about the businesses on the community map, could prove to be an interesting future incentive for network growth.

Alternative Maps in Counter Public Spaces

Creating and sharing these alternative maps (or interpretations) of the Red Hook community through the TidePools interface recalled the last episode of David Lynch’s *Twin Peaks* television show. Agent Cooper enters a counter public space when visiting the Black/White lodge. It exists outside of the visible spectrum – one can only enter through a ring of sycamore trees, when Jupiter and Saturn are in alignment. ¹

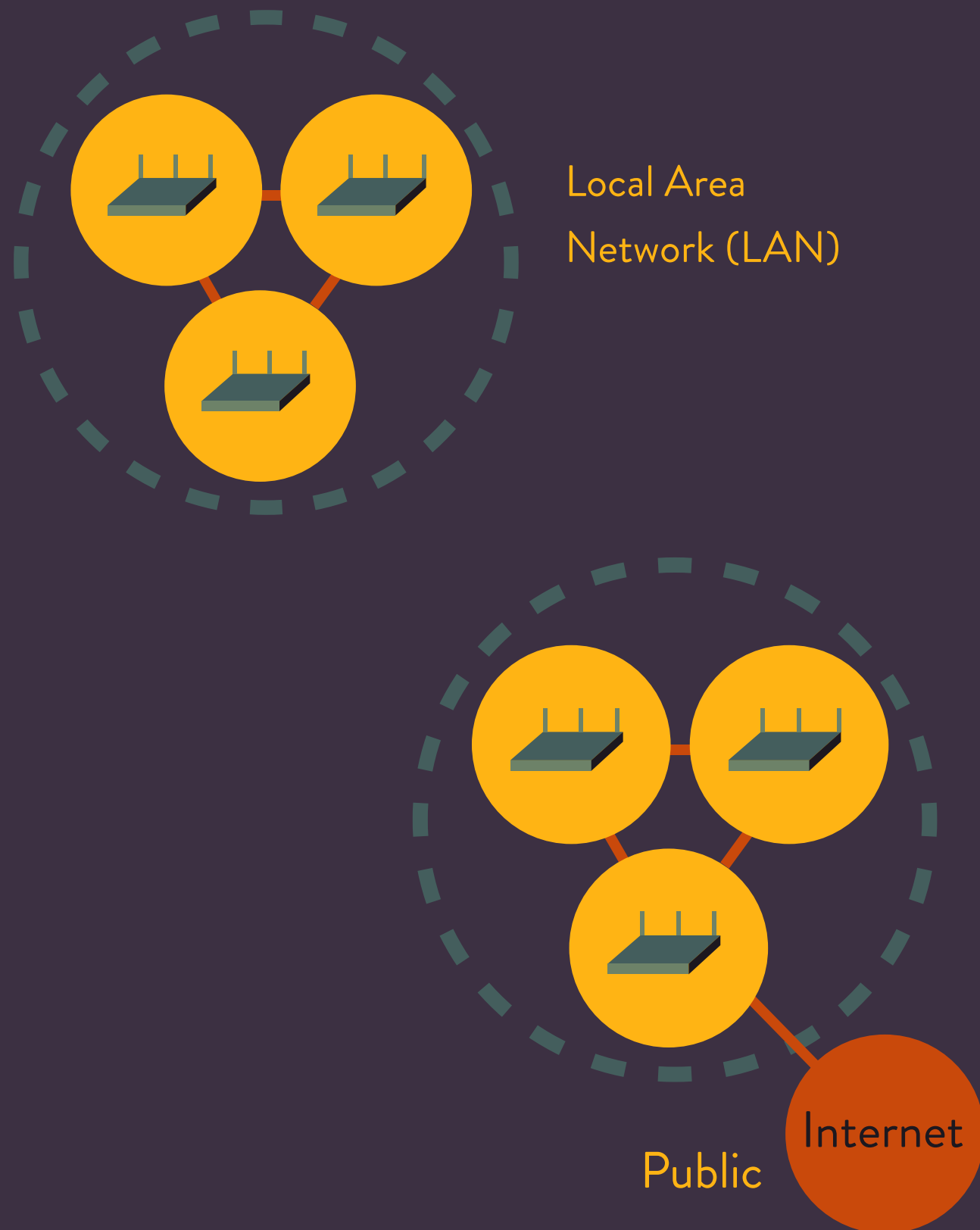
Is this similar to entering alternative spaces through WiFi gateways? Could a wireless network be interpreted as an alternative room/space/world? Can one create their own custom room/space/world? Will they allow others (friends, similar groups, community) to enter their custom spaces? What happens when multiple people on a network create their own rooms? Does it become a shared, counter public space? Does it eventually grow to a virtual city?

¹ Michael Warren, “Twin Peak: One and the Same,” Entertainment Guide Film TV, October 6, 2011, accessed May 2, 2012, <http://entertainmentguidefilmtv.blogspot.com/2011/10/twin-peaks-one-and-same.html>.



David Lynch, “Twin Peaks,” television show, episode 2.22, 1991.

Counter-Public, Community Intranet



Michael Warner's "counter publics" theory¹ is referred to in Alison Powell's community networking thesis, as separate, autonomous spaces for groups and people that lie outside the majority.² In networking, this is the difference between a self-contained, local intranet and the rest of the world-wide Internet. These counter public spaces can merge with the public, remain isolated, or share only certain information outside their alternative space.

In "Divining a Digital Future," Dourish and Bell write that the Warlpiri and Kaiditch peoples of central Australia believe a separate Dream state exists, outside of the normal world. The dreamscape "carr[ies] the resonances of human activities and events...[that] leave their impact on the land...[the] experience of the landscape is thus a cultural one."³ Can a community interface convey long periods of time within geographic counter public/public communities, by making the passage of time visualized and tangible?

January 25, 2012: Community Change Workers (Brainstorming)

Red Hook Initiative employs Community Change Workers (CCWs), who "...[work] to improve the neighborhood by mobilizing and educating the residents of the Red Hook Houses."⁴ The CCWs I worked with: Khadija Toni Jones-James, Reg Flowers, Daniel Aiken, Carlos Viveros, Alisa Pizarro, and Nyoka Acevedo, are involved with a wide range of activist and community organizations and group meetings in the neighborhood.

After working with the Youth Radio Group, it was beneficial to gain perspective on Red Hook from the young adults and middle-aged residents that comprise the CCWs – such as Alisa and Khadija, who have been living in Red Hook for over twenty years.

The discussion began with an introduction to our overall goals and the current state of the captive portal Red Hook website, which was warmly received, but led to a discussion about residents, including some CCWs, that don't have smartphones to access the WiFi. "I don't have a new-fangled phone like that," Khadija said, "[but] I'm going to get one." Future plans of providing subscription-based community announcements texted to phones to all residents was encouraged by Khadija: "That's a way we can reach people, because they'll be more apt to want to come because they'll know what going on...Red Hook is like a word of

1 Michael Warner, *Publics and Counterpublics* (New York, NY: Zone Books, 2002), 115-117.

2 Alison Powell, "Co-productions of Technology, Culture and Policy in North America's Community Wireless Networking Movement" (Concordia University, 2008), 58-59.

3 Paul Dourish and Genevieve Bell, "Divining a Digital Future: Mess and Mythology in Ubiquitous Computing" (Cambridge, Massachusetts, MIT Press, 2011), 80-81.

4 "Community Development," Red Hook Initiative, accessed April 2, 2012, <http://www.rhcenter.org/prog-community.html>.



Footage shot by Becky Kazansky

RED HOOK INITIATIVE
STOP, QUESTION & FRISK
 RED HOOK COMMUNITY QUESTIONNAIRE

1. Have you been involved in a street encounter with the NYPD in Red Hook? (A street encounter is any time you are approached and questioned by a police officer as part of their official business.)
2. Have you been in a 'stop' encounter in Red Hook? (A 'stop' is when you believe you are not free to leave the scene.)

If yes to questions 1 or 2...

a) Was force used (includes 'frisking')?							
b) What reason was given?							
c) What was the outcome?	arrest	summons	allowed to go	pending	other		
d) When did it happen?		2009	2010	2011	2012	other	
e) What precinct did officer(s) come from?		76th	PS1	not sure	other		

If yes or no to questions 1 or 2...

3. Should NYPD improve the 'stop & frisk' policy?
4. Do you find the NYPD courteous, professional and respectful?

mouth kind of thing..."

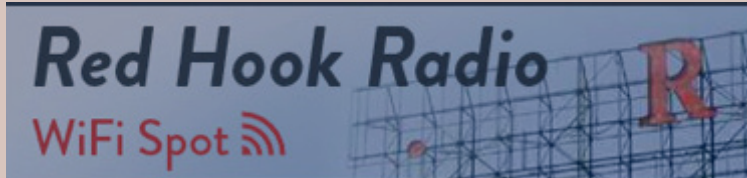
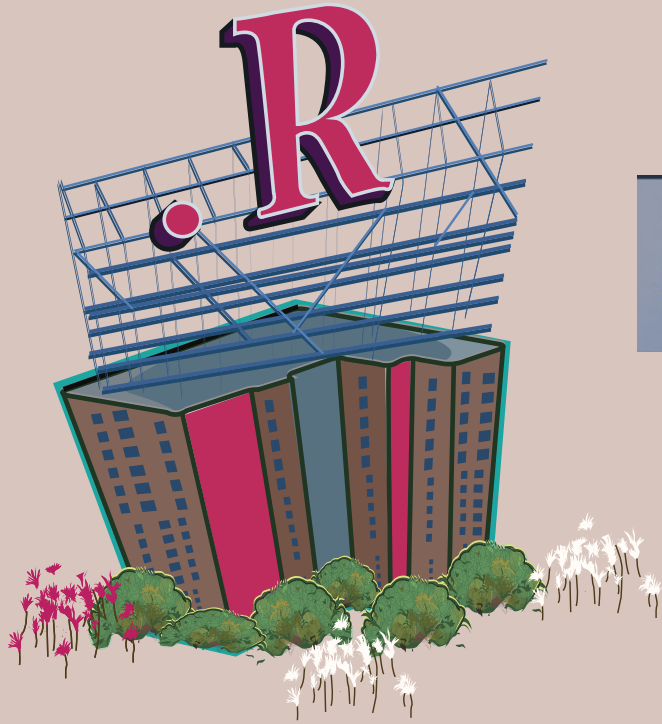
Reg brought interesting incite next. He discussed the possibilities in bringing in a LETSystem, skill share or other types of informal learning to the system, as well as learning circles (i.e. book clubs), alternative currencies and local business startup integration. His comments reinforced earlier research I had conducted in the area of reciprocal and micro exchange economies as applied to community mesh, in which long term social sustainability of these networks should encourage alternative, grassroots initiatives. While out of the scope of the current project's focus, this is still a potentially critical step towards a resident-powered community network that will come into play later on as the network matures.

An interactive community bulletin board idea came up next, including resume posting, announcing jobs in the community (and what the requirements are), and, in particular, an interest in sharing when upcoming meetings will be taking place. "If more people knew about Occupy Red Hook, they'd get involved," Khadija said, "...especially with the Stop and Frisk situation...parents ask: 'Where can I go to make it safe for my children to walk around the neighborhood without the police stopping and frisking'...we don't live in a Police State, people need to know what's going on in Red Hook."

There's been a rise in stop and frisks by the NYPD in the last few years.¹ At a later meeting, I noticed a Stop & Frisk questionnaire being distributed to the community, as well as photos mounted to poster board of RHI members participating in a Stop & Frisk legislative event at City Hall with other community organizations from across NYC.² Utilizing the community software as a digital extension of the analog reporting and campaigning that RHI members are already employing could help to augment awareness to non-residents.

