Service Designing the City

NATALIA RADYWYL
Fjord

From cataclysmic recessions to unprecedented climate disasters, our cities seem awash with unintended consequences borne of complex times. While city administrations grapple with developing systemic supports, our infrastructure, communities and individual wellbeing are increasingly succumbing to the strain. This paper examines a practice gaining recent traction for improving our cities' sustainable resilience: service design. As an inherently user-centered, reflexive and iterative practice, it develops service systems by drawing upon a range of disciplinary roles - from makers to strategists, and ethnographers to technologists. I examine three New York City-based case studies which each attempt to improve the services its residents use and need. While responding to the complex needs of the same city, these case studies illustrate the vastly different possibilities for improving broken civic services through institutional intervention: housing in civic service design, mobility in private sector service design, and online access, in what I term 'generative', community-based service design.

INTRODUCTION

On October 29, 2012, the grave fragility of New York City's (NYC) infrastructure was abruptly exposed. As the night wailed with Hurricane Sandy's ninety-mile-per-hour winds, New Yorkers were swiftly reminded they'd built a city atop islands. Storm surges of up to nine feet devoured shorelines and bloated the city's belly. Water swelled through underground cabling, the subway system, basements, apartments and streets. Trees reared and fell, while subterranean explosions marked the demise of neighborhood power. The winds eventually passed, leaving only the sound of lapping water. As the full moon's glow faded and the skies shone blue with a quiet dawn, impossibly, the big city had been silenced. Lower Manhattan, Staten Island, and parts of Brooklyn and Queens were waking up to a sodden, sad chaos. Those who had spent the night in the dark were now experiencing an information blackout, with phone batteries dying and the few functioning cell towers jammed. Communication was broken. NYC had clearly failed to cope with the unanticipated shock of a large climate event. It cost forty-eight people their lives, and left the city's coffers $US19 billion emptier (Blake et al., 2013).

Sandy was devastating, but not an unprecedented case of city system failure. From climate events to recent recessions, city administrations around the world are struggling to create systemic supports which sustain urban life. Ulrich Beck describes this as the legacy of 'reflexive modernization', a phase of modernity characterized by the dissolution of modern institutions. Existing systems are destabilizing, rupturing, and resulting in a slew of

'unintended consequences' (Beck, 1994). In this context, a city is best understood as a complex and adaptive system. Rather than a programmatic output of blueprints and policy, it is a whole comprising the ad hoc sum of its parts, and many non-linear, interacting elements (Alberti, 2008; Marzluff et al, 2008). This complexity challenges modernist assumptions of basic predictability and order, meaning that institutions, such as city agencies, need to adapt their practices to account for unpredictability (Snowden and Boore, 2007). Cities can also be resilient in problematic ways. When understanding resilience as the capacity of multiple, stable systems to maintain the same function, structure, identity and feedback while absorbing and reordering around systemic disruptions (Walker 2004), our cities' resilience actually reflects 'institutionalized unsustainability' (Westley et al, 2011).

Fortunately, within destabilized systems lie opportunities for innovation. As cities become increasingly networked and digital information more readily accessible, new forms of knowledge, practice and technologies come together in novel ways. In this paper, I propose that these are also the seeds for more sustainable forms of urban resilience. However, while technological development carries great potential, we need a more sophisticated understanding of the way technology can be positively harnessed. There is a risk in failing to. In recent years techno-centric rhetoric has been allowed a large and loud platform, promising big data and the roll out of the 'smart city' as magic bullets for improved urban living (Hollands, 2008). Yet these concepts are predicated upon efficient and smoothly running services (Antirroiko, 2013), which, at least in rhetoric, are hoisted upon the modernist, technocratic strategies now failing us (Greenfield, 2013), thus reinforcing the current state of unsustainable resilience. Moreover, these concepts often abstract the role of human relationships with the city and each other. Recent resilience research has shown that social relationships are just as, if not more important than technical systems for enhancing sustainability in cities. This suggests that resilience should be fostered as an everyday steady state, founded upon strong community networks and city-supported social infrastructure, irrespective of potential disasters (Fullilove, 2005; Klinenberg, 2012).

This paper examines one innovative practice for developing sustainably resilient civic services: service design (SD). While designing services may sound immaterial, services are indeed played out through the lived and material experiences of city dwellers. According to Lucy Kimbell, SD has taken two approaches to achieve this: a service engineering approach (designing the look and feel of a service as end result) and designing for a service approach (a social and material platform for ongoing action) (2011). The latter lends itself to complex system intervention, as the service system acquires value through all of the interactions it encompasses between provider, users, intermediaries, stakeholders, technologies, physical artifacts and other resources (Maglio et al, 2009). This approach reflects the strategic turn made by design fields aiming to tackle the complex 'wicked problems' (Rittel and Weber, 1973) characteristic of this era, and is the focus of this paper.

As a product of these times, SD is a wide field encompassing many disciplines, from makers to strategists and ethnographers to technologists. Design research is at its foundation, informing efforts to holistically design services by taking all components of the service ecology into account, from historically-grounded longitudinal views to the relationships which inform the current state. Therefore, broadly, SD is a user-centered, reflexive, empathic and often participatory process which generates rich data, uses elaborate

tools for documentation (e.g. service blueprints and user journeys), and produces system interventions using iterative, prototyping methods (Segeleström, 2009). In many ways it bridges anthropology and design practice by adapting methods from both. Ethnographically-informed social analysis becomes applied, and design is subject to a critical lens for the prototyping of design concepts, as well as implementation. Design ethnography also facilitates collaboration between multi-disciplinary team members and often cross-sector partnerships, as it provides a common point of focus – the system users.

