

Title: Contesting Digital Futures: Urban Politics, Alternative Economies, and the Movement for Technological Sovereignty in Barcelona

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Abstract

Scholars have offered important critiques of the socio-spatial processes of contemporary technological development, including the rise of “smart city” urban development models. While these critiques have been essential for understanding contemporary forms of techno-capitalism and its reach into new areas, this paper calls for a consideration of *alternative* modes of digital development in urban life beyond the logics of securitization and capital accumulation. In particular, I examine the critical discourses and experimental practices of a grassroots movement focused on claiming “technological sovereignty” (TS) in Barcelona. The TS movement is a broad, de-centralized network of cooperatives, associations, and community initiatives experimenting with alternative practices of locally-rooted, open-source digital development. These groups explore democratic and cooperative practices of work, property, production, and consumption in relation to digital technology, based around an ethics of care and a commitment to working through and within local communities. In examining the values, beliefs, and practices of the TS movement, I bring ongoing discussions around digitalization and the “smart city” into critical conversation with the extensive literature on prefigurative urban politics and postcapitalist economies.

Keywords: technology, sovereignty, digital, postcapitalism, urban politics

1. Introduction

In the past several years, geography has seen the rapid growth of interest in questions around digital technologies, including robots (Del Casino 2016), big data (Kitchin 2014), algorithms (Crampton 2016; Amoore 2018), social networks (Shelton, Poorthuis, and Zook 2015), and the new spatial forms to which they give rise—the smart city (Kitchin 2015), the smart border (Amoore 2006), and “code/space” (Kitchin and Dodge 2011). Geographers have been well positioned to offer insightful and necessary critiques of the ways these technologies reshape dominant epistemologies, relationships of power, and spatial practices, while highlighting the agentic capacities of technological objects and systems (Ash, Kitchin, and Leszczynski 2018).

Yet, this growing body of scholarship has given less attention to the question of alternatives—alternative digital economies, alternative spatial forms, alternative understandings of what technology *is* or *might be*. In much of this scholarship, emerging technologies are developed and controlled by state, military, and/or corporate actors; and indeed, this is the hegemonic model of technological development today—driven by the sometimes convergent and sometimes conflicting desires of the State for new forms of security, surveillance, and control, and by private firms’ drive for profit.

If, as much of the digital geographies literature has argued, we need to recognize emerging technologies as inherently political and entangled in power-laden socio-technical assemblages, then what might an aspirational postcapitalist politics (Gibson-Graham 2006) of digital technology look like? What kinds of radical political possibilities arise from the ongoing co-evolution of technics and humanity (Stiegler 2013)? If urban algorithmic governance is constituted through “material-discursive projects of ‘future-ing’” (Leszczynski 2016, 1691)

based on logics of securitization, what alternative projects of ‘future-ing’ exist or might exist?
Based on what logics and values?

This paper explores the question of alternative modes of digital development in urban life. In particular, I explore the discourses and practices of a grassroots movement in Barcelona organized around the notion of “technological sovereignty” and devoted to claiming radical democratic control over processes of technological development. The movement experiments with alternative economic practices and forms of organization for digital production and consumption. These practices are driven by an ethics of care and deeply territorialized in the city and local community—seeing technological sovereignty as a way to “rethink the model of the city” (*SobTec 2016* website, accessed 17 December 2018).

In exploring the values, beliefs, and practices of this movement, I bring geographic discussions on processes of digitalization and the “smart city” into critical conversation with work on urban political movements and alternative economies. I build on previous work on grassroots urban movements that aim to radically remake the socio-political and economic relations of the city by enacting alternative practices—a kind of prefigurative politics of grassroots city-making (Davidson and Iveson 2015; Wanzer-Serrano 2015; Gray 2017); and I highlight the importance of exploring the possibilities for alternative economic arrangements and practices based on post-capitalist logics (Gibson-Graham 2006; Diprose 2017; Zanoni et al 2017; Healy et al 2018). Following previous geographic research on such “diverse economies,” I aim to bring “marginalized, hidden and alternative economic activities to light in order to make them more real and more credible as objects of policy and activism” (Gibson-Graham 2008).

The goal of this paper is to move from a standpoint of critique to a position of openness toward the possibilities for alternative, counter-hegemonic (Laclau and Mouffe 1985) modes of

digital development in (re)producing urban life. Existing initiatives of activist and hacker collectives around the world offer glimpses of alternatives. The Free and Open Source Software (F/OSS) movement has long struggled against the privatization of technological knowledge, working to build a digital software commons through alternative regimes of labor and property (Söderberg 2015), while “hacktivist” movements work to disrupt the functions of state and capitalist technological apparatuses (Coleman 2013). A report by the group *Derechos Digitales* (2017) documents projects around Latin America devoted to building common digital infrastructures, free software, and feminist technology often through social movements and cooperative enterprises; while two dossiers from the Calafou Postcapitalist Eco-Industrial District near Barcelona offer examples from around the world of self-managed servers, biohacking labs, and open-source 3D printing (Hache 2014; Hache 2017).