What other issues could be addressed? Khadija was quick to reply: "I'm behind on rent, who can I talk to, my mother's disabled, we live on the 12th floor and looking for an apartment for her on a lower floor...my medicaid is about to run out, my child came home, beaten up, where do I go? Who do I talk to?" This initial list was the inspiration for a Community Frequently Asked Questions (FAQ) integration into the website and mapping interface developed at a later meeting.

¹ Ryan Devereaux, "Stop-and-frisk challenge: Rights group uses NYPD data to claim racial bias," Raw Story, May 9, 2012, accessed May 9, 2012, <http://www.rawstory.com/rs/2012/05/09/stop-and-frisk-challenge-rights-group-uses-nypd-data-to-claim-racial-bias/>.
² Javier Soriano, "New Yorkers United to End "Stop-and-Frisk" and Discriminatory Policing," javiersoriano.com, February 29, 2012, accessed May 2, 2012, <http://javiersoriano.com/blog/2012/02/29/new-yorkers-united-to-end-stop-and-frisk-and-discriminatory-policing-photos/>.

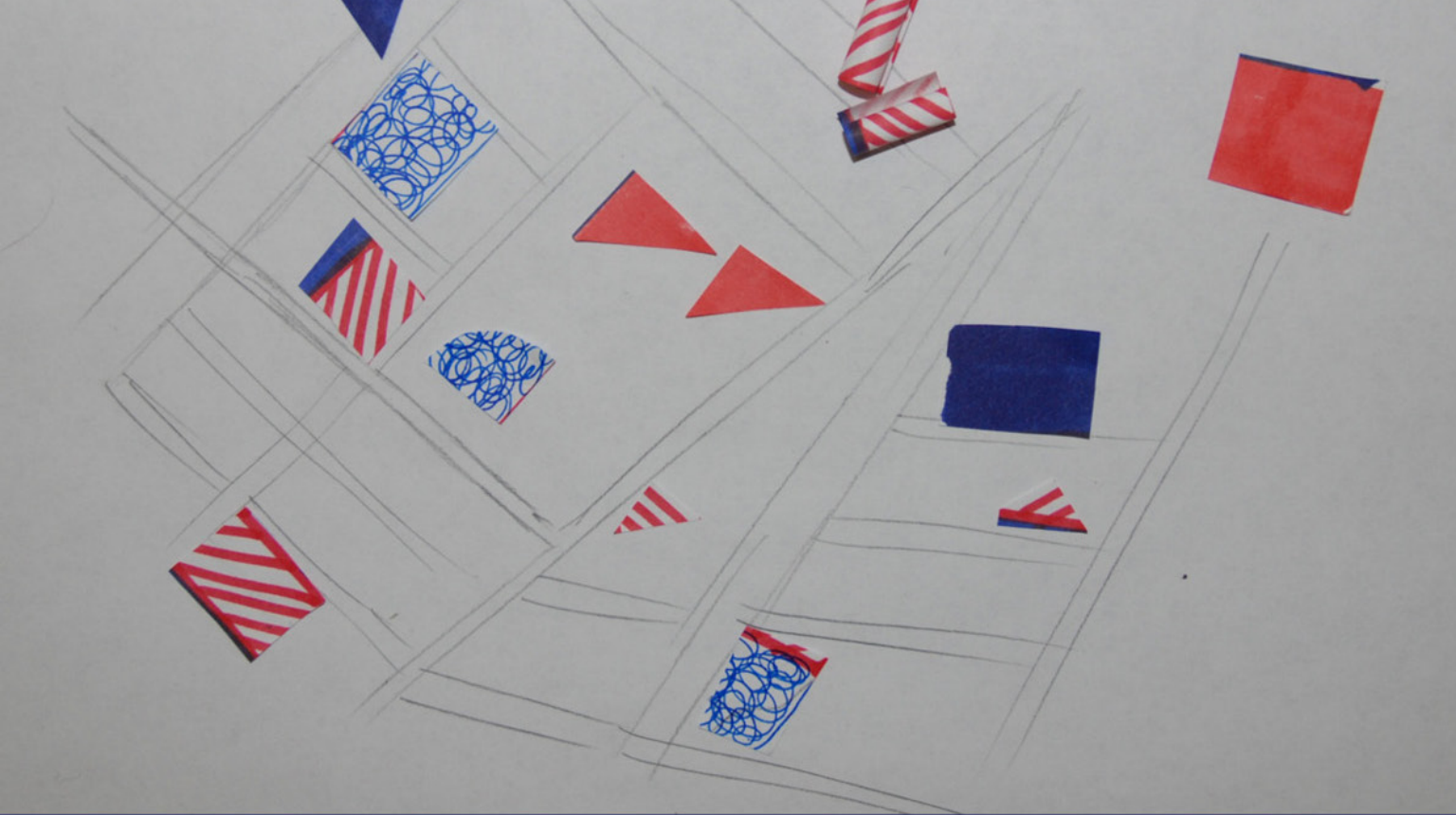


The conversation shifted when Carlos brought up the idea of some kind of instant messenger, that lets people know when others are in the Red Hook area and leave messages. Daniel was quick to interject: "...that's dangerous...what if Carlos got beef with someone and they know he's back in the neighborhood?" Reg: "If you have beef with someone, if you're hiding out, you probably wouldn't log on." As in the last discussion with Jocelyn's comment about anonymity, this was another aspect of privacy and security to consider. The solution boiled down to a voluntary check-in system, which could be used for locations, meetings, events, or anything else on the network.

Near the end of the session, the conversation turned more conceptual, as Reg recalled early Internet bulletin boards, specifically NYCnet from 1996, that had a tight knit, fresh community feel. That feeling has been lost since – those proto-social media, free form channels of communication have been replaced by more robust options, which at times can boil down to "...just pollution..." (IRC retains some of that original feeling, but has a high barrier of entry and will always remain cemented in the past). There's a feeling there, though, of asynchronous conversation – a latent, modular means of dialogue. As opposed to the ultra fast, mobile synchronous chatting all over the Internet. "It's not private chat...you can see who stops by...like a virtual community center," Reg said, "...the idea that there's a lobby" where everyone checks in and then go to their respective groups, separated by many small rooms, to discuss their respective topics.

"I like that way of phrasing it as a virtual community center," I said. Reg replied: "Make sure, when you write your diary that you...[mention]...he was sitting there in his funny hat and weird sweater...when he [Reg] coined the phrase: virtual community center." I hope I've done justice for Reg's request, although as I'm replaying the audio recording of the meeting, I can't remember the specific details of his hat or sweater to properly paint this narrative – sorry Reg!

This many-roomed community center concept migrated into later iterations of the interface – having a modular means of dropping in landmarks (chat rooms) to initiate new, Twitter-like asynchronous conversations one can follow. The virtual community center feel would be maintained by restricting the map boundaries to the Red Hook area and combining all custom maps and landmarks together on a "general map" before one can dive in further or filter out unwanted information. This is akin to a billboard at a community center that is changing over time as more and more layers of fliers are stapled on top of each other – or, in this case, landmarks layered and clustered across the map. As one walks by the billboard, going to a specific room (or the Internet, through a captive portal), they might notice a new



flier (landmark) that intrigues them.

As the meeting ended, the CCWs were very excited to show me a video they had just finished editing. It was bringing light to a community wide issue of illegible, missing or covered building numbers. As the Red Hook House buildings are very similar in appearance and bunched together, the only differentiation is that of numbers painted on sides of the red brick outer walls.

Neighbors, food delivery, even emergency vehicles have a hard time finding the right building – which has caused many problems in the past. In a conversation later on with Liz Barry, she suggested incorporating the Open311 civic issue tracking API (which NYC and other cities use to catalog, track and address issues around the city). Recalling the building number video, as well as a mention of a problem with potholes at one point, a special “Fix This” landmark was included in TidePools.

Developing the Mapping Interface

After a few more interface discussions with Tony and Liz Barry (my thesis advisor, who is also Director of Urban Environment at Public Laboratory and passionate about grassroots mapping), the idea of a tangible map interface began to emerge. To start thinking about how landmarks could “drop” onto the map, with the possibility of layers or other pseudo-3D elements, I cut out pieces of colored and textured paper that indirectly resembled a mix of Burrough’s Cut Up with a Jean Arp dada collage.

Liz and I drank tea, while I showed her a surreal map of Red Hook that morphed out of the collage work. We talked open source mapping empowerment on a local level. Afterwards, we played a bit of Minecraft – this game is similar to the “putting stuff on maps in large possibility space” building mechanic that I’m using in this project, but for very different reasons.

Liz cut out a chunk of open source city data, and I layered it on top of an OpenStreetMap of Red Hook. LeafletJS, an open source mapping platform fueling TidePool maps, is a shining beacon of HTML5 and Javascript that runs tile maps from anywhere on the Internet or hosted on a local (in this case, on a USB keychain) hard drive. I tried a few different mapping programs to build code on top of. Leaflet was smoother than Google Maps, among others, on Androids and laptops.

Leaflet lets you use your own custom maps, so I loaded it with the map tiles (map images at different zooms) from TileMill. I now had the capability to run all the maps locally, on



Visitation School

South Brooklyn Health Center

Red Hook Park

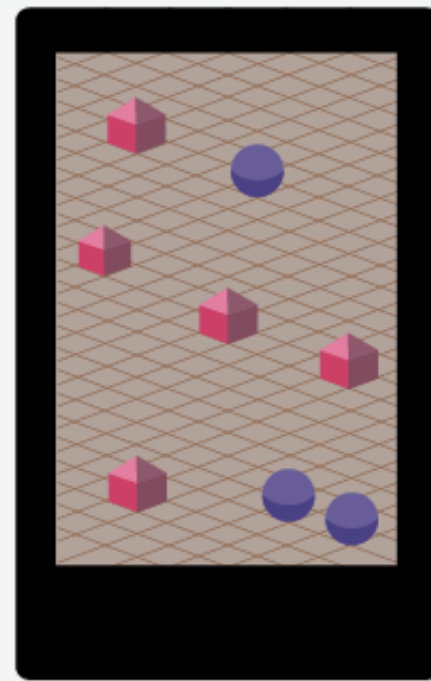
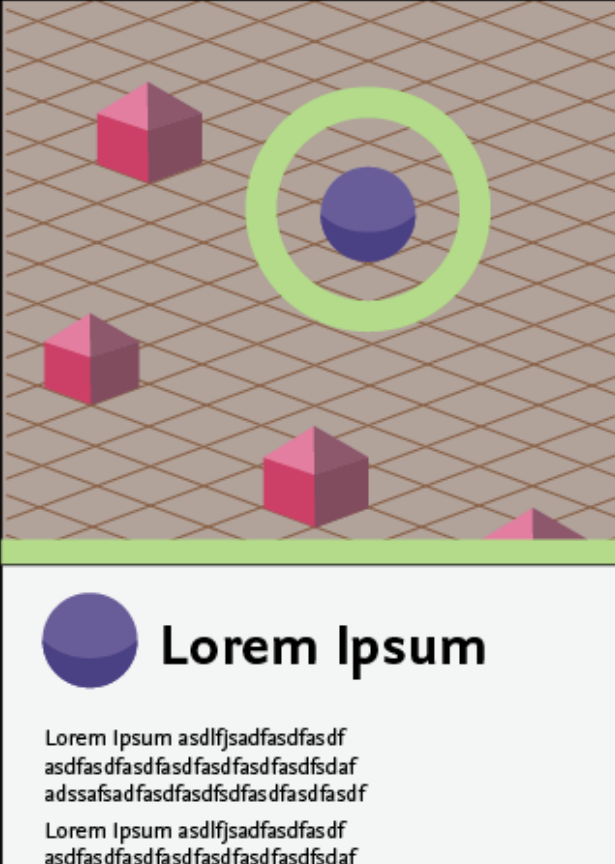
Public School 27

Red Hook Houses

Public School 30

26

Str
Con
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(his




**Scroll
large map**



very small and inexpensive computers (called plug servers), that essentially plug into the wall like a night light (Freedom Box Foundation is also using these for their anti-censorship project). Everything is geo-coordinated to other maps on the Internet, so when someone drops a landmark at a certain location, it is recorded to be on the same street intersection (or wherever) as all other maps.

