"We Are Sensemakers": The (Anti-)politics of Smart City Co-creation

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Cans of Coke, bottles of beer, coffee cups, and empty pizza boxes are scattered across the tables in the room. On other tables lie scissors, notebooks, and small translucent bags that contain sensors made of metal and plastic. Yellow Post-it notes next to the bags describe what these sensors are able to "sense": "dust," "CO [carbon monoxide]," "noise."

People at the tables type frantically on their laptops, jiggle wires, and hunch over one another's screens. Another group sits in a corner of an adjacent room, engaged in a concentrated conversation, one of them scribbling notes onto a flip chart.

Right outside the building, a guy is holding a small computer with sensors into the fumes of a running moped. A wire connects the computer to a laptop, showing a graph that moves up and down in tune with the alternating force of the moped engine.

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In December 2011 I found myself amid the frenzy of one of the meetings that was announced through the online social networking platform Meetup.com as the "Amsterdam Internet of Things Meetup."[1] Around that time, "Internet of things," or IoT, was just becoming one of the buzzwords indicating the perceived burgeoning of a new technological paradigm, associated with environments becoming "smart" by means of objects fitted with interconnected data-gathering sensors (Shepard 2011). More recently, this vision has become part of the imaginary of the smart city. Future cities, in this vision, having harnessed the full potential of IoT technologies, are shaped by ubiquitous sensing and tracking information technologies, which constantly monitor and orchestrate urban processes at multiple levels. In the context of European Union (EU) policy making, a central legitimizing principle of the smart city vision, in addition to its "smartness," is its decentralizing politics. In explicit contrast to those behind corporate- and government-driven "blank-slate" smart city projects, such as New Songdo in South Korea or Masdar City in the United Arab Emirates (Greenfield 2013: 76; Halpern et al. 2013), European policy makers depict their version of the smart city as a transition from top-down urban planning to co-creative city making (Aarhus University 2014), with citizens, as "makers" and "do-it-yourself (DIY) scientists," appropriating the powers of sensing technologies on equal terms with facilitating governments and corporations (e.g., the European Innovation Partnership on Smart Cities and Communities [EIP-SCC]).

In recent years, at smart city conventions all over the world, this version of participatory smart city creation has been reproduced through the exchange and recycling of a few "best practice" stories, vignettes of settings and moments where citizens have allegedly been doing just that: voluntarily and collectively tinkering with sensor technologies to build better living environments and to become "smart citizens" (Hill 2013; Kresin 2013). The 2014 Smart City Event, organized with EU funding and held in the Amsterdam Arena sports stadium by and for representatives from corporations, municipalities, and research institutes, was rife with examples of citizens deploying IoT technologies for the mapping of air pollution, the tracing of trash, and the improvement of traffic conditions. At this event, the project that I had begun to study that December in 2011, which came to be referred to as the Air Quality Egg (AQE) project, was also mentioned as

1. These face-to-face gatherings as they were organized through the platform Meetup.com were referred to as the Air Quality Egg, or AQE, meetups. When referring to the project more generally, encompassing the meetups as well as related activities such as the crowd-funding campaign, I will use the term Air Quality Egg *project*. The Air Quality meetups were later renamed Sensemakers meetups. I will comment on this change later in the article.

such a best-practice story. Keynote speaker Anthony Townsend referred to it as a promising example of bottom-up smart city creation, an argument that Townsend (2015: 209) elaborated and contextualized in *Public Culture*, where he described the project as "citizen-led urban data collection and analysis" undertaken by a global consortium of volunteers.

The eleven AQE meetups that I attended between 2011 and 2012 seemed to testify to this promise of bottom-up collaboration. At the meetups, organized on weekday evenings and on weekends by different, yet connected, groups in Amsterdam, London, New York, and Barcelona, with participants sometimes flying to other cities, the setting of the first meeting would be repeated: people getting together, tinkering and talking. In addition to a mailing list, a wiki, a software repository, and a Google group, the meetup website connected the dispersed participants, providing room for them to create a profile, leave comments or pictures, and read up on developments relating to the project. Two objects were central to all this tinkering: the AQE device (alternatively referred to as the "Egg"), a small computer with sensors on it that can measure substances in the air that in high concentrations are toxic to humans or that are indicative of air toxicity, such as CO and nitrogen dioxide (NO_2), and the online data-gathering platform that would visualize these measurements.

In a video, made by participants of the AQE project for a campaign on the crowd-funding platform Kickstarter (2012), the AQE was presented as a project aimed at making the air we breathe "more visible," initiated by a diverse global group of makers, designers, and developers who "care about our air." Yet, as was clear from the outset, the project wasn't uniquely driven by concerns over "air quality" and by the dedication of self-motivated volunteers. Already in July 2011 the data platform, then called Pachube, had been acquired by the US software company LogMeIn, which offered "remote connectivity services [for] collaboration, IT [information technology] management and customer engagement" (Yahoo Finance 2012). The company provided financial and organizational support for the meetups, with the eventual aim of scaling up the platform to a full-blown, for-profit service. The transformation of the open and free data platform Pachube into the for-profit platform that came to be known as Xively introduced quite a few changes regarding access and ownership regimes, challenging the ability of the meetup participants to exchange data and conduct discussions through the platform.