I'll present three case studies which illustrate how the seeds of SD are taking root in various city sectors based in NYC: housing in civic SD, mobility in private sector-led SD, and online access through what I call 'generative' community-driven SD. While responding to the needs of the same city, they demonstrate the range of possibilities for enhancing sustainable resilience through institutional and infrastructural transformation. However, given SD is so nascent in NYC the case studies are not fully-realized expositions of the practice and lie somewhere between Kimbell's two distinctions. Rather, I tease out their emerging practices, and examine the challenges they face when trying to shepherd the design delivery of complex services: from teams evolving their research and design methods, to working with government agencies and engaging communities. By mapping the design teams' approaches and weaving in the voices of project leaders I interviewed in 2014, I'll appraise how modalities of SD can effectively disrupt service systems through user-centered strategies, and ultimately support more sustainable complex service systems.

CIVIC SERVICE DESIGN

Background: Improving the Housing Lottery Odds

For many New Yorkers, stable, affordable housing is increasingly slipping out of reach. Two-thirds, or almost two million of NYC households rent their homes. Rent burden is steadily rising. Almost a third of renters are 'severely rent burdened', spending 50% or more of their household income on gross rent. Unsurprisingly, low income renters are struggling most, with 78% rent burdened (Furman Center, 2012:24). The Department of Housing Preservation and Development (HPD) uses a lottery system to distribute affordable housing equitably, however historically, the service has been complex and inefficient. Service providers inherit poorly-filled applications, and many eligible New Yorkers don't even know to apply.

The Public Policy Lab (PPL), an NYC-based nonprofit organization dedicated to improving public services, and the Parsons Design for Social Innovation and Sustainability (DESIS) Lab, formed a partnership for Public and Collaborative, an international program dedicated to public policy innovation. The team approached the HPD to develop a project, for, as Chelsea Mauldin, PPL Executive Director, explains, they presented the best 'fit': "you need an in-house sponsor: an innovation or strategic planning unit which has the job of thinking about the future." The HPD's strategy division offered the greatest collaborative potential, as it was "interested in it as an experiment… and were willing to engage in the process in a substantive way" (Mauldin 2014). This included collaborating with the design team and making a good faith promise to implement the proposal. The twofold project goals

aimed to assist the HPD in delivering more effective, efficient and satisfying services, while exploring methods of community resident involvement in housing-related services, specifically in neighborhoods with significant public- and private-sector investment leveraged by HPD.

Process: On the Ground Empathy

The project followed what Bunt and Leadbeater (2012) call a 'creative decommissioning' process. The team firstly appraised the state of existing services by engaging a range of stakeholders, created prototypes to envision how the service could work, and then developed implementation and scaling measures. The appraisal commenced with an initial three month 'exploration' phase comprising loosely structured observations and interviews to refine the team's ethnographic focus. This became the Melrose Commons Urban Renewal Area, a former brownfield attracting recent HPD investment with plans for affordable housing, a new college campus, and commercial and community space. A second, more formalized and extensive fieldwork phase included structured observations (such as observing a lottery sorting event), ethnomethodological interviews and onsite workshops with HPD leadership, front-line agency staff, staff at community-based organizations (CBO's) offering housing assistance, affordable housing developers, and current or potential users of the agency's services. This phase aimed to reveal seeds for possible SD ideas, as Mauldin describes: "all of the work definitely evolved from what people told us about their needs or problems. We really tried to listen in this preliminary and then secondary research about what people are telling us" (2014). Here, 'listening' ensured that technical design ideas were borne of empathy and truly reflected user needs. This 'critical design ethnography' fosters trust-based relationships, informs socially-responsive design interventions, and supports sustainable change (Barab et al, 2004:264-265). Ultimately, it was this reflexive awareness which helped guide the design process, "figuring out when we hit the point where we've heard enough to be able to draw on… and create a construct of professional empathy… You can then go back to the office and do synthesis while holding them in your head and in your heart… And then enough engagement to see if you're getting it right" (Mauldin 2014).

Following synthesis of their ethnographic work, the team began exploring design concepts through a comprehensive participatory design (PD) process. PD is an iterative method which engages multiple project stakeholders through field visits and collaborative workshops, and invites users to coproduce design ideas through in-context activities. In best practice it is also a reflexive and empathic process. It builds a mutual respect for different knowledge (workers' and designers), creates opportunities to learn others' knowledge domains (occupational and technical), enables joint negotiation of project goals, supports the development of tools and processes to facilitate participation, all the while building a sense of shared project ownership (Blomberg and Karasti, 2012). Given that civic SD typically works with disadvantaged communities, PD can be an especially powerful engagement tool, including voices often marginalized in efforts to design the systems of which they are a part. However, as important as reflexivity is for high-quality SD, it also reveals the limitations of project impact, an at times challenging realization: "what does one do about the fact that

people have problems and needs that the system can't actually address, or even accommodate? There's not much we can do about those terrible stories" (Mauldin, 2014).

One aspect of ethnographic synthesis involves examining the improvisations users make to compensate for system failure. For example, research revealed that some CBO figures were attempting to bridge information gaps by acting as on-the-ground 'ambassadors' for the service unbeknownst to the HPD. These figures had deep community relationships, which indicated they could become an excellent social mechanism for localized communications: "We wouldn't have known about ambassadors if not for observing and then talking to them – and this became a key design idea which is set to be piloted… Let's build this bridge with these people who are pursuing the same goals, and who don't currently have a relationship with one another - and facilitate that in a 'light' way" (Mauldin, 2014). The team then tested design concepts such as these through co-design sessions, held in-context to approximate 'live' considerations and ensure participant comfort: "they should not be asked to be in a context which is not their context. That would feel like a co-design of someone's lived experience" (Mauldin, 2014).