Since roughly 2014, a loose network of individuals and collectives has emerged in Barcelona organized around the notion of “technological sovereignty.” This community is focused on distinct projects and initiatives building community-based technological systems and services with social objectives. The movement is particularly interesting for the wide variety of projects with strong territorial ties to the city—from community-managed broadband infrastructure, autonomous servers, and an open source Internet of Things network, to free software cooperatives and spaces for public education and collective reflection. Each year since 2016 a group of activists has organized the “Technological Sovereignty Congress”—or *SobTec*—while global justice NGO, SETEM-Catalunya, has organized the Mobile Social Congress featuring “technological sovereignty” as a primary theme. Increasingly the language of “technological sovereignty” can be found in the manifestos and websites of many local

cooperatives and associations, and is frequently evoked in public events, debates, training courses, and workshops.

Below, I offer a brief discussion of methods and then introduce the TS movement, situating it in the context of contemporary Barcelona. In the following section, I review existing literature on the “smart city” and processes of digital innovation in cities, highlighting the lack of discussion around alternative modes of development. I then place this literature in relation to scholarship on prefigurative urban politics and alternative economies. The remainder of the paper is divided into two main sections. Section 3 examines TS actors’ critiques of the hegemonic model of technological development and their theorization of “technological sovereignty” as an alternative. Section 4 explores the practices and strategies for pursuing TS, focusing on the movement’s experimentation with alternative models of economic organization, practices of care, its territorialization in Barcelona and relationship to the municipal government.

1.1 Methods

This paper is based on over a year of fieldwork carried out in Barcelona between 2016 and 2018. During this time, I conducted participant observation with several TS-related initiatives and attended public events related to technology politics in the city, including the Smart City Expo, Mobile Week Barcelona, the Mobile Social Forum, and the Technological Sovereignty Congress (SobTec). I participated in several digital forums focused around TS on platforms like Telegram, Signal, and Riot. I also conducted more than 20 interviews with individuals involved in TS initiatives and collected and analyzed pamphlets, promotional materials, flyers, and other documents related to TS. Most interviews were conducted in Catalan, while others were conducted in Spanish. Events and meetings were typically conducted in Catalan and Spanish, as

well as occasionally English. I am fluent in all three languages and all translations throughout the paper are my own.

1.2 Technological Sovereignty in Barcelona

The movement for technological sovereignty represents a confluence of multiple historical and contemporary influences in Barcelona. The movement partially emerges as a reaction to the intensification of capitalist technological development models in the city. Beginning in 2011, then-Mayor Xavier Trias sought to turn Barcelona into a premier “smart city,” partnering with multi-national firms like IBM and Cisco to experiment with “smart” technologies for urban management (March and Ribera-Fumaz 2016). Barcelona also became the host of the annual Smart City World Expo and the Mobile World Congress—holding the title of “Mobile World Capital.”

Yet, the city is also home to an extensive activist community that has mobilized in opposition to corporate globalization, neoliberalism, and austerity—including the 15M protests and occupations of 2011 (Perugorria and Tejerina 2013; Antentas 2013) and the counter-globalization movement of the late 1990’s and early 2000’s (Juris 2010). The particular manifestations of these movements in Barcelona are rooted historically in the city’s anarchist movements of the late 19th and early 20th century (Ealham 2010). Barcelona has also been an active hub of activity in the Free Knowledge movement (Fuster Morell 2012; Fuster Morell et al 2015) and hacker movements, and boasts an extensive solidarity economy sector rooted in historical traditions of cooperativism in Catalonia (Miro and Fernandez 2016). Finally, the growth and evolution of the movement for Catalan independence from Spain has increasingly

prompted critical debates over the nature of democracy and sovereignty and the failures and abuses of current forms of state power and capitalist development (Benitez Romero et al 2017).

The TS community is composed of a diverse range of initiatives, from those focused on infrastructure, hardware, and software development, to the provision of technical services and the promotion of reuse and recycling (see Figure 1). For instance, Guifinet is a decentralized network of community associations and volunteers that build and maintain their own broadband internet infrastructure, managing their own servers, laying fiber optic cables, and relaying signals through a series of antennas and routers. The network is the largest such “community wireless network” in the world, with over 35,000 active nodes. The Things Network (TTN) builds a community-managed Internet of Things sensor network through the Guifinet infrastructure.

Small worker cooperatives—including Jamgo, Colectic, Adab1ts, Dabne, Coopdevs, and Lliuretic—develop open-source software and technical services for local businesses, often in the broader Solidarity Economy Network. Meanwhile, eReuse and Alencop promote the responsible reuse and recycling of digital devices. Other cooperatives in the housing, mobility, food, and service sectors experiment with forms of “platform cooperativism” (Scholz 2014)—using open source technologies to innovate and coordinate broader cooperative economies. Cooperation across these groups is common, pooling resources, skills, and knowledge in pursuit of shared projects. Such is the case of the CommonsCloud Alliance in which multiple groups coordinated through the cooperative FemProcomuns collaborate to create a commonly-managed cloud infrastructure. There are also multiple initiatives focused on community education and training, and creating spaces for collective reflection and theorization, as discussed above.