February 7, 2012: Antenna Replacement and Network Software Maintenance

Becky Kazansky, a master's student at ITP, NYU joined me at RHI to record footage for her own thesis documentary, on alternative networks. It was a bit cold out, and we (Me, Becky, and Tony) were on the rooftop of RHI. I needed to swap out the broken antenna with a new one – I wonder if it was due to the heavy winds and rain from back in December...

February 15, 2012: Community Change Workers (Feedback & Focus)

After showing the current interfaces and the previous visual iteration, the Community Change Workers in Red Hook responded very well to the "The Sims" – like visuals of the neighborhood. The prospects of a visually diverse and expressive community view, where anyone can create their own interpretation of the neighborhood (and add relevant information) was received positively.

I showed the first prototype, a bare-bones map of Red Hook with 3D symbols layered on top. At this point the pan, zoom and clicking on landmarks were the only features.

"It's really interesting,..." Reg said – an organization he founded has a yearlong plan called "The Vision of Red Hook." It's an art project which would theoretically take place within a virtual Red Hook, where one aspect is the ability to zoom in and out and place one's avatar where they currently are (i.e. at Hope & Anchor restaurant). It's encouraging to know that others in the community are thinking on the same track, making my project all the more relevant (and a potential platform host for the Vision of Red Hook).

I showed the "Sims" style map mockup to the group next. Carlos was the first to say it looked like the Sims, while everyone else chimed in with "yeah, like the Sims" in an excited tone. There was particular interest when I talked about one of the core mechanics of the interface, the ability to create and share new maps with any theme, based on the discussion from last time about making a special Stop and Frisk map. "Kind of like rooms in a chat," Reg said in agreement.

We talked about the community directory/community FAQ next, and the possibility of listing these directory items on the map itself with additional information (like the phone



number). Khadija nodded, “the times different establishments are open, like for Fairway or Ikea...” Incorporating business and organization hours into the map (as this map is all based on cycles of time) came up a few times, which led to time based options when placing landmarks (the landmark will glow when it is open, or when a meeting is about to / already taking place, etc.).

I started to write community FAQ ideas on a giant piece of sketch paper, mentioning “I have really bad hand writing by the way...um, sorry.” Are you a doctor?” Reg asked, then said “no, it’s not bad enough.” “You have the scrawl of a serial killer...” Khadija said jokingly “...I can see ‘time places are open’...you’re good.”

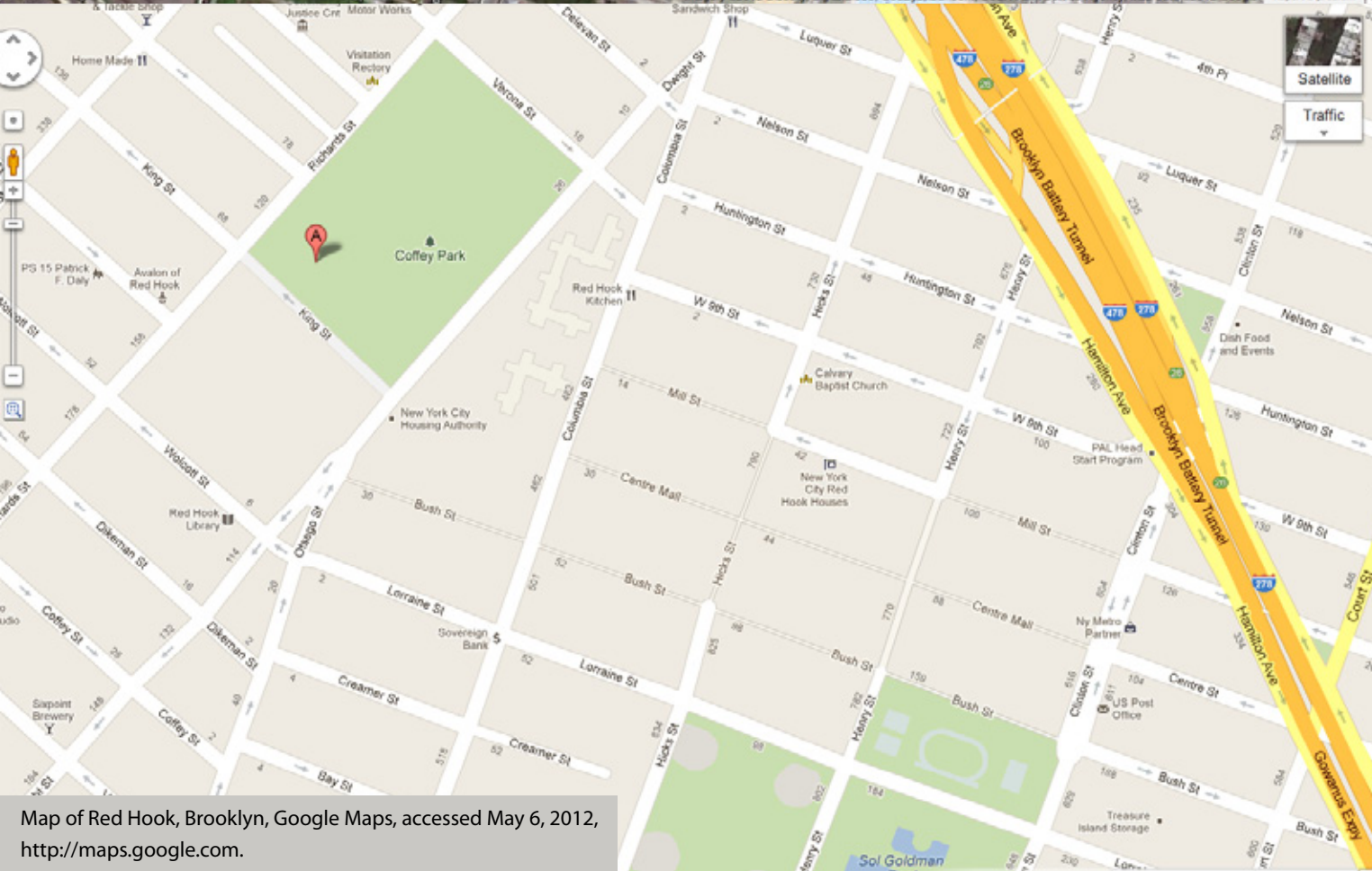
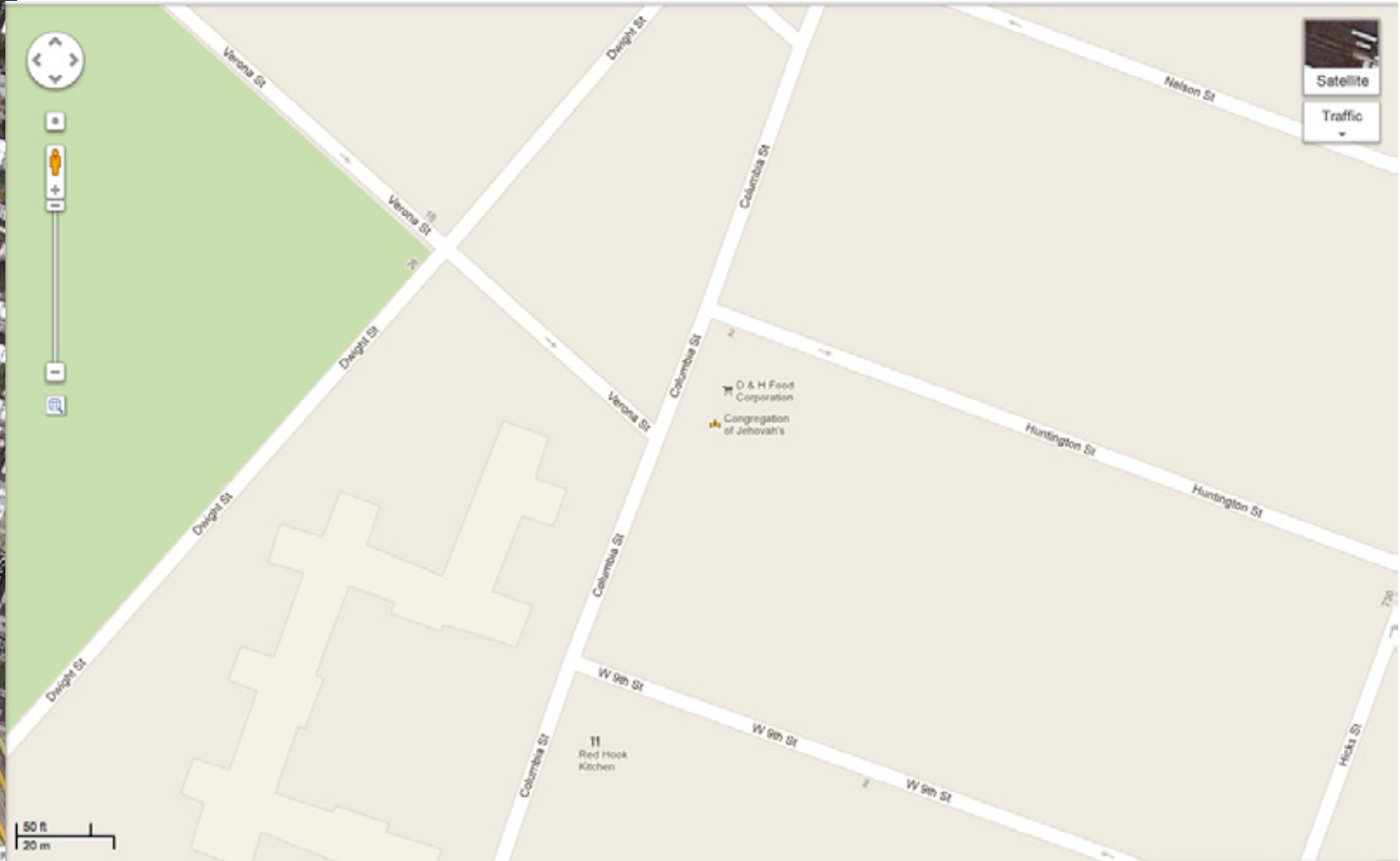
We proceeded to brainstorm a list of services, and other elements that would be important assets for the FAQ and map. We talked about other languages the software would need to be translated into, to include all Red Hook residents: Spanish, Arabic and Tagalog (Filipino). We also discussed the idea of creating a kiosk center (loaded with the map software) near the water taxi stop, where Manhattanites land when journeying to Ikea. Instead of just shopping and hopping back on the boat, the kiosk might intrigue Ikea-goers to wander around Red Hook and enjoy local restaurants or happening events.