Given the tension between the project's self-depiction as a form of voluntary, bottom-up, and issue-driven citizen engagement, on the one hand, and the corporate commodification of both this volunteer work and the data sent across the

data platform, on the other, the AQE story might read as yet another example of the neoliberal co-optation of the commons so entwined with digital media in general (Andrejevic 2009; LaDousa 2014; Terranova 2000) and increasingly so with the notion of the smart city (e.g., Gabrys 2014). With the following empirical exploration of the AQE project, however, I suggest that a critical anthropology of smart city making—and "co-creation" projects in general—should not only do the important work of exposing the material-economic conditions sustaining collaborative settings. It should also account for the subtle, emergent, and complex political subjectivities of participants themselves (see also Sharon and Zandbergen 2016). While the presence of oppositional interest positions did cause certain tensions within the AQE project, it did not lead to disengagement or serious fallout. How can this be explained? Which modes of discourse, forms of practice, and understandings of technology sustained this collaboration against all odds?

This account asks these questions through the exploration of three related concepts as they informed the AQE project: open source, prototyping, and doing. Having roots in both activist and corporate domains, these concepts often get mobilized in the constitution and self-depiction of projects as collaborative, their principles, practices, and ethics governing the understanding of projects' ongoing openness to involvement by multiple publics and perpetual material tinkering. As I have suggested, the openness of the AQE project was mobilized in the service of both corporate and anticorporate agendas; in this article I show how the project also called for yet another, emergent understanding of this openness, mitigating the opposition between these agendas. This understanding governed the AQE meetup settings as what I argue are "liminal" spaces of transformation and called for a forgetting of the participants' daily networks, roles, and institutions.

An Open-Source City?

According to Townsend (2013: 119, 120; Dale 2013) projects like the AQE have the potential to constitute an open-source alternative to the smart city, with "civic hackers, artists and entrepreneurs . . . [finding] their own uses, and their own designs, for smart city technology." Whereas the concept of open source was formalized in the late 1990s as a set of practices and licensing schemes aimed at facilitating the collaborative modification and creation of software (Coleman 2013; Kelty 2008), the adjectival use of the term indicates how it has obtained relevance beyond those origins. The European Commission (EC), for instance, has been inspired by open-source principles in its plans for "opening up" fields as diverse as science and innovation (EC 2016), policy-making and governance pro-

cedures (EC 2014a), education and learning (EC 2013), and urban decision making (EC 2014b) to intervention and influence by nonexpert publics. This enthusiasm for open source sustains an organizational ethos that postulates a recursive relationship between the processes and the results of collaborations. In requiring the collaboration of stakeholders as varied as private companies, research institutes, municipalities, citizens, and activists, the EC envisions future smart cities as simultaneously profitable, innovative, environmentally sustainable, and democratic (EC 2014b).

While the idea of open source is generally evoked to suggest the mutually beneficial cooperation of a diverse array of stakeholders, in practice it has sustained distinct and opposing political and economic agendas. Open source, for instance, has been celebrated by multinational information and communications technology (ICT) corporations, such as IBM, as a smart way to innovate (IBM 2016) and by activists as "a radical and independent alternative to the existing corporate-driven market" (Coleman 2013: 194; Milberry 2009). Such differences were also reflected in the AQE project participants' divergent understandings of the project's "openness."

Hobbyists, Activists, and Community Organizers

The AQE project participants I engaged with were constantly in the process of fine-tuning their understanding of what the project was about, what it was they were making, and how it related to their own personal and professional ambitions. In order to participate as well as study the project in a way transparent to all participants, I sought to make myself useful in relation to this conceptual work, working with AQE meetup participants in casual conversations, one-on-one interviews, and group discussions to find formulations for the project that best fit the setting and the moment.

Some participants referred to themselves as hobbyists, interested in the project for the chance to tinker with a relatively new type of technology. The core physical part of the AQE was a "single-board" computer, the size of a credit card, called Arduino. Built in 2005 with open-source licenses, the Arduino (2013) is specifically designed for "interactive projects": different types of sensors that can be added onto "shields" atop these computers are able to receive "inputs from many sensors, and [to affect] its surroundings by controlling lights, motors, and other actuators." Stephen, a participant in the London-based workshops, uses Arduinos to automate his house, with a "tweeting fridge" and automatically controlled lights. For him, the AQE offered a nice addition to this collection. Another self-

ascribed hobbyist, JC, joined the London-based AQE meetups to update his technical skills through the project's offer of direct, hands-on access to programmable hardware.