Figure 1: TS Initiatives

Area of Action	Groups, Projects, and Initiatives
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Infrastructure and Hardware	Guifinet et al, The Things Network, CommonCloud, Equipaments Lliures, Mar de Bits, Ateneus de Fabricacio
Software and Services	Coopdevs, Jamgo, Colectic, Adab1ts, Dabne, LliureTIC, Barcelona Free Software
Reuse and Recycling	eReuse.org/reutilitza.cat, Alencop
Cross-Sector Economic Activity	Katuma, SomMobilitat, Riders por Derechos, Voki Voki, SomConexio, Pangea, ITC Commission of XES
Education and Training	Colectic, ExO, Ateneus de Fabricacio, La Comunicadora, Alencoop, Smart Citizen/DECODE, Smart Barris, Universitat Lliure de Sants, Dimmons (Digital Commons Research Group, Open University of Barcelona)
Reflection and Theorization	SobTec, Mobile Social Congress, Calafou, La Teixadora, Dimmons

2. Digital Geographies and Alternative Futures

I situate the following discussion of the TS movement in relation to recent geographic scholarship on processes of technological change and the emergence of new digital technologies in urban life. I argue that the TS movement demonstrates the possibilities for alternative modes of digital development—a topic that has been thus far neglected in most digital geographies literature focused on critiques of the dominant model. To think through the possibilities for alternatives, I position the TS movement in relation to two existing areas of geographic scholarship: the extensive literatures on grassroots, prefigurative urban politics and alternative economies.

2.1 Digital Geographies and the “Smart City”

The past several years have seen the rapid expansion of geographic scholarship focused on the proliferation of digital technologies and their widespread impacts across economies, governance, social life, and geographic inquiry itself (Ash, Kitchin, and Leszczynski 2018). Much of the emergent scholarship in digital geographies has focused on the “smart city”—the

increased use of complex assemblages of digital infrastructures, data, and algorithms in the governance of cities (Kitchin 2015). Scholars have offered careful explanations of the operations and forms of agency exercised by increasingly connected, “smart” infrastructures and devices, and their roles in producing urban space (Dodge et al 2005) and delivering vital services (Goldsmith and Crawford 2014; Albino et al 2015).

Within this literature there have been continual calls to politicize the smart city. Geographers have offered insightful critiques the smart city as a techno-capitalist model of entrepreneurial urban governance (Wiig 2015; Luque-Ayala and Marvin 2015), and as a new form of securitization, surveillance and control (Vanolo 2014; Klauer et al 2014; Leszczynski; Shaw 2016). Others have examined how digital media and devices “augment” the experience of urban spaces, mediating relationships of power (Graham et al 2013). While scholars explore the possibilities for “citizen participation” in smart city initiatives, they have often found very limited and constrained forms of participation in practice (Tenney and Sieber 2016; Cardullo and Kitchin 2018), highlighting the ways smart city programs turn political issues of urban governance into problems with “technical” solutions. Citizen participation becomes constrained by techno-solutionist logics. Despite these critiques, there have been fewer attempts to consider what alternative, more democratic, and socially-just alternatives might look like.

In her critique of this literature, Rose (2017) has argued that most discussions on the “digitally-mediated city” have failed to fully theorize *posthuman* agency, focusing instead on the agential capabilities of digital devices and infrastructures. She calls on geographers to “reconfigure their understanding of digitally mediated cities and acknowledge both the reinventiveness and the diversity of urban posthuman agency” (Rose 2017: 789). By highlighting the possibilities for urban residents to enact different forms of “spatial and temporal organization

of practices and meanings” (Rose 2017: 787), Rose gestures toward to the possibilities for exploring alternative techno-social relations in the city. More explicitly, Elwood and Leszczynski (2018: 640) have recently called for “feminist digital geographies” to explore the “possibilities of a liberatory digital politics for re-making our technologies and ourselves as digital subjects.” Along this vein, I argue that the TS movement in Barcelona offers an example of how urban residents can exercise political agency through forms of creative experimentation with digital technologies—performing alternative economic practices and enacting forms of radical democracy against the “post-political” turn in urban governance.

2.2 Prefigurative Urban Politics and Alternative Economies

The de-politicization of key aspects of urban life through the implementation of “smart city” models is just the latest in a long succession of “post-political” urban policy agendas focused on making cities “competitive, global, secure, and sustainable” (Davidson and Iveson 2015: 544). MacLeod (2011), Swyngedouw (2011), and others have examined how urban policymaking has become increasingly shaped by the production and policing of consensus as opposed to the “dissensus” or agonism seen by many as key to robust urban democracy (Staeheli 2010). This constructed consensus as to what constitutes good urban governance allows for the rise of technocracy—as experts are brought in to implement global “best practices” and the space of democratic debate is continually constrained.

In opposition to such “post-political” logics, several scholars have recently explored the possibilities for enacting radical alternatives—reclaiming the city as the space of democratic politics (Iveson 2014; Davidson and Iveson 2015). While some of this literature has examined large-scale mobilizations reclaiming urban space for protest (Staeheli 2013), others have focused on examples of *prefigurative* urban politics—enacting the social, political, and economic

changes the activists wish to see, beyond petitioning the state for rights (Ince 2012). In an historical case from the 1970's, Gray (2017) examines the autonomous Marxist "Take over the City" movements in Italy, presenting their direct "territorial autogestion" as a more radical alternative to rights-based discourses. In a similar way, Wanzer-Serrano (2015) examines the case of the Young Lords in Spanish Harlem in the late 1960's and early 1970's, a liberation movement demanding community control over local institutions and land. In a more contemporary example, Bunce (2016) describes the East London Community Land Trust as a political strategy for challenging capitalist development models and creating new "urban commons." This literature stresses the material and spatial relations of the city as key to enacting such alternative futures—reclaiming radical democratic control over the common infrastructures on which urban residents depend and the common spaces in which they live. In many cities around the world, these common infrastructures and spaces are increasingly controlled, augmented, or mediated by digital technologies.