On Google Maps at the Local Level

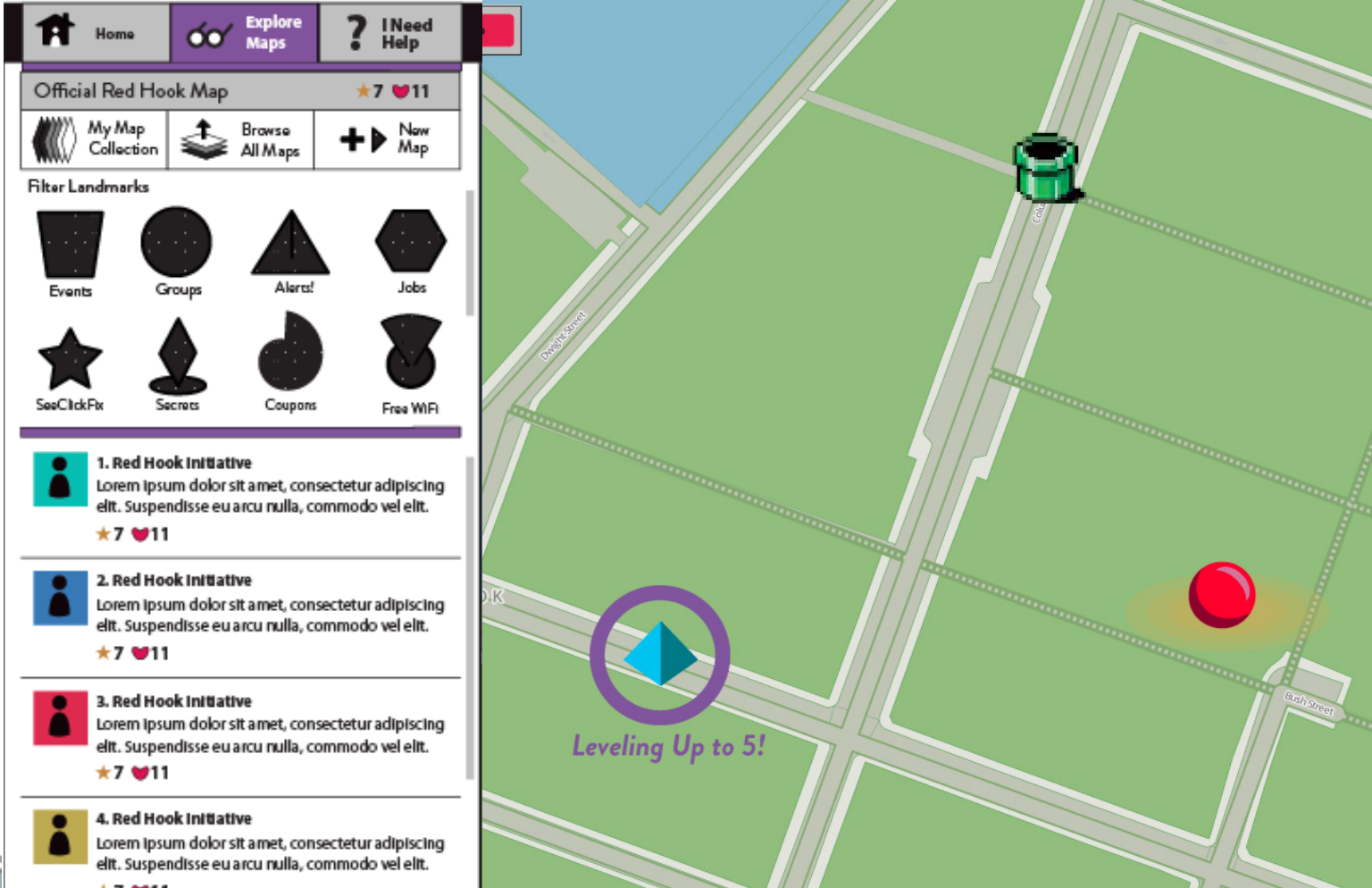
While continuing to write code for the mapping interface, I started to refine the artistic style of the Red Hook map. I knew it shouldn’t look like a Google Map, as this map would be generated from the ground up and should reflect the identity, culture, the feeling of Red Hook, and the people who live here. While Google Maps and other general mapping platforms are extremely good at what they do (navigate, provide macro perspectives on nationwide trends, etc.), there’s a gap between static data, such as street names and buildings, and what is actually going on in that physical location, day to day. I don’t blame Google Maps for being ill-representative of mapped culture on a micro-level, the resources to keep that up would be endlessly vast.

Instead, I believe that the communities can maintain this information locally themselves, use it for their own means, and then, if they choose to, project it outwards (via an API or RSS) to an aggregated map of all community networks connected to the Internet.

Usually, when zooming in on a map, you begin to lose perspective. Instead, you should be able to gain more information about a location the closer you zoom in – this is the philosophy behind Google Street View, which, again has its benefits, but does not capture the day to day local conversation or cultural sentiment – only a static picture of what’s



Map of Red Hook, Brooklyn, Google Maps, accessed May 6, 2012, <http://maps.google.com>.

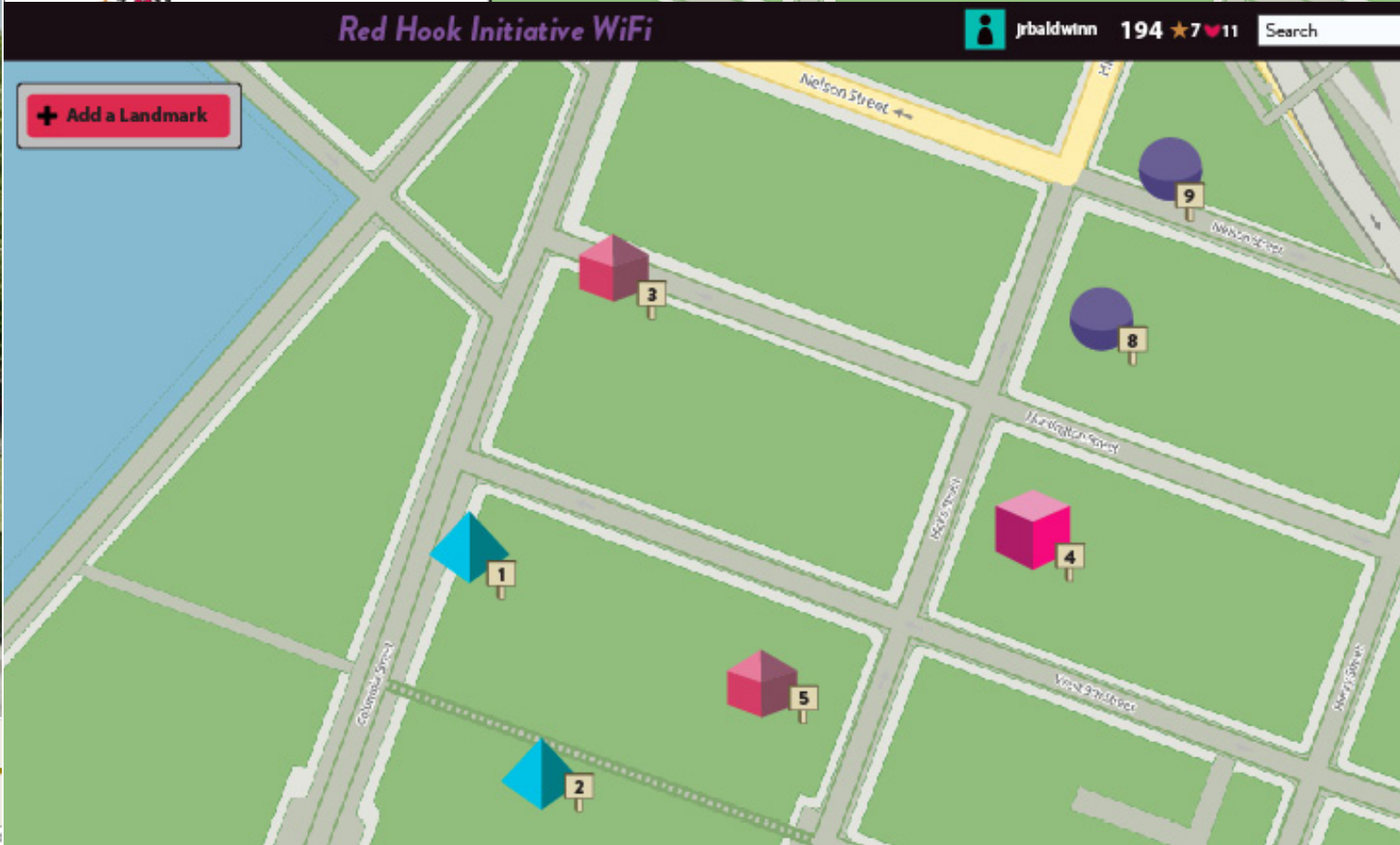


going on at a particular time.

March 7, 2012: Youth Radio Group (Feedback & Focus)

I had another feedback and focus meeting with the Youth Radio Group. When I showed the first map interface prototype to the teens, without any style to it, they were not excited at all. Honestly, this interactive map, although technically cool because it was all hosted locally and running smoothly, looked very much like a Google Map (an OpenStreetMap, in this case). But, when I showed the original map concept image, with all the crazy buildings, they were much more intrigued.

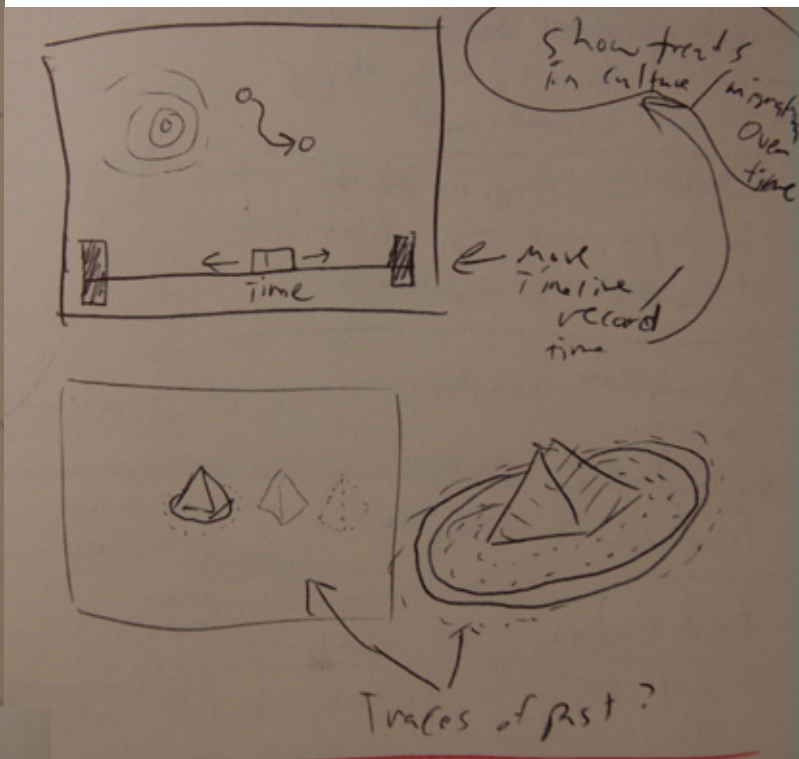
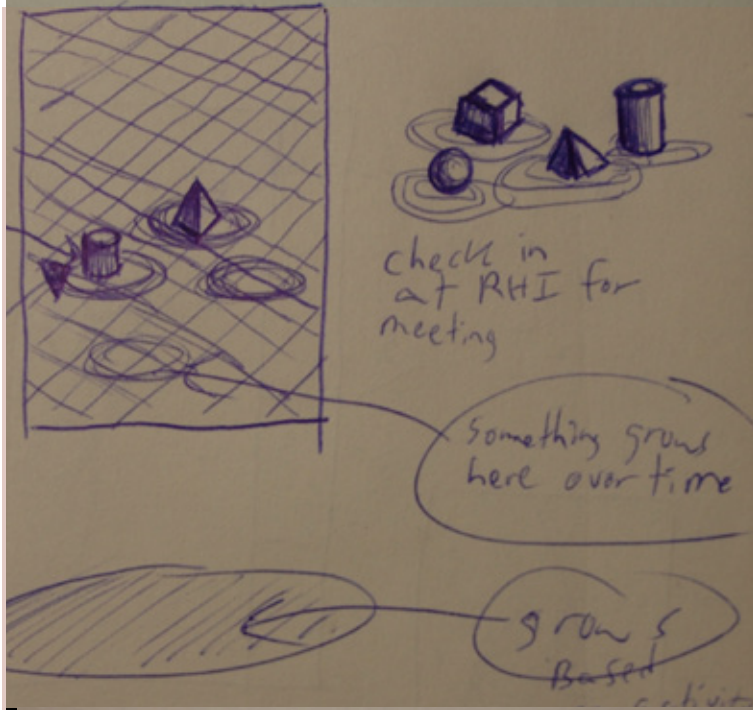
With enthusiasm, they said it looked like the Sims (a reoccurring observance). We switched back to the map interface design, after the game-like intent was clearer. There were minor critiques over which symbols meant what (The Circle as Group and WiFi symbol were both good, while the shape representing Events should be a star, not a trapezoid). We moved on to the map style, in particular what the neighborhood schools should look like. It was immediately clear the YRG teens weren't interested in a direct translation of the school buildings from real life – they are giant rectangular boxes. Instead, the intangible, expressive quality of what the schools represent to the community, in particular the students who attend, would be more important.