The PD outcome was a complex service system which provides knowledge-sharing infrastructure. This infrastructure would adapt to the dynamic and reciprocal exchanges of information between residents, community-based partners, housing developers, and HPD leadership and front line staff (Dragoman and Kühl 2013:9). The team produced four multi-stakeholder pilot proposals: new, user-centered informational materials, a strategy for encouraging hyper-local marketing by developers, supporting community-based 'housing ambassadors', and forming a street team for in-person HPD outreach. To date, the HPD has accepted all four proposals and is now implementing pilots, with support from PPL Fellows.

Resilient Agencies: Shifting Mindsets

This model indicates that the work of SD is less about designing artifacts than resilient 'action platforms', engaging all service stakeholders into "a system that makes a multiplicity of interactions possible" (Manzini, 2011:3). In this way, organizational silos can begin sharing laterally as 'learning organizations', producing and transferring knowledge through inclusive and horizontal networks, from communities to personnel. They influence community and organizational behavior based on this new knowledge and related insights (Anttiroiko et al, 2014). Yet promoting organizational change can be a sensitive proposition, especially with legacy institutions such as government agencies. For example, Mauldin noted that "a big finding for us was that agencies don't have a lot of experience with ethnography", yet at the same time "tend to believe they know their service users, claiming they hear the same stories and complaints all the time… but this is not the same as deeply understanding the context of these stories and complaints" (2014). The team found that their project partnership model, in which an agency partner works closely with the design team, helped resolve this challenge. Opportunities for informal and inclusive knowledge-sharing revealed the lived reality of the service's users, while also building trust between the team and agency. The agency's orientation subsequently shifted to "think about user experience… ways to capture user feedback… creating pathways for communication…That is definitely

something that's now more obvious to people in the agency than it was before" (Mauldin, 2014). This landmark realization allowed the HPD to begin envisioning social infrastructure as a real service strength, and ultimately conceive of itself as a user-centered service system. As explained by Kathryn Matheny, Chief of Staff/Deputy Commissioner of Strategic Planning, Technology & Administration, upon identifying expertise beyond their own, HPD administrators now recognize untapped potential: "Perhaps most important, our partners in this initiative have brought a single-minded focus on the experiences and perspectives of the real experts on the matter of public service delivery – the residents of New York City and the agency staff members who, on a daily basis, work with the public to improve housing conditions" (in Dragoman and Kühl, 2013:6).

PRIVATE SECTOR SERVICE DESIGN

Background: NYC On-The-Go

Navigating NYC's subways can be a frustrating experience for the most seasoned of New Yorkers, let alone visitors and irregular commuters. From temporary printouts of service disruption notices to incomprehensible overhead announcements, the current notification systems are inefficient for both commuters and service providers. To improve communications for commuters, the Metropolitan Transit Authority (MTA) launched 'On the Go!' kiosks in five locations in 2011. However they remained largely ignored, unintuitive and offered few compelling reasons for interaction. In early 2012 the MTA put out a request to redevelop the kiosk experience, and Control Group, an NYC-based technology and design consultancy, was selected as a project partner. By mid-summer 2014 fifteen of NYC's subway stations will be the new home for 90 one-tap navigation kiosks. They feature wayfinding, trip planning, realtime service updates, selected third party content and are enabled with video cameras, microphones and WiFi to facilitate two-way messaging and public communication.

Process: Testing Interventions

Unlike the previous case study, Control Group knew what kind of artifact they would be designing at the outset – a kiosk. However the technical requirements, interaction design and strategies for optimizing its use all required investigation. The User Experience (UX) design conventions the team most commonly uses emphasize rapid development cycles, with systems architecture and interface design evolving through repetitive testing. Yet this process often doesn't allow time for broader design research and analysis. The team therefore adapted largely instrumentalist ethnographic approaches, conducting precisely targeted fieldwork in a limited timeframe, and synthesis focused upon the rapid production of prototypes for testing. 'Quick and dirty' ethnography (Hughes et al, 1995) endeavors to understand work environments with short, focused studies while referring to previous context-building research. This framework allowed the team to better understand the institutional terrain they would be encountering, a necessary step in the creative decommissioning process, as Paul McConnell, Design Director, elaborates, "we are going to

be a part of a system which is also established… We need to know our place in the system" (2014). Stakeholder interviews also revealed unanticipated gatekeepers of passenger information, such as the rider experience team, whose influence was "huge for giving us a quality of information and team conditions… They deal with people all the time, they hear their problems, they hear their pain" (McConnell, 2014). 'Rapid' ethnography (Millen, 2000) selectively targeted participants, using multiple interactive observation techniques to increase the chance of capturing 'exceptional' user behavior, with a collaborative approach and triangulation supporting analysis. Here, observations of existing kiosks and short contextual inquiries with commuters quickly revealed fundamental information about how the kiosks were – or weren't – being used, and informed early design principles. For example, other than displaying train information, there was a need for integrating the subway experience with street-level wayfinding. The kiosks were also assessed as suffering poor interaction design, "dominated by advertising, using web paradigms and patterns, with placement in the stations which was not routine… It's not helpful" (McConnell, 2014)