Another often-heard motivation to attend the AQE meetups had to do with their social character, providing networking and learning opportunities with potential employees, collaborators, or peer researchers. One participant told me that they provided him with a "safe environment" to "experiment with giving presentations," something he turned out to be "actually quite good at." Another self-employed participant, who was "in between" jobs, characterized the AQE meetups more generally as "a personal MBA" in which she "learned, in practice, about bottom-up organization." Another person told me: "In the course of facilitating these meetings, I discovered my own professional skills and drives more, making me more aware of career choices to take."

Environmental concern was another motivation for joining the AQE project. This concern was particularly highlighted in public representations of the project and was central to the project's description compiled collectively by participants during one of the first meetings: "The Air Quality Egg is a project that gives people a way to participate in the conversation about air quality." Inspired by this formulation, two employees of the Dutch chapter of Friends of the Earth were drawn to the project to see whether the AQE could play the role of public-awareness tool in their next anti–air pollution campaign.

These different understandings of the project configured the Egg in the making according to different imaginaries: it figured as an open-source "tinker device," an opportunity for social collaboration and career building, and a conversation starter about environmental pollution. These understandings governed similarly diverse notions regarding the AQE social collective: as a peer group of hobbyists and DIY scientists, an educational collective, a citizen initiative, and an environmental activist group.

Whereas the combination of these approaches shows the strength of open source as an organizational process that facilitates collaboration and learning— attracting self-motivated people with different skill sets to collaborate—the larger historical-cultural setting of the project mobilized the project's open-source character in two additional ways, translating into different and mutually exclusive demands for the AQE organizational structure and design choices. In the following I explore the cultural and historical legacies of each of these.

Political Activism or Corporate Innovation?

I met John, a hardware engineer in his late fifties, at an AQE meetup in London in 2012, at the height of what has come to be referred to as the housing crisis. Against this background, John told me: "The capitalist system clearly isn't working for my generation . . . with banks . . . taking all that money off us." Having been part of hacker spaces and open-source initiatives "all his life," he strongly identified with the "political thread running through DIY tinkering places," recognizing a similar vibe in the AQE project. To John, the act of personally creating the Egg "brings power back to the individual."

For Frank, a "community organizer" in his late thirties who took on an organizational role in the Amsterdam meetups, the AQE project showed how citizens can be autonomous by "transcending the corporate drive" and "increasing the capacity of people to organize the world according to their own rules." The AQE project, Frank explained, lets you "share the problems that you experience with others and collectively do something against it."

A similar motivation drove two meetup participants from Madrid, Sandrin and Gaspar. At a London IoT meetup, Sandrin explained how open-source ICTs, generated and deployed in collaborative environments like the IoT meetups, can empower citizens to stand up against government and business. For them, this understanding came naturally in the wake of their experiences with the Indignados movement that same year. As thousands of protesters in Spain's major cities were denouncing the abuse caused by political and economic powers, Sandrin and Gaspar and the many other participants of the Free Culture and Digital Commons movement involved in these protests embraced open-source ICTs, as both a tool and "an inspirational organizational model" (Morell 2012: 386, 387). For the two Spaniards, an essential aspect of the AQE project was that it enabled citizens to collect their own data instead of having to rely on data produced by governments, corporations, and scientific institutes that they and other Indignados protesters had come to suspect.

A very different way of imagining the project's meaning came from meetup participants who represented multinational mobile phone companies and who perceived the meetups as a corporate innovation environment exploring new types of technological products and services. One of them, whose business card read "innovation manager," told me that he perceived the participants of these IoT meetups as early adopters of IoT and thus as indicative of new potential future market segments. For him, these meetups offered a great opportunity to find out which types of products and services would cater to this new market segment

and provided ideas for "suitable projects to promote to prototype stage." Another research and development person told me that by "trying to understand what people are using these things for," she was exploring "how IoT can be monetized."

Each understanding roots the project in a different historical legacy and evokes a very different sense of the social collective it seeks to engender. Reproducing the long-standing Anglo-American association of (digital) technology with citizen empowerment and democratization (Barbrook and Cameron 1995), an often-told story about the project's data platform recalls when Japanese citizens used it for the uploading of radiation data in the aftermath of the nuclear disaster at the Japanese Fukushima I Nuclear Power Plant in March 2011. The Japanese had gathered this data with Geiger counters on their cell phones, with the aim of challenging official radiation readings provided by the government (Mack 2011). A similar subversive intent also characterizes the AQE project's aims, as narrated on its blogs, Kickstarter video, and mailing lists. Here the project is cast as well positioned to contest official government data on air quality. As one meetup announcement put it: "The air quality data collected by the government is likely sampled from far, far away and then applied to you on a regional level, almost completely useless from the standpoint of trying to understand or change the local dynamics of pollution that affect you. Not good" (CCSS 2012a). Fundamental to such accounts is the notion that the project produces more than just alternative data. It forges, more significantly, a "global community [of] like-minded enthusiasts" (ibid.), who voluntarily become part of the "Air Quality Egg Nation" (Kickstarter 2012) or, suggesting the project's formation of a sovereign sphere, a "sensor commons" (CCSS 2012a).[2]