Such prefigurative politics have also been at the heart of geographic literature on various kinds of "community economies" (Roelvink et al 2015). This work explores the possibilities for creating alternative economic practices beyond or in opposition to the hegemonic capitalist order (Bauwens 2005; Gibson-Graham 2006; Benkler 2006; Stiegler 2014). Gibson-Graham (2006) develop a vocabulary of economic diversity, recognizing the multiplicity of existing and possible arrangements for organizing economic activity. Activists around the world have theorized and experimented with alternative "solidarity economy" initiatives (Allard and Davidson 2008), while scholars across disciplines have examined processes of creating new "commons" (Healy et al 2018). All of this literature considers how relationships of production, consumption, labor/work, and property are reconfigured through experimentation with alternative economic

models guided by notions of autonomy, solidarity, equality, and care (Diprose 2017). While the “community economies” literature in geography has engaged little with the possibilities offered by digital technologies, others have examined the alternative models of production and consumption in the free software movement (Söderberg 2015) and the broader possibilities for commons-based modes of peer production made possible through the internet (Bauwens 2005; Benkler and Nissenbaum 2006).

Like the movements for radical urban democracy discussed above, diverse economy movements contest hegemonic visions of the future and actively work to build alternatives through grassroots forms of organization and experimentation. I draw on both bodies of literature in approaching the TS movement in Barcelona. I describe the movement as a network of prefigurative projects collectively theorizing and experimenting with alternative political economic models of digital production and consumption to re-produce and re-make urban life.

3. From Critique to Alternative Digital Futures

This section describes TS activists’ broad critiques of the hegemonic model of technological development, and then examines the production of a discourse around “technological sovereignty” as a way of collectively imagining alternative digital futures.

3.1 Critiquing the Techno-Capitalist Order

The TS movement is informed by a well-developed critique of techno-capitalism based on the lived experiences and observations of Barcelona-based activists. The critiques offered by TS activists are not directed at any particular digital technology or set of technologies, but rather at the political economic arrangements and techno-social relations within which such

technologies are produced, proliferated, and utilized in the contemporary conjuncture. Significantly, this approach to critique leaves open possibilities for imagining and experimenting with alternatives.

TS activists' critiques can be organized into four related themes: the loss of control over technological systems, the exploitative and opaque business models of contemporary techno-capitalism, the depoliticization and de-socialization of technological knowledge, the uneven geographies of technological development, and the state's facilitation of increased surveillance. All of these critiques are addressed within the broader TS discourse as demonstrated by activist Margarita Padilla's (2017) explanation of the driving questions behind the movement: "the question we wish to discuss is who has the power to make decisions about them [technologies], about their development, about their use, about access and about distribution, about supply and consumption, about the prestige they have and their power to fascinate..."

Many TS activists argue that as digital systems become more complex and infiltrate further into all aspects of life, the average person has less knowledge of them and thus less ability to exert control or make informed decisions about their relationship to them. As TS activist Chris (interview, 3 May 2018) explains: "Technology is continually more present, and we are continually more dependent on it. You take a cell phone and you can say, 'I don't know half of the things it is doing, and in two years when I have the next one, I'll know even less. And it is going to have a greater impact on my life.' And it will get to the point where you have something that you don't recognize, and it is yourself." This perspective is common across TS activists, who highlight broad concerns about losing control over key aspects of everyday life to techno-capitalist firms with limited accountability.

TS activists take specific issue with the opaque business models of contemporary technocapitalism based on the exploitation of personal data and the monitoring, profiling, and manipulation of digitally-mediated activities. As one activist explicates: “People use Google and Facebook and Twitter, and it is all free. But they don’t realize that if something is free, you are probably the product—your data, your information, and your privacy” (interview, 16 February 2018). The vast majority of technology users lack basic knowledge about what data are collected, how they are used, by whom, and toward what ends, as many of the algorithms that process such data are hidden from view, subject to intellectual property protections.

Such exploitative practices are also obscured by the discursive privileging and depoliticization of technological knowledge. TS activists critique the division of knowledge into separate social and technological spheres, echoing common calls in scholarly analysis to recognize technologies as always situated in socio-technical milieus (Kitchin and Perng, 2016). For instance, Nuria explains that “technologies are ways of fulfilling some need or accomplishing something you want to do. They can’t be separated somehow from the rest of life” (interview, 21 March 2018). Margarita Padilla goes further situating technology at the heart of human life: “[t]echnology, from fire or flint to the monumental constructions that we use everywhere, almost without noticing, is the body of culture. Without technology, there would be no culture” (Hache 2017, 10). Recognizing this, TS activists reject the discursive framing of technical knowledge as a specialized and privileged field of knowledge to which only a select few have access—generally wealthy, white, educated men. They critique how this artificial division of knowledge allows for the proliferation of a singular narrative about what technology *is* and projects the future of technology as a linear progression of development divorced from broader social systems.