“Cartoonish...” “...it should look like a giant brain,” was tossed around, and, in the end, the pseudo-surreality of this image, a giant brain resting on a map, was carried over as a giant apple resting on a stack of books, on top of the standard brick block building throughout Red Hook ****pictured**** (the apple with three books stacked underneath was inspired by the Charter school’s information billboard graphics). This initial design concept of large representative objects on top of buildings was later carried over to other permanent map landmarks.

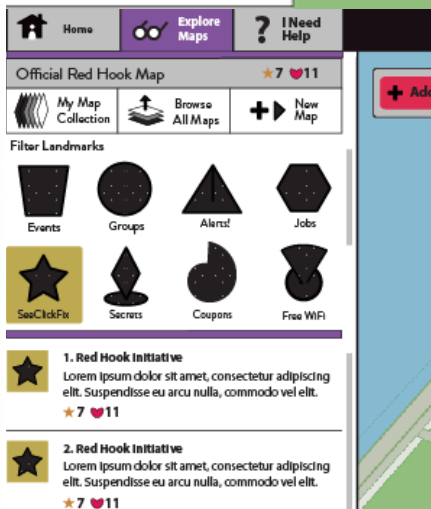
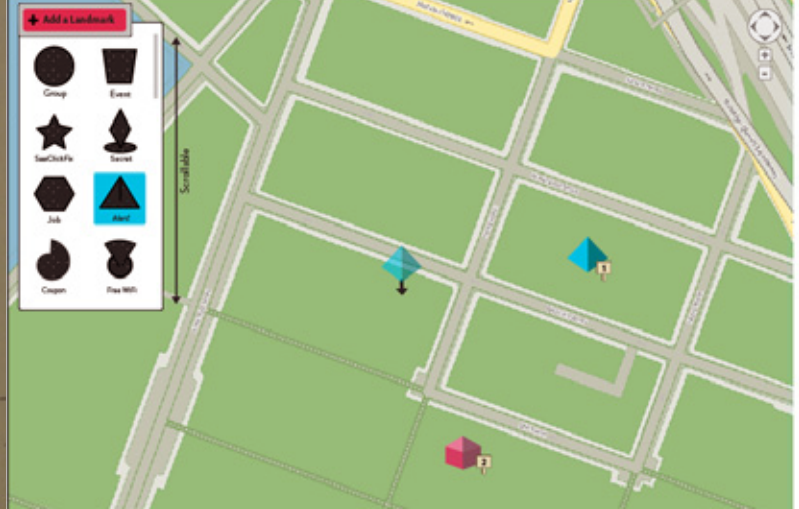
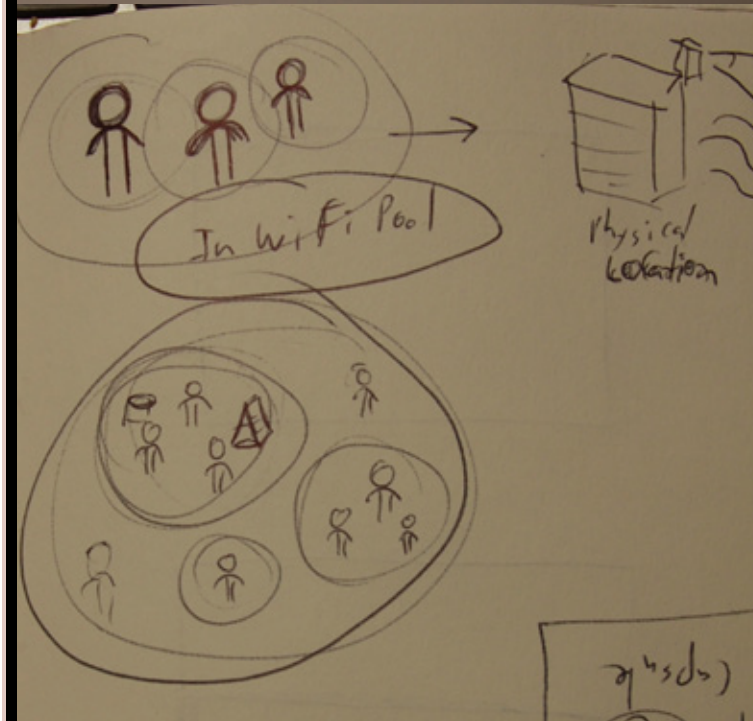
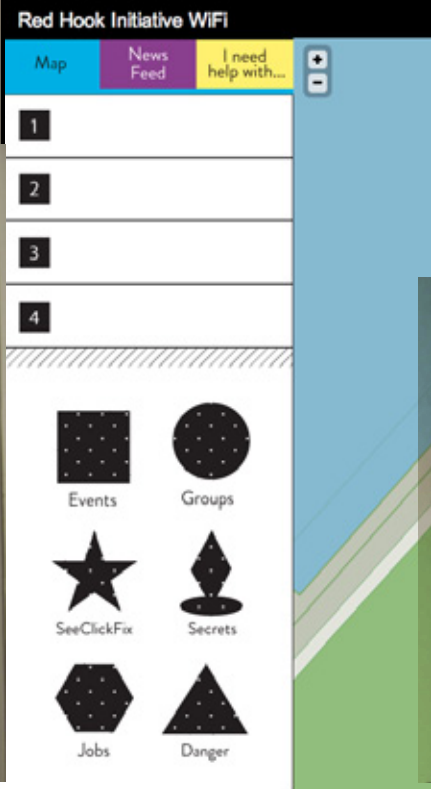
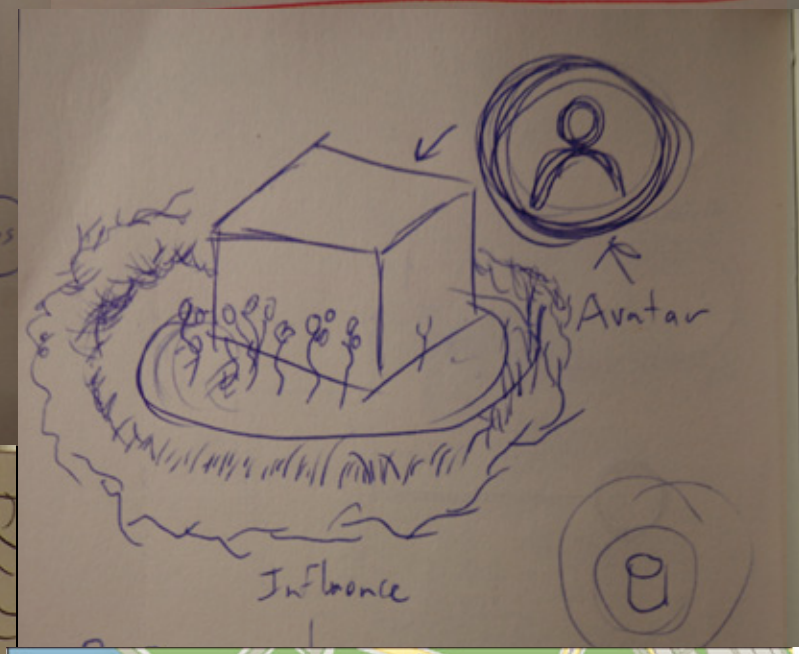
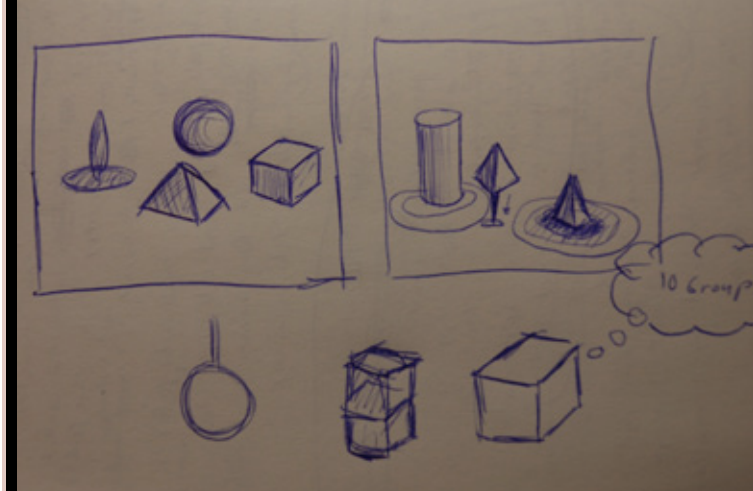
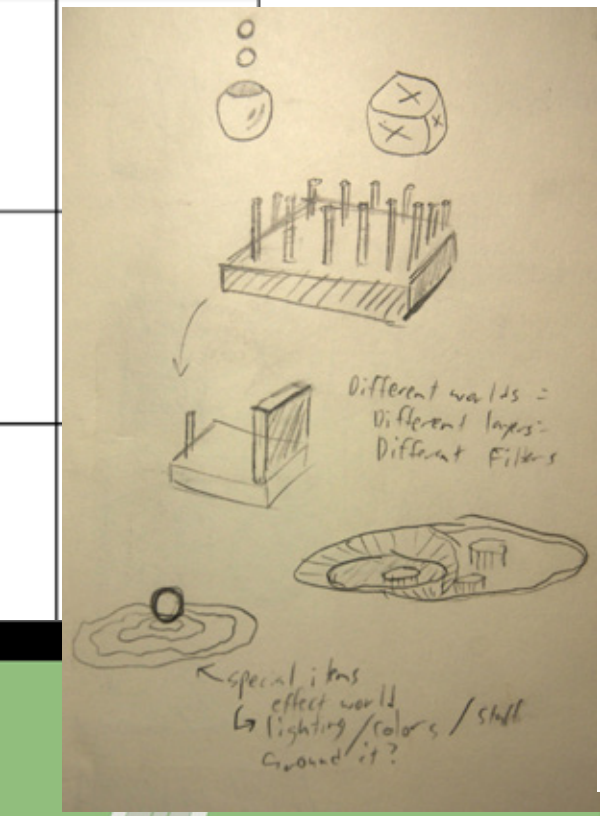
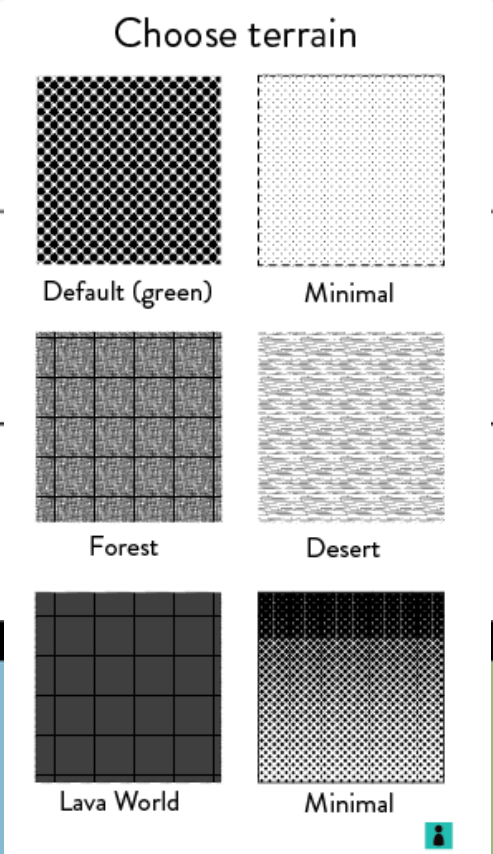
Afterwards, we talked about other incentives we could use to get people to contribute and interact with the map. An interesting notion of rewarding top users with age appropriate real world parties at RHI - a dance party for teens, a dinner party for adults - was proposed. This was an intriguing embodiment of previous research into the need for face to face, ritualized interaction among active community members, as well as bridging the gap between physical and digital community spaces.