A design objective therefore emerged to eliminate the 'friction' of people's use, "to give people the most amount of information with the least amount of effort" (McConnell, 2014). This involved designing for a variety of use cases: "how we create design depends on where you are in your transit journey…do they want to know that track work will be happening in a month, or is it about finding out information about 'right now'?", while also improving the interaction design, minimizing touches and surfacing context-appropriate information in pleasing ways: "[The old kiosks] look like Times Square… Motion for the sake of motion, it's kind of distracting" (McConnell, 2014). These use cases also informed how success and failure would be defined. McConnell found that "early on it was about understanding that the physical touch interaction with kiosks isn't the only sign of success" (2014). Where tourists and non-peak commuters might need a 'high touch' service with wayfinding and neighborhood information, regular commuters need only cast a short, cursory glance to confirm train arrival times. Yet, Chris O'Donnell, Partner and COO, emphasizes that the team wanted to move beyond utilitarianism, perhaps pleasantly disrupting habitual expectations: "New Yorkers will tell you that you're wrong. They like things a certain way. They have their commute, and stick to it. You need to sell the benefits in a different way" (2014). This insight formed the basis of a design principle to "have New Yorkers feel more like tourists, and have tourists feel more like New Yorkers" by creating interactions which both engage and inspire interest (O'Donnell, 2014).

As with the previous case study, a healthy collaborative relationship with project partners proved vital for building trust. The team found that their high-fidelity prototypes provided use beyond testing design concepts, helping articulate design value within the MTA's more technocratic and bureaucratic environment. As McConnell explains, "we fought hard for a simplified user experience. There were a lot of requests that might satisfy just a small number of people." Therefore when used within an iterative design process, instrumentalist ethnography, while at times criticized for failing to leverage ethnography's more complex social analysis and interpretive strengths, can offer additional strategic value by quickly producing artifacts which build stakeholder buy-in: "they gave us a lot of freedom and we've been able to build equity because they can see we have the best interests of riders at heart" (McConnell, 2014). This relationship also helped guide design priorities, with the

team shelving some sensitive ideas as they "could have put the e-brake on the project because it was a political issue" (O'Donnell, 2014).

An initial prototype was installed at the Bowling Green subway stop for six months to 'design-in-practice,' an emergent process which allows basic design intentions to be tested and through design (Kimbell, 2011). This site-specific installation helped map complex backend information architecture, from running new cabling to strategies for data download, as well as how to best site the kiosk to optimize commuter interaction. The Control Group team also worked with maintenance and construction workers to develop the kiosk's industrial design. While this process wasn't participatory, it did reflect empathic design, which typically involves observations, data collection, reflection and analysis, brainstorming and prototype development (Leonard and Rayport, 1997). This research exposed unanticipated findings into what would be required for the kiosks' long-term viability. For example, an anecdote revealed that one of the old kiosks had stood out of service, unnoticed, for eight months. At this point the team realized they weren't just designing a passenger experience, but would need to create a user-centered maintenance system by "making life easier, not just for the community of riders, but the people who can make your project live or die, helping them out" (McConnell, 2014). Empathic design with maintenance workers resulted in industrial design improvements and troubleshooting tactics, such as a maintenance FAQ sheet inside kiosks: "If we didn't show we were listening to those constituents, and listening to their pain points, [the project] would not have succeeded" (McConnell, 2014).

As with the HPD, the MTA's internal organization would need to evolve to better support the service. A complex service system providing a distributed information network requires 'connected governance' (Dais et al, 2008:377), by which common standards and interoperability allow the smooth sharing of data and knowledge. McConnell notes that "trying to create very digital organization with very silo'd channels… It's really about that system," meaning that multi-faceted use scenarios demand a sophisticated 'back stage' design, ensuring efficient service delivery through operations management and technological infrastructure. The demand for better-integrated relationships in complex service systems development is a general challenge with SD implementation (Patricio and Sangiorgi, 2014:43), particularly when working with legacy institutions. The MTA is no different, needing to resolve inconsistent reporting for existing digital signage and workflow challenges for content development and distribution. A further measure of this service's resilience will therefore be the MTA's aptitude for promoting collaboration between and within project teams.

With the final kiosks currently being rolled out, Control Group will be collecting analytics on backlog features and undertaking further ethnographic work and partnership with the MTA rider experience team. This process will inform design iterations through a co-realization process where the technologies are designed in use, integrating a strong analytical focus with empathic design (Grønbæk et al, 1995). This long-term engagement between designers, service providers and users is often not a consideration in design projects. Design needs to be scoped longitudinally so it can be adapted to the complex system of which it is a part, including the unintended consequences it may yield (Simonsen

and Hertzum, 2010), a point McConnell appreciates, reflecting that "a lot has been a big experiment. We'll know how successful we are over the next few months, then we'll create the next iteration."

Resilient Infrastructure: A Distributed Information Network

Recently observing passenger interaction with the kiosks in this early rollout phase, some, seemingly tourists, linger to explore sites aboveground and experiment with wayfinding. Commuters watch on, curious, but keep their distance. A great deal more are oblivious, backs turned and trying to decipher overhead announcements and older signage. At this first implementation stage, much of the kiosks' innovation remains hidden from public view. In fully-scaled capacity they're are a complex service system providing resilient communications infrastructure. Designed as an adaptive, distributed information network, it's interdependent in both content and hardware, and responsive to location-specific needs. O'Donnell explains that they're intended to offer both hyperlocal as well as city-wide information to "dynamically tune the messaging to the situation…taking the experiences that are successful to the web and translating them to physical space" (2014). This element of network design was inspired by Hurricane Sandy, which showed "we do need public messaging infrastructure separate from mobile devices…Having our environment able to change in context to what's going on is really important" (O'Donnell, 2014).