This erasure of the social and political nature of technology is also an erasure of spatial differences. TS activists highlight the uneven spatial distribution of technological access, knowledge, and authority, namely the concentration of authority over technological development in the United States, and Silicon Valley in particular. As the world's largest technology firms are located in the United States (and increasingly China), citizens in Barcelona have limited ability to interrogate or challenge the practices of companies that control personal data and maintain the infrastructures on which daily lives increasingly depend. The loss of basic technical knowledge also contributes to the loss of broader spatial and political knowledges, as the material and spatial nature of technological systems are made invisible, fading into what Thrift (2004) calls the “technological unconscious.” Irene reflects on this hidden geography: “You hear about the ‘cloud’ and people think it is literally up in the air. You send an email and people think it just magically arrives on someone else’s computer. You don’t see that these services work through modems and servers that are located in particular places” (interview, 16 February 2018).

The TS community also critiques the ways corporate technology is increasingly adopted by states and municipalities. They point to Barcelona’s own experimentation with “smart city” and related programs as projects of surveillance and control that work to depoliticize vital debates over urban development processes while privatizing urban data and vital infrastructure. For instance, activists have fought against the implementation of T-Mobilitat—a “smartcard” ticketing system for public transportation—highlighting concerns about data privacy, the lack of transparency, and the privatization of public services. These critiques have been widely echoed by critical geographical scholarship on smart city projects.

3.2 Theorizing Technological Sovereignty

Since around 2014, the notion of “technological sovereignty” has gained influence in Barcelona as a way of imagining and building alternatives to the hegemonic model of technological development. Since then TS activists have collectively theorized what technological sovereignty might look like in practice and how it might be pursued. Like the prefigurative politics of the movements discussed above, this theorization is the product of active experimentation and reflection. The two dossiers published by the Calafou Post-Capitalist Eco-Industrial District develop a theory of “technological sovereignty” based on the experiences of a range of actually-existing open-source technology projects from around the world. The community conference SobTec creates a space for local initiatives to exchange ideas and reflect on their own practices and their politics. Other events like the Solidarity Economy Fair of Catalonia and the Mobile Social Congress create spaces for networking and exchange of ideas across open-source, community-based technology projects, out of which “technological sovereignty” emerges as a common organizing concept. As the working product of ongoing processes of collective experimentation and reflection, “technological sovereignty” is a concept with multiple meanings that gets taken up and enrolled in a variety of projects in different ways. Here, I offer a rough outline of some of the common ways TS is understood in Barcelona.

For many TS activists, the notion of “sovereignty” has roots in movements for food sovereignty, rather than direct claims on state power. In the introduction to the 2014 *Soberanía Tecnológica* dossier, Alex Hache cites the conception of food sovereignty as the basis for theorizing technological sovereignty, explaining that the idea was first coined by Via Campesina in 1996 to combat discourses of food *security*. Logics of food security worked to diminish community control over vital food systems, through a rationalization and de-socialization of food production and close partnerships between corporate food interests and state apparatuses. Food

production and distribution became a de-politicized ‘technical’ question. This juxtaposition of sovereignty to security is key, as many scholars have highlighted the similar logics of securitization on which contemporary processes of digitalization are based (Leszczynski, 2016).

The TS movement sits in relation to other movements in Barcelona focused on reclaiming energy, food, residential, cultural, and health “sovereignities.” The concept of “sovereignities” has become an increasingly powerful organizing concept for progressive and radical politics in Barcelona and beyond in recent years. The collective authors of *Sobiranes* [Sovereignities] (Benitez Romero 2017)—affiliated with the left-wing, pro-independence political platform *Candidatura d’Unitat Popular* (CUP)—present the fight for “sovereignities” as processes of creating direct democratic control over the vital systems and infrastructures of everyday life. Activists argue that these movements are fundamentally about “putting social reproduction under democratic control” (Benitez Romero et al 2017, 49) and promote them as a “proposal against capitalism” (ibid). In this sense, the notion of “sovereignities” articulates an alternative political economic logic and strategy in a similar way to the various alternative economy movements discussed above. It calls for fighting ongoing processes of neoliberalization not just by demanding changes to state policy, but by building new structures, relationships, and arrangements for meeting the population’s needs.

Thus, when applied to technology, the idea of sovereignty is about building alternative modes of developing, producing, and consuming technologies that are transparent, democratic, and work toward the overall goal of meeting community needs and re-producing collective life. Additionally, as digital technologies become increasingly important to the management of other vital systems—from food systems and health care, to energy and mobility—TS becomes essential to re-claiming broader forms of radical democratic control.