While this is a long term activity to incorporate, it is important to consider when bringing in other measurements of social capital, role and contribution to the network (points, awards, etc.) on a user’s profile. By overlaying real world incentives, in this case exclusive parties,



Red Hook Initiative WiFi

Map	I Need Help With...
Everything	Money
Safety	Housing





Tina Kügler, "Village Map for Textbook," JPG, accessed May 7, 2012, <http://tinakugler.blogspot.com/2010/04/village-map-for-textbook.html>.



onto digital, rivalrous currency, it projects material value onto point/coin/badge collecting mechanics.¹

These reciprocally exchanged currencies are also prevalent in socially networked games, such as Draw Something or Farmville, that work off growth/leveling up cycles and a constant flow of goods trading to keep players hooked – the million dollar question that “gamification” heralds, is whether or not these mechanics truly translate into the real world.

March 14, 2012: Coffey Park Installation

The clear, warm day was a great time to ascend a rather tall rooftop in Red Hook to install a new antenna to beam connectivity to Coffey Park and (theoretically, the “Trip Towers” housing buildings as well, based on line of sight). It was quite windy up there, and of course the ladders were old, rusted and wobbly. The ethernet cabling was strung all the way down to Anthony Fatato’s apartment, the director of another Red Hook organization called WE Endeavor, where a plug server and router were connected to it and hidden behind a dresser.

This node is self-contained and unconnected to the Internet. A temporary, “coming soon, under construction” page was put up for people trying to connect. And yes, the under construction image is an animated GIF.

Artistic Map & Landmark Styling

It was difficult to come up with a map style which would embody the sentiment of Red Hook and be interesting to look at, but also functional as map data to sift through. With a more expansive creative process (and more time), I would have enlisted local artists from the community to help in this conceptualization and execution process. I propose that an interface should be integrated to make it easy for local artists to swap out my imagery with their own, in any community that wishes to create their own local TidePool network.

I started from “The Sims” isometric (pseudo-3D) building art direction that both the Youth Radio Group and Community Change Workers recognized and responded to positively (this familiarity is probably related to the ubiquity of the Sim franchise in popular culture – to the point where it is a core mechanic in itself to build on top of...which is a very good thing to do). I combined this with my observations into village/small city-oriented (usually hand-drawn) maps, which highlight important landmarks by isolating and enlarging them, resting on top of simple drawings of roadways.

¹ Raph Koster, “Social Mechanics, The Engines Behind Everything Multiplayer” (slides presented at the Game Developers Conference, San Francisco, California, February 28-March 4, 2011).





Conor McGrady, "Red Hook through History," Groundswell Community Mural Project , JPG, accessed May 6, 2012, http://www.groundswellmural.org/Public_Art_Projects/2008/2008_Red_Hook_Through_History.html.



Jules Antonio, "Red Hook Graffiti," JPG, accessed May 7, 2012, <http://www.flickr.com/photos/julesantonio/6787856140/>.

For a time, I was obsessed with the surreality and landmark oriented aspect of maps found in the original Mario Bros. games (when navigating Mario from level to level). However, the results of trying to convert this concept into a Red Hook map were muddy and unintelligible. At this point, I was quite frustrated and felt a sense of futility about trying to capture an artistic essence of Red Hook.

After a meeting with Liz, wherein we discussed a range of artistic styles, I set out on catapulting off the stylings of Hundertwasser. I needed to break out of the mold of literal translations of building styles, and this was a good start. I mocked up a concept interface in this style and shared it with Tony. He didn't feel it captured the sentiment of Red Hook, neither the stylings of the nautical area around the docks, nor the Red Hook Houses tall brick buildings. I felt more confident when he said I should just "go for it" and interpret the area from my own experiences, because I had been working in Red Hook enough to capture a personal sentiment.

I fell back into browsing through my photos of the Red Hook area and local graffiti artwork, as well as mural paintings I found through image searches. There was definitely a difference between the public art around Van Brundt st., the artist area, and the pieces closer to the Red Hook Houses. The former had the indie-styling of any arts district – inspired by the early 1900s aesthetic of Egon Schiele (later popularized by Peter Chung's animated show, "Aeon Flux").

The style I needed to focus on was different – it was comprised of thick, clean black lines (with a slight hand-drawn feel), colorful highlights, a curviness and forced perspective 3D-ness to the text and painted images. It's not necessarily derivative of graffiti, but does share a commonality with the aesthetic, combined with the color palette and surface textures around the neighborhood. I began to see it in school murals, logos, and even older signs around the Red Hook area. I combined this with the ubiquitous brick building architecture (as a design platform for a range of buildings), and native flora to paint the Red Hook landscape into the map interface.

March 28, 2012 : Community Change Workers (UX / UI / Art Style Feedback)

Becky joined me to document the user test with the Community Change Workers. I brought along some hummus, baby carrots, chips and salsa for the test. Tony brought in some iced tea, cups and plates. It was a nice little snack in that weird time between lunch and dinner.

I was intent on answering a few major questions to further the mapping software:





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is the interface intuitive (does dropping a landmark onto the map make sense)? Are the CCWs excited to add landmarks and see what else is going on around the map? Is the informational beneficial? Is the artistic style I settled on relevant to the Red Hook community?

The testing and feedback session was populated by a mixture of CCWs and some others from RHI. The overall response was positive, and the discussion was more lively and diverse in terms of who wanted to talk about it. "It keeps you intrigued, you want to see what else is going on..." Khadija said, "...it looks kind of cartoonish, but it's easy, it's relatable." (The colors would be later muted a bit to create a design hierarchy) "It looks so animated, it looks fun," Azula Crawford said.

"...it looks like a game," Tiwan Burrus said positively, when asked whether the style would appeal to everybody in the community, "...[it] makes me want to look at it more, see what else is going on...if it was an old style...old fashioned, with regular buildings, it wouldn't be so cool."

Tony asked what else the map could do. "If you're lost it would be very good," Alisa said, "...I've lived here 21 years and I don't know Red Hook...I can't tell you street [names]." Khadija agreed, "...I've been here 21 years and I don't know every block." "I don't know either," Azula said, "there are different types of blocks...the numbers on the blocks have disappeared...or they took them off [completely]."

Later on in the conversation, Khadija said: "...it will help us around Red Hook...people say go to Poor Block, go to Sly Town, what the hell are they talking about? I don't know where that's at. I don't know them [(the areas)] like that." "I know where I live and I know how to get out of here," Azula said. "Another one is Trip Towers," Alisa said about the nickname for the three connected housing buildings south of Coffey Park, where she lives, "I didn't agree to that [name]!"

Earlier, on the walk over to the test with the CCWs at RHI, Becky and I went a new route and got lost. It was starting to rain, so I tried searching for RHI on Google Maps. Google couldn't find Red Hook Initiative's address – the name is listed wrong in their database. Instead, I had



Footage shot by Becky Kazansky





to navigate into RHI's website and grab the location manually, finding our way just before it started pouring. If only the map interface was running and I could reach the WiFi from our location.

There was much discussion about the B61 bus stop I put on the map, and my intention to have it glow in some way when a bus was coming soon. I was going to just synch it up to the official bus schedule, but I was reminded that the B61 (one of the only buses in the area) never comes on time and barely shows up at all. Tony mentioned the new "real bus arrival time" program the MTA is starting to roll out – there's an API, so as soon as the B61 is integrated into the program, bus arrivals can be synched with the community map – this idea was welcomed adamantly by the majority of the room.

We discussed other landmarks we could put on the map – such as, places to eat and medical offices. The idea of adding people to the map came up: "If you know where buildings are," Carlos said, "you should be able to know where friends are." There's been a lot of comments throughout the sessions from residents about wanting to put avatars of themselves and their friends on the map. This may be the true relationship that one has with a digital interface that represents those core elements of The Sims – without the ability to project oneself onto the spatial simulacrum of their immediate surroundings, a true empathetic connection to the interface cannot mature. This would be the difference between the self-omnipotence of Sim City versus the self-mirroring in The Sims.

After the discussion, volunteers tried out the interface for themselves. The first person up was Carlos, who, upon selecting the "group" landmark to put on the map and a tree popped up where he clicked, said "Oh a tree, I don't know what that is, I don't want a tree," got up and walked away. He was not expecting and greatly disliked the fact that the group landmark was represented by a tree – an admittedly odd combination in hindsight (and has now changed).