Beyond short-term emergencies, the kiosks could play a further role enhancing local resilience in the longer-term through social and cultural programming. While ideas such as 311-style user inputs (a government service to report non-emergency information), civic engagement community boards, arts projects and two-way interactive installations are in the pipeline, this is still an open question given the project's business priorities. The MTA is covering installation and maintenance, while Control Group is funding development and hardware, and aiming to raise revenue through advertising. As McConnell quips, "you could say we're ready for the risks an entrepreneur would take" (2014). However some commentators view the private funding of public infrastructure with skepticism, fearing it will become "a smokescreen for ushering in the business-dominated informational city" (Hollands, 2008:311). Nonetheless, it would seem that social programming would fit well with Control Group's grand visions for the system's scaled potential, with the kiosks' integrating into a larger, citywide information ecosystem "so it's not a different experience… not a different system. It's the city" (McConnell, 2014).

GENERATIVE SERVICE DESIGN

Background: Community Connections

Despite being located barely 1.5 miles from some of NYC's most expensive real estate, Red Hook (RH), a neighborhood in southern Brooklyn, has historically been isolated. Excised by the Brooklyn Queens Expressway, and with the lumbering B61 bus one of few public transit options, it has also suffered underinvestment in local infrastructure despite its residents being among the city's most needy. Nearly 70% of its 11,000 residents live in NY

State's second largest public housing complex (Cohen, 2014), with 50% below the poverty line (González-Gladstein, 2013). The Red Hook Initiative (RHI) is a CBO and well-regarded presence in the in RH community, running social change engagement programs for local youth. Tony Schloss, RHI's Media Coordinator, was concerned that poor online access was further contributing to RH's isolation, while compromising opportunities to strengthen RH's tight-knit community and leverage their social capital. The 2010 census revealed only 50% of residents had domestic broadband access at home, while businesses are seriously disadvantaged by inhibitive broadband costs and poor infrastructure (Schloss, 2014). Rather than waiting for city agencies to bridge this gap, Schloss embarked on a plan to build a community-owned wireless mesh network. Mesh networks are generally more resilient than standard internet connections, being activated through distributed hotspots rather than central cabling. In Fall 2011 Schloss partnered with the Open Technology Institute (OTI), a non-profit, non-partisan public policy institute supporting open source innovation through inter-sector partnerships and then-Masters student, J.R. Baldwin, whose work focused on mesh networks. The result was a free network in the immediate surrounds of the RHI building, providing internet access and a digital platform for adaptively developing local applications and services.

Process: Workshopping Trust

Unlike the previous case studies, this project emerged without government agency input, and rather than consultant collaboration, was coordinated by a long-term RH resident and RHI employee – Schloss himself. This positioning allowed years of reflexive immersion to translate into informal participant observation: "the culture within public housing is super-specific, the way they conceptualize their physical area. It's amazing what I've learned over the years" (2014). While Schloss was embedded in the very community he would be working with and within the systems under design, he realized that PD would best "honor and use the expertise that exists in the community" (Schloss, 2014). Thus this case study represents an amalgam of the methods used in the previous case studies, from an instrumentalist approach concerned with building new Information and Communication Technologies (ICT) infrastructure (rapid concepting, prototyping and implementation) to reflexively cultivating a deep, empathic relationship with system users.

The first priority was quick technical testing of the wireless network components, with Schloss and Baldwin installing a single Uniquiti Nanostation on the RHI roof and a router inside the building connected via Ethernet. The first iteration of a community website, a 'shoutbox', was launched shortly after. Upon connecting to the internet users would be taken to the shoutbox, a portal with messageboard functionality which streamed RHI announcements and invited feedback and opportunities to participate in the project. This became an extremely valuable backchannel for gathering insight into user experience, and technical and social network sustainability. A year of PD workshopping with members of RHI's media programs focused largely on the development of this portal. It became Tidepools, a resident-generated, open-source collaborative mapping application which populates maps with place-based data (such as businesses, schools and restaurants), a local information exchange for events and social messaging. This concept emerged after the

workshop revealed that even long-term RH residents struggle to orient in their neighborhood, with building numbers often faded, obscured, or incorrectly listed in Google maps, as one resident, Khadija remarked, "...I've been here 21 years and I don't know every block" (Baldwin, 2012:37).

Similarly to the previous case studies, this early research phase revealed that the team needed to build trust. Despite Schloss' long-standing RHI presence, the workshops revealed deep community concerns about violation of trust and privacy, with some participants suspicious of the project and whether it really intended to benefit them. For example, the team hadn't questioned the use of avatars or making the map publicly visible online: "My assumption was put all the data out all of the time.. But just because you have the data doesn't mean you have to display it… The problem in the big data world is that… if you want to display it with integrity it's more intimate. The data belongs to the community" (Baldwin, 2014). This was compounded by the difficulty of demonstrating the integrity of their design intentions: "does the map allow people to tell their story or to infiltrate? You assume the benefits which media production can bring, but people have trouble conceptualizing why these benefits are benefits" (Schloss, 2014). Clearly, applied researchers must deal with a tension between prioritizing action while empowering participants, and negotiate between multiple participant views and their own individual biases (Collins and Cook, 2014). For this project, the tension began alleviating as the workshops moved towards prototype development. Once again, like the previous case studies, this process helped both advance design and build trust as participants saw their desires materialize: "when people are valuing your opinion, that goes a long way. We ran the workshops in that way" (Schloss, 2014). Informational probes strengthened this collaboration, as participants helped create materials for design (Crabtree, 2003) and refined design concepts. This informed the interaction design and usability objectives, as Baldwin recalls: "We had three computers set up, there was pizza… When they were able to add something to the app, they were ecstatic, being able to edit and redo… Is it something you can just pick up and use, or you can teach someone else really easily? They are primary to me" (2014).