While existing practices of “open-source” production are important, they do not go far enough. Several authors have highlighted the ambiguous politics of the open-source movement, and recognize the various ways open-source knowledge gets enclosed, sometimes feeding further capital accumulation. Further, the open-source community is rather limited, consisting of generally geographically dispersed individuals and groups without strong territorial ties. TS recognizes the importance of open-source models, while seeking ways to socialize and territorialize them—involving a more diverse and inclusive community and using them to transform broader social, political, and economic processes. As one activist commented in 2016: “We cannot rely only on five ‘nerds’ if we truly want to transform our relationship to technology and remake our city” (fieldnotes, 15 August 2016). In challenging the privileging of “technical” knowledge above social knowledges, TS activists also see questions of gender equity and broader questions of social equality as key to creating more inclusive, democratic digital systems.

4. Enacting Alternative Modes of Digital Development

The remainder of this paper examines the ways Barcelona-based actors work to create an alternative model of digital development in practice. I explore TS initiatives’ alternative forms of economic organization and then examine how these alternative models rely on everyday practices of care. The following section describes how these projects constitute a particularly urban, place-based politics, presenting the city as a key site from which to enact such alternatives. The final section reflects on the role of the progressive municipal government in promoting TS.

4.1 Alternative Digital Economies

TS initiatives experiment with alternative economic models, including the collaborative model of open-source software production, as well as commons and cooperative-based arrangements. These alternative models challenge traditional notions of labor and property, and divisions between producers and consumers, while working to democratize technological knowledges.

Technology workers' cooperatives, like Colectic and Jamgo, offer alternative models for organizing work in the technology sector. While Stiegler (2014) argues that in contemporary “cognitive capitalism” so-called “knowledge workers” are increasingly enrolled in complex organizational forms that deprive them of knowledge and agency, these cooperatives implement horizontal forms of decision-making for organizing work processes with workers exercising direct control over their own knowledge. As a member of one cooperative explains: “We meet in an assembly each Friday to organize the work and make decisions. It can be very complicated and we do not always agree, but in the end, we come to collective decisions” (interview, 16 March 2018). These cooperatives also make collective decisions about the use or investment of the surplus generated by their activities. In the case of Colectic, the cooperative offers digital services on the local market, the income from which goes to support the cooperatives' youth social work programs—reinvesting in the capacities of the local community.

While in cooperatives such work constitutes a form of employment (cooperative self-employment), in commons-based projects like Guifinet or TTN, “work” is a more diffuse concept. Such projects rely on the contributions of a wide array of local actors, from the neighbors who install and maintain their own antennas, sensors, or other equipment, to those who coordinate such projects in their neighborhoods or experiment with new equipment to improve the common infrastructure. This work is typically not remunerated and is instead

inspired by a mixture of personal enjoyment, political conviction, and care for the broader community.

The economic practices also challenge traditional notions of property. Alternative notions of property are clear in the free software and free knowledge movements, within which code, designs, and other forms of “intellectual property” are shared via the internet, building a digital knowledge commons. This model is harnessed by actors in the TS movement, as when the worker cooperative Coopdevs uses code from the Open Food Network to develop the application for Katuma, a local agricultural consumption cooperative. As Sergi from Coopdevs explains: “we developed the application from the Open Food Network, adjusting it for our needs, but we don’t own it. We develop it *with* them, and the cooperative [Katuma] can do what they want with it. They can replace us with other developers and keep using the app. And others can take and use and change the app however they want” (interview, 29 January 2018).

Notions of property are further challenged by the practices of Guifinet and eReuse. While in free software development the “property” in question is intellectual property, and thus easily shared via the internet, in these projects property consists largely of material objects and infrastructure. In the case of eReuse, electronic devices are managed through “community licenses” in which individuals exercise a right to *use* devices, but are required to adhere to particular principles regarding the devices’ reuse and eventual disposal. Such an arrangement reconsiders property in its original legal sense, as a bundle of rights over a particular object—rights that may be selectively restricted or contingent on particular actions.

In Guifinet, much of the infrastructure that makes up the network is private property, but is offered voluntarily to the common infrastructure, while other pieces of equipment may be owned collectively by a local association or the Guifi Foundation. The networked nature of the

infrastructure means that any individual piece of equipment is reliant on the broader whole. While I own my own antenna, router, and cables, they only function if connected to the broader network. This co-dependence of the material infrastructures necessarily obscures notions of property. While anyone is welcome to withdraw their individually-owned piece of equipment, that equipment loses its use-value outside of the broader network.

These models also blur divisions between producers and consumers. For instance, in GuifiAmunt, the local Guifi association for the neighborhoods of Horta and El Carmel, members pay five euros per month to maintain and update the shared infrastructure. Not every member actively participates in the maintenance of the infrastructure beyond their own home—either for lack of time, desire, or technical knowledge—but there are no distinctions among the association members. All decisions are made by consensus at monthly meetings. While some members may have more technical knowledge, or be more involved in the work of the project, they collectively decide on updates or changes to the network. In the case of Katuma, the local food cooperative is composed of agricultural producers, app developers, and local consumers with decisions made collectively among them. Such organizational forms recognize the co-dependent relationship between production and consumption and build democratic practices for managing that relationship and the various knowledges on which it is based.