Upon encouragement, he came back and tried again. This time he tried to drag an activity (represented by a star) from the landmark panel to the map. There was not a mechanic in place to support drag and drop (just click and drop), but since this observation, I have incorporated this feature into the interface (as it is more natural plotting gesture for map

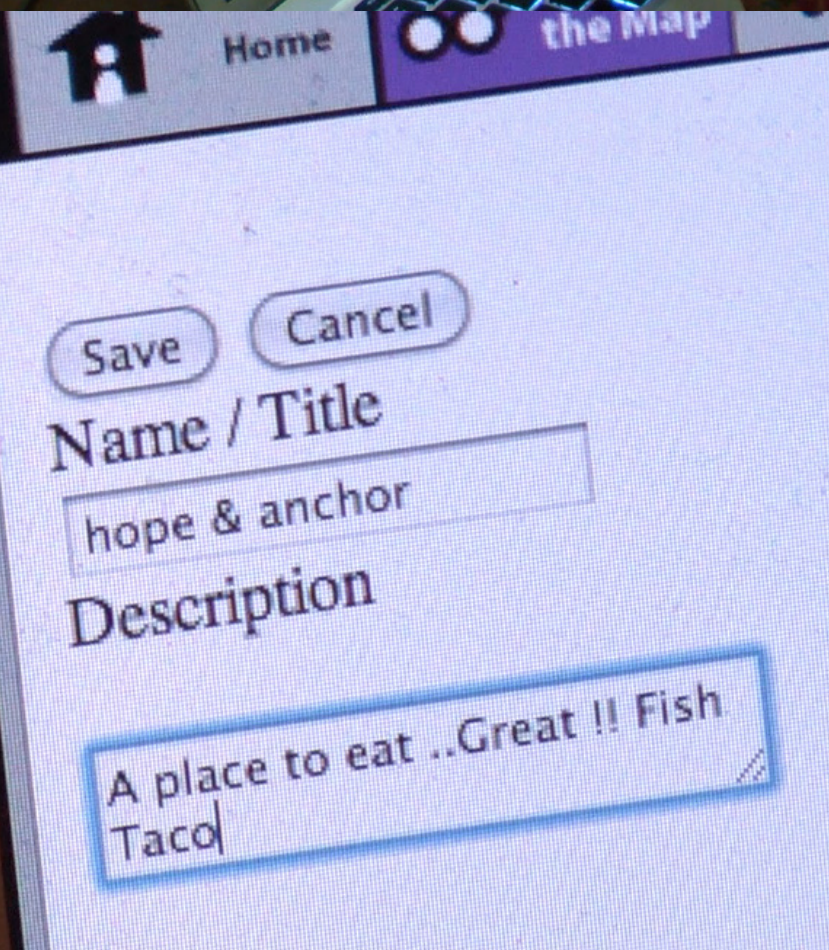


populating). He did successfully put an activity star on the map, named it “lgbtq,” and was happy to see it show up in the ordered list and map.

Daniel was next – he dropped in what he referred to, jokingly, as his imaginary sex shop on the other side of the freeway, in Carroll Gardens. Others in the room voiced against it, so instead, he called the landmark “store” with the description “nice.” The map refreshed, and he was very pleased to see that his shop was still sitting there, in Carroll Gardens.

Afterwards, Khadija tried out the interface. “It really looks like the [B]61...,” she said of the bus stop on the map, and “...this looks like the Trip Towers” she said of a set of buildings I placed on the map, where the Trip Towers were located. After a few problems figuring out how to navigate (partially due to the in-progress computer code causing issues), she added a Memory landmark for the restaurant named: “Hope & Anchor,” with the description: “A place to eat ..Great!! Fish Tacos,,” and was excited when it showed up on the map.

“I think people are really going to like it,” Khadija said, “it needs work, but it’s fun...this is our own little Sims in Red Hook.” Tony tried out the interface afterwards, adding a landmark called “Valentino” near the Red Hook pier, with the description: “walk your dog here.”



Footage shot by Becky Kazansky



Conclusion

Over the past six months, I worked closely with the Red Hook community, in both a digital space (through the WiFi powered, local shout box website on the roof of RHI), and in a physical space (meetings with the Community Change Workers and Youth Radio Group at RHI).

Based on my original goals I consider this a successful thesis. The social realm of community wireless mesh network engagement were met to a tangible degree. My intention of creating incentives to use a local network, by addressing community needs, interests and culture were well received and relevant to the Red Hook Housing residents. They thought the interface was overall, very engaging.

It forged new research and practice into community wireless mesh networks, localized data aggregation, and grassroots mapping. It has opened a dialog within the community that the residents are genuinely interested in working with and developing into the future, as it serves their custom tailored needs.

Based on the level of activity that was received by the shout box interface, there is evidence that when the TidePools mapping software is broadcasted over the community WiFi, there will be some level of adoption and usage. This might be augmented by word of mouth and community flyering, as well as SMS integration for maximum usability and awareness.



Findings & Long Term Applications

Going forward within the Red Hook community, the need for what OTI New America calls “digital stewards” are necessary for long term technical sustainability. These mesh gardeners must be local to the area, ideally from the Red Hook neighborhood itself, to maintain the networking architecture.

The “Global Innovation and Local Talent” talk at the New School, from the UNICEF team, discussed methods and strategies in implementing SMS, or text messaging, tools in mobile networks throughout African countries. According to Christopher Fabian of UNICEF, the most effective, stable and long-lasting developments involved educating locals from these communities in Python computer coding and structural network knowledge.¹ This provided autonomy to self- sustaining, interoperable technical communities, that didn’t require further intervention other than the initial catalyst by an outside influence. Residents were also more adept at addressing local needs and issues that unforeseeably arose.

Educating the community on networks as a whole, while teaching the most interested members how to setup antennas and flash routers with new firmware and program their social software will be an important factor in long-term mesh survivability. Community networks have their own socio-political, economic and topographical issues that only a local community could navigate and resolve.

An equally important role are those involved in continued social and community development – listening to the needs and interests of residents, reassessing the current physical and digital interfaces, and continuing to integrate real events and meetings to perpetuate awareness and interest in the network. It is also important that local artists can easily replace the landmark designs that were created for the project, to compensate for constantly fluctuating cultural sentiments in a given area.

Past the specific Red Hook community level, long term use of TidePools across communities can lead to an API aggregation of geospatial landmarks and community data, from all communities, onto a global map server. As communities have specific needs that might be shared in other regions of the world, a community app marketplace of locally brewed TidePools extensions, would stimulate a pan-regional, ecosystem of sharing and bootstrapping.

¹ Christopher Fabian, “Global Innovation and Local Talent” (lecture, The New School, New York, NY, October 6th, 2011).



Social capital, where acquired skill and participation are rewarded to user profiles on the networked level is important for long term social capital between residents as well. The Mozilla Open Badges initiative is a great example of how this integrates into real world goals and learning rewards, easily fitting into a community atmosphere with social and technical praise from others in the area. "Badges have been successfully used to set goals, motivate behaviors, represent achievements and communicate success in many contexts,"¹ as is stated in the Open Badges white paper on badges in general, is a concept carried into gamification as well. A preview of this in the alpha TidePools build, are flowers that start growing around landmarks the more comments it receives.

¹ The Mozilla Foundation and The MacArthur Foundation, "Open Badges for Lifelong Learning," (The Mozilla Foundation, 2011), 6.

Linux router & low-powered plug server with USB storage

Addendum

In the process of writing up this thesis paper and developing the software, concern was raised by a few of the Community Change Workers about putting nicknames of the places around the community on a public map, outside of Red Hook (in my thesis exhibit and on my thesis website). In particular, they felt it was not acceptable that a non-member of the community, like myself, would be populating the map with community-only information for a thesis show.

A majority of the CCWs were actively supportive of my intentions behind mapping these nicknames (Trip Towers, Flagpole, etc.) in direct response to what I learned from earlier meetings (not everyone knew the locations of these places within the community, which could help in local navigation). Both arguments were valid, so I chose to remove the nicknames from my thesis related work hosted outside of Red Hook, while leaving it up to the community to add nicknames they are comfortable with in their community map.



Grouping synchronous (visitor) & asynchronous (resident) interfaces



Technical Networks & Public Safety

Organic Hierarchy

Nodes and clusters with strong ties require more bandwidth to properly communicate, while weak ties can be less prioritized. These strong ties are the “backbones” or “highways” of traditional, centralized Internet networks – the nature of mesh networking limits the formation of such static structures, thus an emergent, ad hoc approach to backbone organizing¹ could be addressed through studying strong ties on a network. Areas with the highest level of communication, such as between two universities, could connect via directional antennas, fiber optics or multi-radio routers to free up bandwidth for the rest of the network.

Combining the human and Internet communication networks could allow for optimal and stable network infrastructure. By metering communication between nodes and clusters through frequency, significance, and packet size, while factoring the number of node messages passed through before their destination, a technical and a social relations approach to mesh communication could emerge.

Additionally, network hierarchies (human and technical) need to move past centralized and decentralized network models, to account for informal power relations and privilege that Jo Freeman describes in her critique of Feminist grassroots organizations.² Galloway further criticizes this “web of ruin” as “a new form of control, as opposed to the magnifying power of the “chain of triumph.”³ The ideal, may or may not be a combination of these two network models, an organic hierarchy of checks and balances.

Public Safety and Emergency Planning

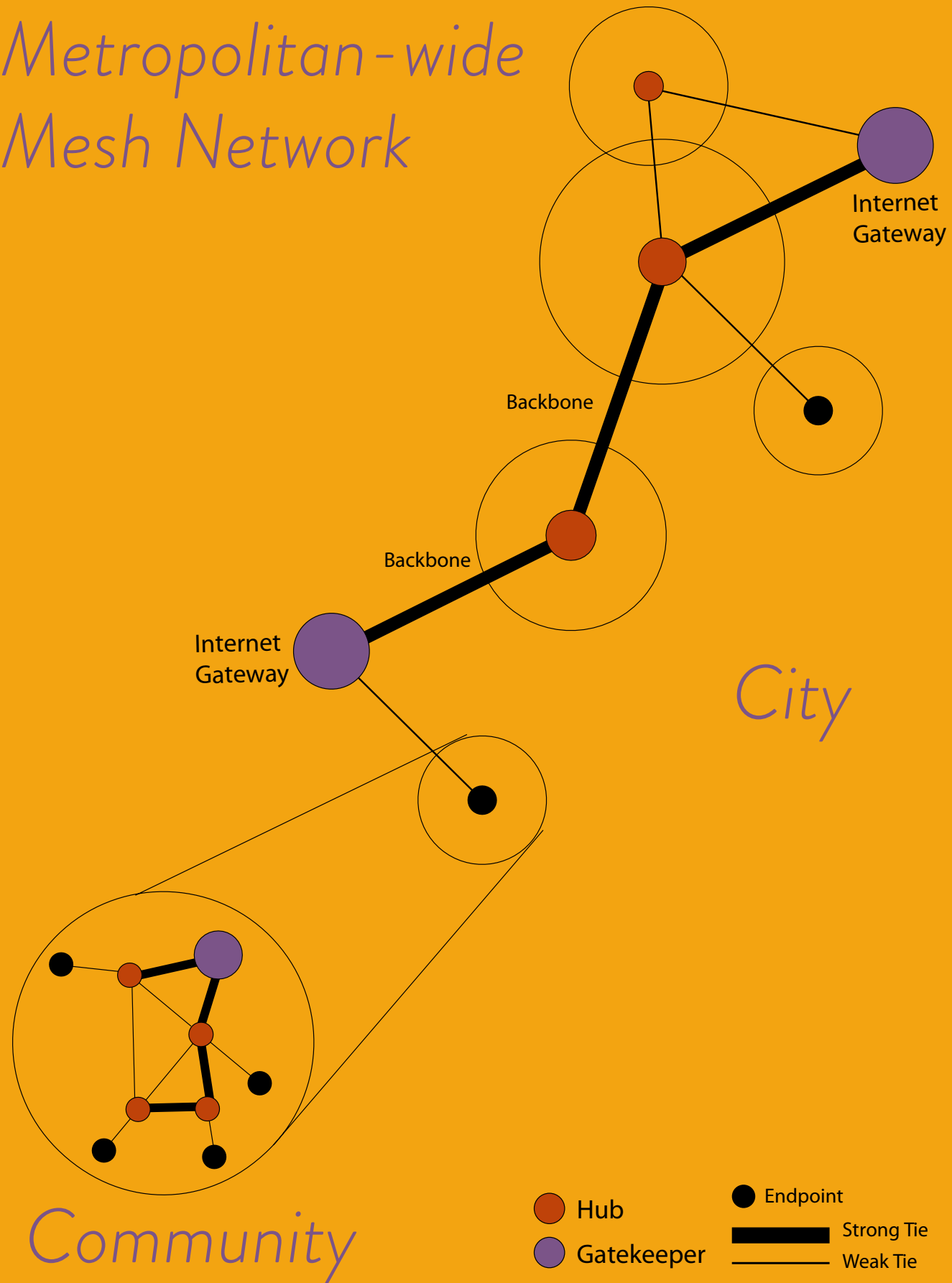
From a technical angle, it is problematic to install mesh-enabling software on users’ phones, devices and laptops to create mobile ad hoc networks. Difficulties include ease in users gaining “root” access to their devices, violating warranties, incompatibilities between mesh protocols, and ease of installation/use for non- tech users. Battery life and CPU cycle consumption are also major factors when routing other users’ traffic through the mesh, while bandwidth optimization (to minimize the number of hops) through ad hoc backbones is still theoretical.