Following the first year the mesh network was set to scale. A second Ubiquiti Nanostation was installed on a roof close to Coffey Park, thanks to a resident who donated electricity and allowed roof access. With these two access points in operation, the grounds for an expanded information network began to take form through the development of three community-centered civic apps: a digitized 'Stop and Frisk' reporting tool to contribute to city-wide data collection, a real time 'Where's the B61 bus' tracker, and using the city's API for 311-style civic issue tracking. The stakeholder partnership formalized with Baldwin joining OTI's staff, and OTI offering technical expertise and strategic support. Yet the true value of this new technical and social infrastructure was not revealed until the aftermath of Hurricane Sandy.

Resilient Communities: Supported Adaptations

Hurricane Sandy devastated low-lying RH. For many weeks serious flooding left residents without power, water or heat. By chance the RHI didn't lose power and the mesh network withstood the storm. In the aftermath up to 300 people a day used it to

communicate with friends and family, and seek recovery assistance. As Schloss explains, the value in having become a local hub for social and technological infrastructure had become clear: "everyone showed up here, our networks were deep in the community, and with organizations in the neighborhood. It's become super clear to me why we were successful" (2014). According to Baldwin, it was ultimately these relationships which made scaling the network possible: "that weekend we leveraged our social relationships… to get it to Coffey Park" (2014). Residents and businesses, including some who had been previously been reluctant to contribute, now supplied resources or their roofs for installing nanostations. As the Federal Emergency Management Agency (FEMA) designated Coffey Park a Disaster Recovery Center the mesh network gained increased utility. FEMA and the International Technology Disaster Resource Center installed a thirty-day satellite uplink to strengthen the network with a more robust internet connection. In the meantime Schloss and Baldwin, upon observing that residents were favoring SMS for communications, leveraged its use and designed an SMS plug-in for Tidepools. Sent SMS's automatically mapped sender locations and needs, connecting people to each other and relief efforts, while RHI sent curated news blasts across the network. RHI rapidly strengthened as an on- and offline hub, with strategic social media messaging attracting volunteers, donations and donors citywide. As volunteerism peaked in the post-disaster aftermath, not only did RH's community strengthen, but RH became more strongly connected to the city by having captured new public attention, resources and the spirit of citywide solidarity.

Yet now, close to two years after Sandy, RH's notoriety has faded. Residents are only just beginning to see a trickle of federal rebuilding funds, and public housing is still relying on temporary boilers and generators. The mesh network is suffering low awareness, although is undergoing a technical upgrade. Schloss is now focusing on strengthening the network's resilience from the perspective of social, rather than technical infrastructure. For Schloss, this means shifting governance and decision-making into community hands through what Michel Bauwens describes as a 'sharing platform.' This is a commons formed through social practices, in which a community co-constructs a common object of value (Bauwens et al, 2012). Schloss strategically partnered with the OTI to implement a 'Digital Stewards' program. It trains young RH adults in supporting both the technical and social sustainability of the network, learning ICT maintenance skills, becoming educators, and gaining confidence and networking opportunities. With one-third of public housing residents under 19 and an unemployment rate of 75% for 18-24 year olds (González-Gladstein, 2013), Schloss considers the program of almost greater value than mesh network, stating that "Digital Stewards have had much more effect on the community than the WiFi… WiFi will be more about the opportunities it creates, than being able to get online" (Schloss, 2014). The result has seen the Digital Stewards become a local community of practice (Wenger, 2002), with their participation generating a coherent internal architecture and sense of established membership, strengthened by the sharing of common concerns, knowledge and expertise. The project is currently a finalist for a $1 million Economic Development Corporation grant. These funds would allow the project to really embed, evolving more comprehensively into self-generated service system, thereby ensuring that it grows and adapts to community needs.

Reflecting on the project, Baldwin comments that "it's not about the technology, the

technology works and isn't going anywhere. Communities, on the other hand, fluctuate immensely over time" (Baldwin, 2012:11). This case study shows that generative SD is emergent, strengthened through trust-based, empathic local networks, where ultimately communities are empowered to design service adaptations based on their needs. It also shows that from the standpoint of developing civic ICT's, the design must be 'value-sensitive' (Friedman, 2008), where technology, rather than a design challenge to be solved, becomes a conduit for positioning human values at the basis of all design phases. This requires the design team to show iterative flexibility and leadership by developing strategies for meaningful user collaboration, for assessing impact, being mindful of how results are used, how success is determined and ensuring equitable distribution of those successes (Collins and Cook, 2014:39). In addition, as seen when FEMA offered large-scale institutional support, government agencies cld very promptly spark a project's scaling, if only to be more engaged with on-the-ground innovation and community needs through sustained programs. This would enhance both internal community and citywide resilience by way of connecting a distributed network of neighborhoods and communities. This case study has also shown that successful scaling in SD is about more than technical, geographic or longitudinal expansion, but also the growing social embeddedness of a project, strengthening the resilience of the civic realm through communities of practice.

CONCLUSION

In this era of complexity and disintegrating institutions, SD's value lies in evolving ossified agency practices. Upon surveying the cumulative efforts of civic, private sector and generative SD, a model for this institutional transformation emerges. Service institutions which are user-centered and adaptive in their practices fare well in complex environments. They can make a more sustainable impact: the more resilient an agency is, the better it can support the resilience of the public realm. We have also seen how the quality of a service reflects the organizational strengths and challenges behind its provision. This means ideally, SD affects organizational change in its effort to improve end user experience.