Through such imaginaries, the AQE social collective fashioned itself in terms of what Christopher Kelty (2008: 3) has called a "recursive public": "[A recursive public is] vitally concerned with the material and practical maintenance and modification of the technical, legal, practical, and conceptual means of its own existence as a public . . . independent of other forms of constituted power and is capable of speaking to existing forms of power through the production of actually existing alternatives." Whereas Kelty coined the notion of the "recursive public" in reference to the practices of free and open-source software, the AQE project's efforts to appropriate tools of sensing and data visualization for its own communal "self-grounding" (ibid.: 8) situates it in the more recent context of smart city aspirations.

2. The concept of the sensor commons was evoked by Ed Borden in his description of the AQE challenges at the 2012 Citizen Cyberscience Summit (CCSS 2012a), borrowing from a certain A. J. Fisher (2011), a data consultant who had published on the AQE project.

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Seen from a corporate perspective, the AQE project's legacy can be traced back to the "new economic" business culture in advanced capitalist economies around the globe that emerged in the early to mid 1980s (Thrift 2000), specifically in terms of its reliance on "hyper-socialized" processes of manufacturing (Turner 2009: 75). As part of the shift from heavy industry to new technology, businesses, particularly in North America and Europe, came to define their operational territory as more and more "out of control" (Kelly 1994) and characterized by "constant and unremitting change" (Thrift 2000: 679). As part of this shift, corporations explored new ways of organizing innovation and managing competition, deeming the "creative forces of chaos, flexibility and creativity" (Nowotny 2006: 3) central to the innovation process. They extended innovation to extra-corporate settings, involving "playful" collaboration (Kleiner and Roth 1996; Nowotny 2006; Wenger 1998) and the constitution of what Nigel Thrift (2004: 688) refers to as an entirely "new ecology of business." More recently, this corporate culture has intensified and formalized its reliance on extra-corporate settings through strategic partnershipping and the sponsoring of informal networks and creative settings, such as "hackathons," "fab labs," and "maker spaces," and the open-sourcing of development platforms.

"Who Are You?"

The AQE meetup facilitator and LogMeIn contractor, Ed Borden, drew from both legacies simultaneously. In his many e-mails, posts, and speeches during the project and in interviews with me, he imagined the AQE collective as a "community" as well as a "customer base" and depicted its activities as both a form of "activism" and a way of facilitating the creation of a "marketplace." And though Borden was attracted to the project when it was still strongly associated with community activism, he also believed that, without LogMeIn's funding, the project would never have gotten off the ground. Borden was aware of the potential conflicts between these positions, and his role as community facilitator during the meetups, he told me, felt "a little strange."

At several moments throughout the project, Borden's association with different sensibilities and interest positions was reason for the project participants to question his true allegiance. Particularly since March 2012, it became increasingly clear to project participants that decisions regarding platform design and project branding were made in corporate settings that were beyond their control. In March 2012 the familiar interface of the data platform Pachube changed along with the name of the platform as it was rebranded into Cosm. While most participants were OK

with the design changes, a year later another name and design change, from Cosm to Xively, had more serious consequences, indicating the transition away from bottom-up participatory sensing and toward offering "IoT solutions" to a corporate clientele (Xively 2013). While Pachube and Cosm had functioned as a DIY help desk, hosting discussions regarding the usefulness of the data and the accuracy of the sensors and allowing participants to ask questions and exchange technical information, information on Xively flowed in a single direction. What's more, as one meetup participant remarked in the Google group shortly after the platform's release: "So far, not a single article that is not PR/Marketing" (AQE Google Group; for a similar account, see Black and White 2014: 208). The transition into Xively also provoked concern regarding the amount of time the platform would store data. Pachube and Cosm had allowed participants to store their data for an indefinite period, allowing for long-term data fluctuations to be observed and analyzed. Xively orchestrated the relationship between LogMeIn and the AQE project in entirely different ways: its "free account" deal now restricted data storage to a maximum of thirty days, offered no control over the mode of visualization, and outsourced the technical support to a paid-for help desk.

Such developments spurred some participants to ask Borden where his loyalties lay. In an e-mail (April 2012), IoT consultant "Jim" suggested that Borden's prime motivation for participating in the project had nothing to do with air quality but was instead to help LogMeIn extend its reach beyond computers, smart phones, and tablets to "potentially all Internet-connectable devices." As he put it: "You start with pollution sensing, but it is not about pollution sensing, it is building a hub to become the gateway in and from the home. . . . It is logical, but it is plain old-school business too." Jim also expressed confusion regarding Borden's claim that the project was about community building, concluding with the question: "Who are you?"