Yet, these alternative economic practices also face challenges, including limited funding and their reliance on volunteer or part-time labor. As many activists point out, the business models of companies like Google and Facebook offer high-quality services for free, making profit from the exploitation of personal data. It is difficult to convince individuals, small companies, and even cooperatives to spend more to invest in open-source, community-based technologies, as the true cost of labor, materials, and maintenance of such systems are made

invisible in the dominant model. Activists admit that the future expansion of technological sovereignty depends on exploring new practices and alliances, and building greater awareness of the abuses of the hegemonic model within the local community.

4.2 Practices of Care

In contrast to the logics of capital accumulation and securitization on which contemporary models of “governing through code” (Klauser et al 2014) rely, the TS initiatives are driven by an ethics of care. That is, the initiatives are not purely “economic” but are concerned more broadly with social development and community wellbeing; or rather, they are “economic” in the word’s original sense of “to take care” (Stiegler 2014). These projects rely on practices of care of technological objects and infrastructures, care for others, and care of the self.

Many TS initiatives are concerned with the care of technological systems and objects. This care is based on a recognition of the growing importance of these systems to everyday life and the need to maintain and improve them in order to support their social functions. As one Guifi actor explained: “Internet access isn’t a luxury anymore, it’s almost as important as having electricity. People rely on it to work, to communicate with family, to manage their money. So, we need the network to be reliable” (fieldnotes, 26 June 2016). Recognizing this, Guifi members organize themselves to fix technical issues when they arise and to continually improve the infrastructure by experimenting with and integrating innovations, like fiber optic cables.

This care is based on a rejection of capitalist models of programmed obsolescence and a series of practices meant to extend the usable life of devices and systems. eReuse coordinates the reuse of devices within communities until all use-value has been depleted, combatting “premature recycling” (Franquesa and Navarro 2018). Events like the Mobile Social Congress often include “Re-Start Parties” in which activists teach people how to extend the lives of their

devices. In Guifinet, when one piece of equipment is replaced in order to strengthen the network, the old equipment is moved elsewhere in the network where it can take on a new use. The association La Mar de Bytes makes use of second-hand and recycled equipment to maintain community-managed servers for web-hosting and email. Such practices are based on a commitment to responsibly manage collective resources, and a recognition of the social and environmental impacts of e-waste and mineral mining in the Global South—issues given special attention at the annual Mobile Social Congress.

TS projects are often inspired by a sense of care for others, or care for the community, with their primary objective to meet a social need or offer a social service. As such, many projects contest constructed divisions between the technical and the social, in which technical knowledge is privileged and value neutral. This is clear in cases like Colectic, where the cooperative integrates technological work with community-based social work. As cooperative member Nuria explains regarding their work with local youth: “Our work is to accompany youth in this process of learning about new technologies, so that is it not just ‘connect yourself to internet to watch whatever’ but to be critical and aware of how things work, what is happening with their data, and what these systems can be used for” (interview, 21 March 2018).

The *Ateneus de Fabricació* carry out similar work, offering public access to 3D printers and digital production technology with a focus on social outcomes and shared property. The network’s moto, “Let’s materialize ideas, let’s co-create our environment,” is based on an ethic of care oriented to the surrounding community and informed by a sense of being-in-common in urban space. Director Jordi Reynes explains that the digital production revolution will produce new forms of inequality and injustice, unless it is radically socialized. For this reason, the *ateneus* are staffed by both technologists and community organizers, who work to identify

community needs, and access to the facilities requires some form of service or contribution to the community in exchange.

Finally, TS initiatives are based around practices of care for the self, in which individuals cultivate deliberate and ethical relationships to technology. This is seen in the forms of experimentation, self-help, and knowledge-sharing common at weekly Guifilabs. For instance, at one event a Guifi contributor explained the process by which he created his own home automation system and manages it through an open source platform. Such activities represent forms of technological experimentation with one's direct living environment while gaining and sharing new forms of knowledge. In more everyday examples, for those without formal technical training the use of self-help guides to install a Guifi connection involves processes of cultivating oneself as a technological subject and reclaiming forms of technical knowledge.

Events like SobTec, MSC, and community workshops also offer opportunities for individuals to reclaim knowledge and cultivate oneself as a digital subject. Discussions at these events focus on critiques of capitalist technological models, how personal data is captured and exploited, and the ways these systems produce certain identities and senses of self—interpolating subjects as consumers. In a workshop on digital political participation organized by Colectic, the facilitators lead group reflections on the kinds of personal data shared online and the multiple ways that data is captured, monetized, and exploited. This critique is coupled with an exploration of the alternatives produced within the TS community and the ways these alternatives offer greater freedom and control over personal data. Participating in these spaces acts as form of cultivating new subject positions. These practices continually push back against widespread social and cultural conventions that see technology as a specialized sphere of knowledge on which the “layperson” majority is not qualified to opine.

4.3 TS and the City

While TS activists experiment with alternative economic relationships and practices around digital technology, they do so from within localized communities. The projects discussed in this paper place a great importance on working “from the territory.” This is based on an understanding and appreciation of difference across space, and of technology as always entangled in the social and thus always spatialized. Yet, these projects are also highly connected and networked to partners, collaborators, and interlocutors around the globe—constituting what Stiegler (2014, 26) calls “the inscription of territory in a planetary reticularity.”