This paper has shown that by evolving into learning organizations, agencies can begin providing complex services. To achieve this, they need to enhance the interoperability of internal systems to help promote connected governance. This improves the quality and circulation of information between and within agencies and related stakeholders. Supported by a distributed sharing of information, agencies can more easily become action platforms, delivering services sensitively and responsively. They'll also be better placed to harness the strengths of one of its least-utilized resources, communities. The adaptive, self-organizing practices communities use to compensate for system failure indicate where complex service systems can be of greatest value, particularly where communities of practice have begun to formalize these efforts. If agencies supported generative SD by listening to the wisdoms of their greatest asset, the arising interdependent relationship would also strengthen the overall resilience of the civic realm. This requires engaging communities with greater transparency while protecting their privacy, for resilient services are trustworthy services. However, as the private sector case study suggests, the integrity of business models will also determine the extent to which this becomes possible. In short, citywide resilience emerges from

interdependent networks across sectors, by which communities of practice are supported by agencies. In this sense scaling means more than geographic and temporal expansion, but also refers to social embeddedness.

Yet the case studies also highlighted how working within or even without government agencies can be difficult, as legacy systems operate in silos. Creative decommissioning can help service designers midwife new, institutional practices with greater sensitivity. To achieve this the interdisciplinary and inter-sector lens of SD also aids the brokering of necessary multi-agency and multi-sector relationships. These relationships are essential for ensuring the needs and behaviors of agency partners inform value-sensitive design. They also enable designers, agencies and users to co-design the system they're a part of through iterative, participatory practices. In this sense, the quality and integrity of system intervention will reflect the quality and integrity of relationship between project partners and stakeholders. The role of the service designer consequently appears as complex as the environment being designed. They are change agents (Barab et al, 2004), bearing responsibility for the creation of artifacts, processes and new relationships. They must negotiate empathy, moral responsibility and professional judgment to develop the reflexivity required for designing system interventions. Yet somewhat ironically, the service designer designs their own obsolescence, "for the time when the designer is no longer an active participant in either enacting the service or being accountable for its outcomes" (Blomberg and Kimbell, 2014:31). This paper revealed building trust as a key theme for enabling this work, from on the ground networks to service providers, within the community as an outcome of their engagement with the project, and as a feature of the service.

For many New Yorkers the hurricane is long-forgotten. Life has resumed its usual rhythm and the city its habitual hum. Yet others are still displaced, or grappling with mould remediation and insurance claims, frustrated by the former-Bloomberg administration's slow bureaucratic wheels, and awaiting acceleration of Mayor de Blasio's catch-up promises (Powell, 2014). The coordination of efforts, professionalization of SD practices and building of trust system-wide are indeed nascent. Yet, as RHI Director of Training and Evaluation, Anna Ortega-Williams observes, "resilience is best nourished through taking action" (Karon, 2012), suggesting that these early cross-sector tendencies towards SD are indicative of a burgeoning potential towards a more sustainable city.

REFERENCES

Alberti, Marina
2008 *Advances In Urban Ecology: Integrating Human and Ecological Processes in Urban Ecosytems.* Springer: New York.

Anttiroiko, Ari-Veikko and Pekka Valkama, Stephen K. Bailey
2014 "Smart Cities in the New Service Economy: Building Platforms for Smart Cities." *AI & Society* 29: 323-334.

Baldwin, James

2012 Tidepools Social WiFi, MFA Design & Technology Thesis, Parsons, The New School for Design, New York.

Barab, Sasha A. and Michael K. Thomas, Thomas Tyler Dodge, Kurt Squire and Markeda Newell
2004 "Critical Design Ethnography: Designing for Change." *Anthropology and Education Quarterly* 35: 254–268.

Bauwens, Michel and Nicolas Mendoza, Franco Iacomella
2012 *Synthetic Overview of the Collaborative Economy*. Orange Labs & P2P Foundation at http://p2p.coop/files/reports/collaborative-economy-2012.pdf accessed 13 March 13 2014.

Beck, Ulrich
1994 "The Reinvention of Politics: Towards a Theory of Reflexive Modernization." In U. Beck, U., A. Giddens, S. Lash, eds., *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order*. Pp. 1–55. Politics: Cambridge, MA.

Blake, Eric S. and Todd B. Kimberlain, Robert J. Berg, John P. Cangialosi, and John L. Beven II.
2013 "Tropical Cyclone Report: Hurricane Sandy (AL182012) 22–29 October 2012." National Hurricane Center, NOAA. http://www.nhc.noaa.gov/data/tcr/AL182012_Sandy.pdf accessed 25 February 2014.

Blomberg, Jeanette and Helena Karasti
2012 "Ethnography: Positioning Ethnography within Participatory Design." In *Routledge International Handbook of Participatory Design*. J. Simonsen, T. Robertson, eds. Pp. 86-116. NY: New York

Blomberg, Jeanette and Lucy Kimbell
2014 "The Object of Service Design" *Mapping and Developing Service Design Research in the UK*. D. Sangiorgi, A. Prendiville, A. Rickets, eds. Pp30-31. SDRN: London

Bunt, Laura and Charles Leadbeater
2012 *The Art of Exit: In Search of Creative Decommissioning*. National Endowment for Science, Technology and the Arts (NESTA): London.

Cohen, Noam
2014 "Red Hook's Cutting Edge Wireless Network." *The New York Times*. P.1 & 7, Aug 22.

Collins, Katie and Mary Rose Cook

2014   "Ethics of Participation within Service Design." *Mapping and Developing Service Design Research in the UK.* D. Sangiorgi, A. Prendiville, A. Rickets, eds. Pp.38-39. SDRN: London**.**

Crabtree, Andy
2003   *Designing Collaborative Systems: A Practical Guide to Ethnography,* Springer Science & Business Media: London.

Dais, Alexandros, and Mara Nikolaidou, Nancy Alexopolou and Dimosthenis Anagnostopolous
2008   "Introducing a Public Agency Networking Platform towards Supporting Connected Governance." *Electronic Government Lecture Notes in Computer Science* vol. 5184: 375-387.