However, whether directed at Borden or at others' interest positions, such expressions of friction and contestation in the AQE group were rare. In the following I explain this in terms of how the affective environment of the AQE meetups informed yet a different understanding of the significance of the project. Instilling a sense of constant urgency and unpredictability, the meetups created the impression that the project—both socially and materially—embodied and prefigured new ways of being and organizing, in so doing transcending the material and organizational grounds for such contestations.

Prototyping the Egg

Participating in the AQE project was fun and intense. It often entailed being rushed, trying to live up to unattainable goals, staying up late, and never being finished. I only realized afterward that this experience contributed, in fundamental ways, to an understanding of what the project generated both materially and socially. To introduce this understanding I recount below one particularly intense meetup in London.

2012 — Summit in London

In February 2012, along with two other project participants from Amsterdam, I joined AQE people from New York and London at the London Citizen Cyberscience Summit. Organized by the Royal Geographical Society and University College London, the three-day summit promoted projects, methods, and tools, "all with the basic premise that everyone should be doing science and be involved" (CCSS 2012b). Here the group worked on the "challenge" of "deploy[ing] a block-level sensor network and mash[ing] up the data with government-supplied readings" (CCSS 2012a). This implied creating a working prototype of the Egg, to be hung at street level in areas neighboring the conference building, and then comparing its air quality data to the published readings from government sensors. Next to the workshop table stood a flip chart showing how the effort was broken up into several tasks: "gather local data," "design a user interface for the AQE," and "think of more applications to be made from the data network of the AQE."

Despite the timetables set for these tasks and signs of orderly planning, the project ended in hurried, but cheerful, chaos. There were many social, logistic, and technical problems challenging the completion of these tasks. The device that would ensure the wireless Internet connection from the Egg to the data platform had gotten lost in travel. The pouring rain also posed a problem, as the protecting enclosure for the Egg had not yet been built. Another hurdle was caused by many shop owners' unwillingness to plug this strange device into their wall sockets and hang it outside their windows. All the while, the trip was also a social gathering and, for some, a reunion with former colleagues or fellow students who had moved to different places in the world. As a result, the team had to resolve the challenges in the few hours that remained after sleeping in after nights of partying, with hangovers and lack of sleep intensifying the sense of chaos and rush.

The last day of the conference ended with presentations from representatives of all teams that had participated in the challenges. Only a few hours before these presentations, with no proper place to hang the AQEs from, the team, in a desper-

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ate attempt to produce at least *some* data, eventually hung an AQE in the garden enclosure of the conference building, underneath a roof in the vicinity of a power socket. Inside, the group watched the website closely, to see whether the sensors effectively broadcast their measurements over the Internet. After an initial short period during which chaotic graphs were coming in, the connection died. Someone had unplugged the Egg from its socket.

Joe, the team's spokesperson, would have to make do with the strange, wobbly, and cutoff graphs to show that the Egg had at least produced something. As Joe put it at the presentation: "I have a suspicion that . . . the data right now is not so reliable." Yet the presentation was cheerful and celebratory, and the project was finished with a sense of accomplishment:

> Ed: "This is the first time that we have these units together."
> Joe: "We are a step closer."
> Ed: "Yes, we are a step closer."

Many other meetups contained the same ingredients as the one in London: they were informed by a specific task ("create the data we want," "move from concept to working plan," "tackle the sensor design," "get some real data," "use the AQE to solve real urban issues"), yet none of these tasks were accomplished in the way they were formulated, leaving the project perpetually in an "in-between" state. While some participants complained about this lack of accomplishment or the lack of time to do things properly, as I argue below, this perpetual "in-betweenness" also fed into another, more positive, understanding of what the project was about.

Both for the separate meetup events and for the project as a whole, an often-stated goal was to "work toward a functional prototype of the Egg." This concept of the prototype came to be a figure for referring not only to the processual state of its material objects but also to the transformation processes facilitated and experienced by the social collective. As such, the project might be thought of as a "prototyping culture," a concept suggested by Alberto Corsín Jiménez (2014: 382, 388) to refer to "cultures" built on "collaboration, provisionality, recycling, experimentation, and creativity," forging their "self-image as a social collective in the very terms of the prototype." However, whereas Corsín Jiménez imagines these "prototyping cultures" to be about critical "political interrogation" (ibid.: 386, 387), other scholars have used the same term to refer to processes of corporate innovation (e.g., Schrage 1993). Thanks to roots in both political activism and corporate innovation, the project was able to accommodate the two understandings of prototyping, with each legacy feeding into a different understanding regarding the project's imagined possibilities.