¹ Amir Esmailpour, et al, “Ad-hoc Path: an Alternative to Backbone For Wireless Mesh Networks” (University of Guelph and Ryerson University, 2007), 1.

² Jo Freeman, “Tyranny of Structurelessness,” accessed December 15, 2011, <http://www.jofreeman.com/joreen/tyranny.htm>.

³ Alexander R. Galloway, “Critical Terms for Media Studies: Networks” (Chicago and London, The University of Chicago Press, 2010), 281-293.

Metropolitan-wide Mesh Network



Socio-technically, mesh networks increase in reliability as the number of users increases. Until a critical mass of meshed devices is within range, the network is unreliable or non-existent. Easily deployable or pre-installed relay nodes between well populated areas could help quality of service. Another difficulty is ensuring that users have access to or have already installed mesh technology on their devices, before a loss of centralized communication services (through natural disasters, political uprisings, etc.). Otherwise, the technology will not be able to satisfy unforeseeable, immediate needs.

Enabling of mesh on devices before a communication shutdown can be incentivized. It could be as simple as creating a culture of latent sharing, in the way that donor stickers work on driver's licenses. This creates a social capital of readiness and awareness, if the user is able to subtly show off their installed mesh software, or "donor card."

In "From Face-Block to Facebook or the Other Way Around?" Apostol, et al. call on urban planning to "encourage the creation of [Wireless Network Communities]," due to the "capability [of WNCs] to increase social capital" and "inclusiveness." They could be "active[ly] operat[ed] through policy implementation and city sponsorship."¹

Emergency preparedness and wireless communities are interlaced. Treating the mesh network as a secondary layer of communication, a community must have an immediate and well-publicized backup plan that includes wireless ubiquity, or the ability to dispatch wireless nodes soon after a disaster or political situation. By ingraining mesh network awareness in the culture, making it distinct but compatible with the regular Internet and providing localized communication incentives and features, a community could be fully autonomous after a crisis.

¹ Ileana Apostol, Panayotis Antoniadis, and Tridib Banerjee, "From Face-Block to Facebook or the other Way Around?" (California State Polytechnic University, University Pierre and Marie Curie, and University of Southern California, 2008), 10.

Annotated Bibliography

Antoniadis, Panayotis et al. "Community Building over Neighborhood Wireless Mesh Networks." Draft accepted for publication at IEEE Technology and Society. Special Issue on Potentials and Limits of Cooperation in Wireless Communications, March 2008.

A collaboration between social researchers and wireless network technicians to conceptualize the best practices and needs for wireless mesh network communities to thrive in a completely decentralized environment (without municipal/government/corporation support). Notable concepts are cross-layer incentive mechanisms, the notion of the "social layer" on top of the traditional network stack, and the need for trust, reciprocal exchange and interdependence in a community network.

Apostol, Ileana, Panayotis Antoniadis, and Tridib Banerjee. "From Face-Block to Facebook or the other Way Around?" California State Polytechnic University, University Pierre and Marie Curie, and University of Southern California, 2008.

A collaboration between social researchers and policy/community planners. As opposed to the approach taken in "Community Building over Neighborhood Wireless Mesh Networks," this paper approaches the problem from the municipal angle, working with city planners to create a grassroots and civic collaborative environment. The most notable concept is that of the hybrid space (digital and physical interaction environments) that shapes a majority of the arguments presented.

Benkler, Yochai. "Wealth of Networks." New Haven and London: Yale University Press, 2006.

A dense analysis of open source, decentralized versus closed source, centralized networked modes of production and information economies that fuel innovation and collaboration around the world. Notable terms of modularity and granularity bridge into analysis of emergent, interactive environments.

Dourish, Paul and Genevieve Bell. "Divining a Digital Future: Mess and Mythology in Ubiquitous Computing." Cambridge, Massachusetts: MIT Press, 2011.

A computer scientist and cultural anthropologist propose new ways to interpret the messy physical and ethnographic digital nature of the third wave of computing technologies known as ubiquitous computing that permeate the world today. Interpretations of the technology draw from sociology, politics and economics.

Forlano, Laura et al. "From the Digital Divide to Digital Excellence: Global best practices to aid development of municipal and community wireless networks in the United

States." New America Foundation, 2011.

An exhaustive and incredibly detailed list of nearly all past and present wireless mesh communities around the world that have formed from grassroots, municipal and a combination of the two. Aspects covered include original motivations to form the networks and factors leading to their success or failure.

Freeman, Jo. "Tyranny of Structurelessness." Accessed December 15, 2001.

<http://www.jofreeman.com/joreen/tyranny.htm>.

An analysis of decentralized, grassroots 1970s Feminist groups and the unmentionable, informal power and privilege structures that indirectly influenced decision making. The most intriguing argument against completely distributed network models.

Gurstein, Michael. "What is Community Informatics (and Why Does It Matter?)." Milan, Italy: Polimetrica, 2007.

Already proving to be a very influential research area that I just discovered, Gurstein formed the research theory area known as Community Informatics to study networked communities as separate from traditional notions of the actor and node and how technology is assimilated/adopted into the community atmosphere.

Kim, Amy Jo. "Putting the Fun in Functional: Applying Game Mechanics to Functional Software." Slides presented at a Google Tech Talk, Mountain View, California, January 30, 2009. http://www.youtube.com/watch?v=ihUt-163gZI&feature=player_detailpage#t=480s.

An influential overview of various game mechanics as applied to social interaction software, including set collections, social capital and intrinsic vs. extrinsic economies.

Koster, Raph. "Social Mechanics, The Engines Behind Everything Multiplayer." Slides presented at the Game Developers Conference, San Francisco, California, February 28-March 4, 2011.

Another influential overview of social gaming mechanics as drawn from a variety of other theoretical areas of research. Notable topics covered are clustering, weak vs. strong ties, social status, leaderboards, rival and non-rival goods, roles, rituals and traditions, lifecycles and trust levels.

Stephenson, Karen. "Of Human Bonding." People Management, October 29, 1998.

An introductory article to gateways, clusters, nodes, actors and weak vs. strong ties in information economies. This writing has helped to analyze existing weak power and communication structures in networks in wireless communities and how these can be re-thought.

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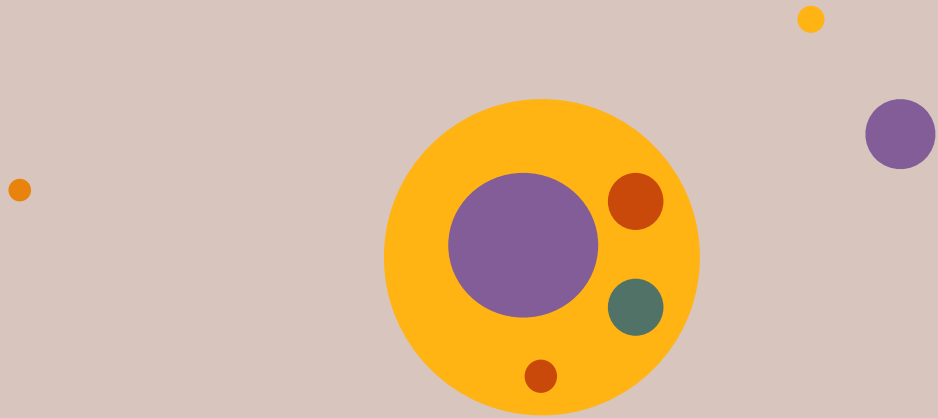
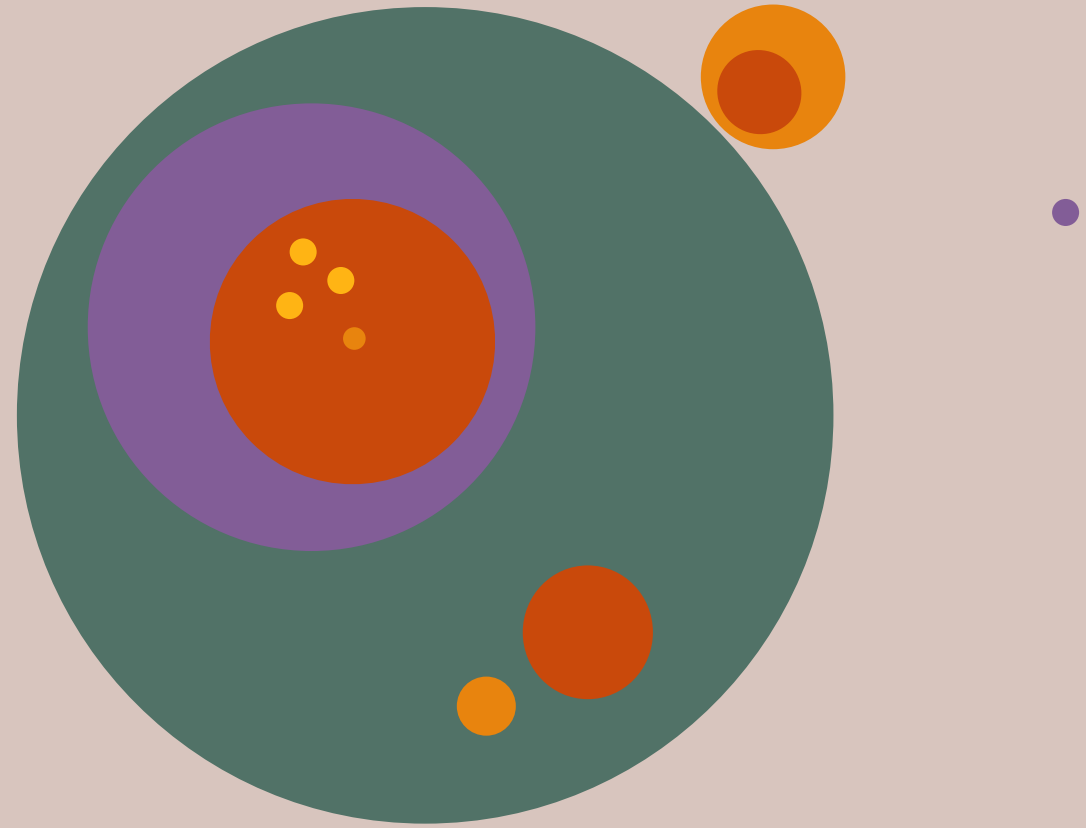
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tidepools.co