Dragoman, Liana and Kaja Kühl
2013   *Public & Collaborative: Designing Services for Housing.* Parsons The New School for Design, the Public Policy Lab, NYC Department of Housing Preservation and Development: New York City.

Friedman, Batya
2008   "Value Sensitive Design." In *Liberating Voices: a Pattern Language for Communication Research.* D. Schular, ed. Pp. 366-368. Cambridge, MA: MIT Press.

Furman Center for Real Estate and Urban Policy
2012   "Renters and Rental Units." *State of New York City's Housing and Neighborhoods 2012.* Pp. 24-29. Furman Center: New York.

Fullilove, Mindy
2005   *Root Shock: How Tearing Up City Neighborhoods Hurts America, and What We Can Do About It.* One World/Ballantine: New York.

González-Gladstein, Sonia
2013   "Perspectives from the Field: Community Resilience in Post-Sandy Red Hook, Brooklyn." http://www.mcsilver.org/2013/05/09/perspectives-from-the-field-community-resilience-in-post-sandy-red-hook-brooklyn/ accessed 15 July 2014

Greenfield, Adam
2013   *Against the Smart City.* Verso: London, New York

Grønbæk, Kaj and Morten Kyng, Preben Mogenson
1995   "Cooperative Experimental System Development." In *Proceedings of Computers in Context.* Pp. 20-29. Aarhus, August 1995.

Hollands, Robert G.

2008   "Will the Real Smart City Please Stand Up?" *City: Analysis of Urban Trends, Culture,*
            Theory, Policy, Action 12:3 303-320.

Hughes, John and Val King, Tom Rodden and Hans Andersen
1994   "Moving out from the Control Room: Ethnography in System Design." In
            Proceedings of the 1994 ACM Conference on Computer-Supported Cooperative Work. Pp. 429–
            439. ACM: NY.

Karon, Tony
2012   "In Hurricane-Battered Red Hook, Disaster is Breeding Resilience."
            http://nation.time.com/2012/11/10/in-hurricane-battered-red-hook-disaster-is-breeding-resilience/ accessed 10 February, 2013.

Kimbell, Lucy
2011   "Designing for Services as One Way of Designing Services." *International Journal of*
            Design 5:2 Pp. 41-52.

Klinenberg, Eric
2013   *"Adaptation: How Can Cities Be 'Climate-Proofed'?" The New Yorker.* Pp. 32–37. Jan. 7.

Leonard, Dorothy and Jeffry F. Rayport
1997   "Spark Innovation Through Empathic Design." *Harvard Business Review* 75: 207–44.

Marzluff J. and E. Chulenberger, W. Endlicher, M. Alberti, G. Bradley, C. Ryan, C.
            Zumbrunnen, U. Simon
2008   *Urban Ecology - An International Perspective on the Interaction Between Humans and Natu*re.
            New York: Springer.

Maglio, Paul and Stephen L. Vargo, Nathan Caswell, Jim Spohrer
2009   "The Service System is the Basic Abstraction of Service Science." *Information Systems*
            e-Business Management. 7: 395-406

Manzini, Ezio
2011   "Introduction to Design for Services." In *Design for Services.* A. Meroni, & D.
            Sangiorgi, eds. Aldershot, UK: Gower

Millen, David R.
2000.   "Rapid Ethnography: Time Deepening Strategies for HCI Field Research." In *DIS*
            '00 Proceedings of the 3rd Conference on Designing Interactive Systems: Processes, Practices,
            Methods, and Techniques. Pp. 280–286. Designing Interactive Systems, ACM: New
            York.

Patricio, Lia and Daniela Sangiorgi

2014   "The Challenge of Complex Service Systems." *Mapping and Developing Service Design Research in the UK*. D. Sangiorgi, A. Prendiville, A. Rickets, eds. Pp.42-43. SDRN: London.

Powell, Michael
2014   "17 Months After Hurricane, Recovery Effort Plods Along." *New York Times*, 24 March http://www.nytimes.com/2014/03/25/nyregion/17-months-after-hurricane-recovery-effort-plods-along.html?_r=0 accessed 24 March, 2014

Rittel, Horst W.J. and Webber, Melvin M.
1973   "Dilemmas in a General Theory of Planning." *Policy Sciences* 4: 155–169.

Segeleström, F., Raijmakers, B., Holmlid, S.,
2009   "Thinking and Doing Ethnography in Service Design." In *Proceedings of IASDR 2009*: Seoul, Sth. Korea.

Simonsen, Jesper and Morten Hertzum
2010   "Iterative Participatory Design." In *Design Research: Synergies from Interdisciplinary Perspectives*. J. Simonsen, J.O. Bærenholdt, M. Büscher, and J.D. Scheuer, eds. Pp. 16-32. Routledge: London.

Snowden, David J. and Mary E. Boone
2007   "A Leader's Framework for Decision Making." *Harvard Business Review* Pp. 1–9.

Walker, Brian and C.S. Holling, Stephen R. Carpenter, Ann Kinzig.
2004   "Resilience, adaptability and transformability in social–ecological systems". Ecology and Society 9:2: 5.

Wenger, Etienne, Richard Arnold McDermott, William Snyder.
2002   "Communities of Practice and Their Structural Elements." In *Cultivating Communities of Practice*. Pp. 23–47. Harvard Business School Press: Boston, Massachusetts.

Westley F. and P. Olsson, C. Folke, T. Homer-Dixon, H. Vrendenburg, D. Loorback, et al.
 2011   "Tipping toward Sustainability: Emerging Pathways of Transformation." *Ambio* 40:7 Pp. 762-780