Those participants who imagined the project to constitute a sovereign sphere understood the project's open-endedness as a prerequisite for its bottom-up nature. Frank's understanding that the project could "transcend the corporate sphere" was informed by his idea that the open-sourcing of its technologies and ways of working opened the project to new stakeholders and newly imagined end goals, thereby preempting the possibility for monopoly formation. Prototyping, in this sense, is about the facilitation of horizontal social collaboration as an end goal in itself.

Another, very different, set of promises associated with the figure of the prototype that also informed the meetup practices comes from the recent history of corporate innovation. For the innovation managers who participated, working for LogMeIn or elsewhere, the meetups figured as prototyping environments in two ways. First, their understanding of the meetup participants as "early adopters" of IoT configured these participants' prototyping practices as a form of "user-centered design," explained by Lucy Suchman (2011: 8) as a way of uncovering user needs and making them "available for use by system designers." Second, as the meetups also implicated the lifeworlds of people already in the process of exploring the possibilities of IoT for their political activism, hobbyism, or community organizing, the meetups also figured as a social world already manifesting the spatial, ephemeral complexity of the anticipated smart city. As such, for the innovation managers the project figured as a "model of reality" that companies often construe as part of their innovation practices (Schrage 1993: 55). In this sense, the meetup environments are akin to urban spaces set apart as "living labs" (Leminen, Westerlund, and Nyström 2012) or to art-technology festivals functioning, Frederick Turner (2009: 75) writes, as "cultural infrastructure[s] for emerging forms of new media manufacturing" to the extent that they "model," as he states with regard to the North American Burning Man festival, "the social structures on which manufacturing now depends . . . [and provide] a place in which to work through the . . . constraints that [such a setting] imposes" (see also Zandbergen 2012).

"We Are Sensemakers"

The different legacies of prototyping outlined above configure the Egg and data infrastructures in the making either as digital commons that sustain and are produced by the political work of a sovereign network or as commodities and models of future worlds producing value for the involved corporations. While the prototype can thus inspire opposing visions, the meetups also questioned the grounds for making such distinctions, their affective environment governing yet another understanding of their sociotechnical "open-endedness."

Expressed in different ways by different participants, a central tenet of this understanding is an image of IoT as disruptive of conventional ways of being, organizing, and knowing and of the meetup participants as implicating themselves in this transformational process. In the introductory round of the first meetup I joined in Amsterdam, one participant referred to this image by calling IoT "self-organizing chaos": "Nobody knows where it is going." In response, Borden characterized the meetup participants as able to come to terms with IoT, if only they would move fast and flexibly. He said: "The Internet of things is all around us. . . . It is happening now. . . . We want to be at the front of this Internet of things kind of stuff." Also, for one participant in the Amsterdam AQE meetups, Ronja, the IoT phenomenon indicates a radical transformation of current practices. For her, this transformation is all about detachment: from financial wealth, institutionalized problem solving, and even material objects. In her daily life, Ronja already seeks to live up to this transformation by having sold her car and some furniture and "transitioning toward" self-employment. For her, IoT embodies this transformation toward detachment—which she also described in terms of "flexibility" and "independence"—by facilitating peer-to-peer solutions of problems otherwise requiring institutional financial and material support. Ronja experienced her participation in the project as "seeing the future" and her engagement with IoT infrastructures as learning a new "language" that can help her explore the contours of this burgeoning reality.

This processual understanding of the AQE project also informed the new name that the group adopted as the project advanced, changing it from being associated with the Egg to indicating the constant acquisition of new skill sets. After conversations with group members, in an e-mail sent to the meetup participants in May 2012, Borden made a proposal: "I think we've arrived together in a new place where technology is not the focus. To that end, I'm putting forward 'Sensemakers' as the new name for our community." "Sensemaking," Borden explained, refers to "a process by which people give meaning to experience."

This new name, with its emphasis as much on "sensing" as on "making," is informed by the premise that meaningful understanding can only come through active, hands-on engagement as opposed to distant reflection. As I explain in the following, this emphasis on active engagement through *doing* draws on two oppositional legacies—direct action politics and corporate rapid prototyping—but also feeds into a sense of commonality through its performative distancing from established roles, norms, and ways of being.

"Less Talking, More Doing"

At the London summit, the AQE team arrived before Ed, awaiting his arrival from Amsterdam in the conference room of the London University College where he was to give a keynote. Yet Borden had missed his train to Brussels, had hailed a taxi to chase the train to Brussels, but also missed his connection to London. He arrived too late for his own keynote. AQE participant Karl responded lightheart-edly: "We are here not to talk, or to listen to presentations, but to get things done!" For the remaining two days of the conference, this focus on doing manifested in a display of laptops, sensors, scissors, Post-it notes, colored pencils, computer chips, and wires that adorned the two tables the AQE participants occupied in the hallway of the conference center.

This emphasis on doing as opposed to talking was also a central theme for the other meetups. Borden even proposed making "Less talking, more doing" the official tagline on the group's meetup page. To the meetup participants, this call made sense in relation to both the activist and the corporate traditions in which the project is rooted. With respect to the former, doing is of central concern to the direct action politics of the protest movements associated with the global uprisings since the late 1990s—alternately termed alter-globalization, global anticapital-ism, or the global Left—and with many local resistance movements, such as the Spanish Indignados movement. Direct action politics, Benjamin Franks (2003: 27) writes, seeks to "equalize power relationships" in a *prefigurative* way, by bring-ing the means in accordance with the ends (see also Razsa and Kurnik 2012; Sturgeon 1995). Drawing inspiration from, among others, the European anarchist movements of the nineteenth and early twentieth centuries (Franks 2003) and the nonviolent protest movements and second-wave feminists of the late 1960s (Stur-geon 1995), direct action roots political resistance in the mundane acts of everyday life through the embrace of alternative modes of practice that simultaneously and thus *directly* contest, interrogate, and transform imposed identity categories. As such, direct action can imply the "breaking or subverting" of particular corporeal styles (Butler 1988: 520); the occupation of public squares as a way of contest-ing "the sovereign power of the state to regulate and control the distribution of bodies in space" (Juris 2012: 268); or the deployment of open-source tools and infrastructures for the formation of a sovereign sphere amid a digital culture that is increasingly dominated by corporate and government control (Postill 2014; Ray-mond 1999).

In the context of "hyper-socialized" innovation (Turner 2009), the emphasis on doing serves quite a different function, that of speeding up corporate innova-

tion processes. Borden's encouragements to *act*, he told me, are also inspired by his corporate management background, in particular by the principles of what is often referred to as *lean* or *agile* innovation. Relying less on future planning, lean or agile corporate innovation accommodates an image of the future as oscillating between "the emerging order on the one hand, and the edge of chaos on the other hand" (Nowotny 2006: 5). Doing and interactive engagement in particular apply to the later phases of the innovation process, with the rapid prototyping of models, concepts, or products in the making (Sehested and Sonnenberg 2011). Borden explained this process to me, as he applied it to the meetups, as a "constant process of refining what you are trying to do," of aiming to generate feedback fast, so that you can "change something again and get to something that is, you know, lucrative or successful—or whatever." "Who is going to pay you to do it slow?," he laughed.

Depending on its framing—as lean/agile innovation or direct action politics— the focus on doing is associated with different values and different temporalities. However, in both framings, this focus on doing has a similar organizational effect in its capacity to distract from mutual differences. As Borden clarified his call for action during one of the meetups: "The problem is that if you are here with a group of people who have a lot of different reasons for coming here, you can come away being more confused." In addition to being a way to speed up the innovation process, his action focus was also a strategy for "getting everyone on board":

> Borden: What I was trying to do is: "Hey, something is happening," and "I am going to do this." "Get on the train because it is happening." Create action by like, a little bit of . . .
> Zandbergen: A sense of urgency?
> Borden: Yeah, urgency.

In the context of Occupy, too, as Marianne Maeckelbergh (2011: 2) argues, the emphasis on action is not only prefigurative but also strategic, in that it accommodates a movement culture that affords the collaboration of many different affinity groups, allows for many different types of identity formations, and has goals that are multiple and not predetermined.

The AQE meetups, by placing the focus on doing, moved away from political and ideological differences and fed into a sense of commonality "by other means." In line with Suchman's (2008) understanding that "sites of technoscience are constituted in and through the same practices that produce their objects," the playful, activating, and affective encounters of the AQE meetups fed into the sense that both the project participants and the objects made were well-positioned to cap-

ture the transformative essence of IoT. This sense of commonality was intensified by the way in which the group's focus on action self-consciously distinguished them from other organizations and individuals that were similarly drawn to the collaborative promises of IoT. As we saw at the summit in London, the AQE participants distanced themselves from the larger lecture-focused conference setting. The sensor components, Arduinos, and soldering machines on the tables set up to accommodate the AQE project figured not merely as tools but also as signs and evidence of action. Accordingly, the group's commitment to enacting difference led to its performance of difference through action. This association with action played a similarly performative role when the collective was given an official presence at a creative industries conference in Amsterdam in September 2012. Borden hired a tour boat for the occasion, which he referred to as a "pirate ship," allowing the AQE team to sail away and have their own party during the official events' happy hours and after-parties. The stunt imagined participants as "pirates" engaging with the "unpredictable currents" of IoT in a way that does not depend on institutional authorization, highlighting how the meetups could be regarded as, to use an arguably overused term, "liminal" spaces of transformation.

Since Victor Turner's (1969) reintroduction of the concept of "liminality" into the social science lexicon, the term has recently been applied to contexts as varied as art festivals (e.g., Gilmore 2005), technoscientific culture (Kember 2005), innovation (Shields and West 2003), online gaming (Harambam, Aupers, and Houtman 2011), activism (Baker 2013), and posttraditional religion (Kripal 2007), indicating the ways that these contexts enable a distancing from conventional social structures, roles, and norms, through direct experiences and active engagements with the out of the ordinary. In this sense, the meetup environment can be thought of as liminal in affording participants' temporary distance from their daily-life networks, organizations, and roles and facilitating experiences of transformation. This liminality also offered alternative interpretations of what might otherwise be thought of as the projects' "co-optation" and material "failures." From this liminal perspective, Xively's commercialization was interpreted in one way as a sign of the company's inability to fully comprehend the social possibilities of the IoT transformation. For meetup participants, this commodification process did not entail the end of what they felt they were involved in; the Sensemakers meetups continued after the acquisition, and the project "forked" into new initiatives aiming at the technological empowerment of citizens.[3] The liminal perspective also offered a way of coming to terms with the fact that the sensors did not provide

3. One such fork is the Smart Citizen Kit (see Zandbergen and Blom 2015).

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scientifically objective data. While many hobbyist-participants continued to argue for the importance of data accuracy, another emergent assessment of the value of data informed the participants' conversations as the project progressed. In Ronja's words: "It is more important for the data to mobilize like-minded people, than to be accurate." Another meetup participant asserted how this network of people could calibrate *itself*, finding meaning in trends and fluctuations of the data patterns rather than in the scientific reading of individual data points. Borden summarized this sensibility on the Kickstarter (2012) website: "We are our own community of people with our own goals, our own momentum and our own vision. No one need pass judgment or proclaim success but we."

Conclusion

Should the AQE project be understood as a "best practice" example of bottom-up smart city making or as one more example of the neoliberal co-optation of volunteer work? Should the meetup's focus on "doing" and open-source prototyping as a value in and of itself be celebrated for the "political effect" of its "openness to future tinkering" (Corsín Jiménez 2014: 386) or be criticized for the ways that it "fetishizes the possible" at the expense of the "interrogation of the actual" (Kember 2005: 155)? Is the project's imagined sovereignty an instance of prefigurative politics or a form of neocolonialism, "rendering obsolete the artifacts, sites and circumstances" that enable its existence (Suchman 2008)? And should Borden's call for "less talking, more doing" be seen as a form of direct action politics or as a management technique of "consensual persuasion" that works in the favor of LogMeIn by discouraging agonistic interactions (Paddison 2009: 13)?

Each of these dichotomizing interpretations assumes a different "politics of the possible" and calls for a different understanding of the AQE collaborative process and the project's relevant history. However, the dichotomizing framework that places these understandings in opposition to one another doesn't offer much room for the political subjectivities through which participants themselves construed a sense of agency and an understanding of the transformational promises of the project. Nor does it offer sufficient understanding of the negotiation processes involved when multiple historical legacies, interest positions, and ideologies come together as one project.

When we look at the project from this more complex ethnographic perspective, as is the aim of this article, no conclusive, empirical answer can be given to the above questions. The meetups figured both as an instantiation of direct action politics, formative of a recursive public shaping a sovereign alternative to a

corporate- and government-driven smart city, *and* as a "hyper-socialized space of manufacturing" generating a marketplace and a customer base anticipating smart city commodities and corporate services. In light of this set of paradoxes, the more interesting and empirical question I explored in this essay is which practices, forms of imagination, discourses, and types of experiences enabled this collaboration against all odds?

To address this question, I focused on the ways that meetup participants mobilized the collaborative principles and practices of open source, prototyping, and a focus on doing in service of different agendas and on how the affective environment of the meetups mitigated these differences by making the open-endedness so important to these three notions, constitutive of the meetups' "liminality." By figuring as spaces of transformational possibility, the meetups enabled a shared experience of detachment from the networks, roles, and institutions of daily life.

This "forgetting," combined with the permanent inconclusiveness of the Egg, the project's failure to help citizens improve air quality, and the eventual commodification of the data platform, would justify the project's characterization as *antipolitical*. In this light, the project is no more than a practice of smart city "corporate storytelling" (Söderström, Paasche, and Klauser 2014), its reference to environmental health an "empty signifier" that gestures toward inclusion by being ambiguous yet inhibits meaningful participatory and democratic engagement by being tied to profit-oriented objectives of LogMeIn that eluded critical debate and open contestation.

However, this assessment only half explains the politics of the project's liminality, since it also sustained anticorporate sensibilities and practices. The liminal imaginary of transformation as an ongoing, never-ending process fed into activists' understanding that the project's commodification was not essential to, nor did it indicate the end of, their ongoing commitment to build spaces of sovereignty within a society enthralled by the hypertechnological and capitalist smart city vision.

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