For instance, the technology/social work cooperative Colectic works specifically in the neighborhood of El Raval. As Nuria explains: “Sometimes we are asked to help facilitate some community process in another neighborhood, and we have to say no. We can have expertise in certain technologies and can maybe help in that area, but we don’t know the community. We don’t know their needs or issues. It wouldn’t be appropriate for us to lead a community process like that” (interview, 21 March 2018). Likewise, Jordi emphasizes the importance of the public 3D printing labs being rooted in “the territory”: “Every neighborhood is different, has its own needs and challenges. I can’t sit here in an office and say what will work in each neighborhood. So we have had to work from the territory [*des del territori*] talking to people about what they need and letting them lead the process, deciding what role these technologies might play in their lives” (interview, 25 July 2016).

Projects like Guifinet and TTN actively territorialize—building and maintaining material infrastructures. In both cases, relationships of proximity and the physical and social characteristics of particular spaces dictate if and how the network can be extended. Most

Guifinet connections are established by antennae relaying a signal from rooftop to rooftop, requiring a line of sight from node to node. Take, for instance, one Guifinet member's reflection on the difficulty of establishing connections in the Gothic Quarter of Barcelona: "In the Gothic Quarter it is really hard. It's almost impossible to have a roof with a line of sight to another node because the buildings are so low and surrounded by taller ones. It's dense, so we could run fiber optic cables, but there are so few actual residents now, it's all tourists and short term rentals. There aren't enough people for it to work." (fieldnotes, 18 January 2018). The project requires working with the complex spatial relations in which one finds oneself, including dealing with neighbors who may be opposed to having an antenna on the roof of their building, a rental market that complicates long-term occupancy, and the particular characteristics of roofs and the urban landscape. As such, Guifinet is a project of actively and deliberately co-producing the space of the city in accordance with the lived realities and needs of local residents. Doing so contests the invisibilization of the "technological unconscious" and recognizes the increasing importance of spatialized digital infrastructures to everyday life.

While all of these projects are committed to working locally, many of them are also extensively networked beyond the city. The cooperatives discussed above often work in collaborative networks with free-software programmers around the world, drawing on and contributing to a digital commons of open-source code. Representatives from Guifinet regularly work with other groups interested in building their own community-managed infrastructure, such as when Guifi participants spent a Guifilab helping the leader of an indigenous community in the Ecuadorian Amazon explore the feasibility of building infrastructure to bring internet access to his village. The annual Mobile Social Congress includes speakers from around the world—and in

particular from the Global South—who come to discuss issues of human rights in electronics manufacturing, or social and environmental effects of e-waste and mineral mining.

Such connections and partnerships demonstrate the potential for alternative modes of digital development to be both deeply territorialized and attuned to the needs and conditions of particular communities, while also radically open to sharing and exchanging information, collaborating on projects, and maintaining extensive networks of solidarity. By working from within localized communities and actively reshaping the spaces of the city, the TS movement contests hegemonic “smart city” models. Yet, most of these initiatives remain rather small—confronting the familiar issues of scale and long-term sustainability explored in much of the literature on postcapitalist economies and prefigurative urban politics. For some within the TS community, the transformation and democratization of municipal institutions offers one potential opportunity to build technological sovereignty on a broader scale.

4.4 Technological Sovereignty and Municipal Government

Emerging from a social movement base, *Barcelona En Comú* (“Barcelona in Common” in Catalan) won control of city hall in the 2015 municipal elections, led by housing activist Ada Colau. Since then, the municipal administration has embraced discourses of technological sovereignty to rethink its existing smart city program. A June 2016 op-ed by Deputy Mayor Gerardo Pisarello titled “Ciutats amb Sobirania Tecnològica” (*El Periódico*, 22 June 2016) calls on European cities to reject corporate prescriptions of the smart city in favor of a network of cities working toward TS. Meanwhile, Digital Innovation Commissioner Francesca Bria has become an active voice for alternative municipal technological models across Europe, leading the production of an “Ethical Digital Standards” municipal policy guide (Ajuntament de

Barcelona 2018). Situated within a broader movement around progressive “municipalism” in Spain and around Europe, the Colau government claims the city as the ideal site and scale from which to lead radical democratic reforms, including around digital technology.

The *Barcelona en Comú* government has promoted TS through a series of changes to municipal practices with an emphasis on free software, open-data, transparency, and citizen participation. The administration has begun migrating municipal computer systems away from proprietary software packages to open-source alternatives like LibreOffice and Linux-based operating systems. This migration has created 100 new permanent paid positions for local citizens with knowledge of open source systems and helps build and promote the broader community of open source software in Barcelona and beyond. The administration has also changed municipal contracting guidelines to give leverage to local cooperatives and firms based on open-source technology and social consciousness, and have implemented programs and subsidies to support cooperative and commons-based enterprises.

Decidim [We Decide] is a municipal project to create an open-source digital platform for citizen participation, in which citizens can make proposals and contribute to the development of municipal initiatives. The platform was developed by a broad community of activists and technologists and is now used by municipalities, cooperatives, and other organizations across Europe. The *Ateneus de Fabricació* are projects of the municipal government, receiving their funding from the city, while several of the collectives discussed above work out of self-managed community spaces owned by the municipal government.

Municipal support has helped promote TS initiatives and worked to imagine an alternative municipal model. Yet, such alliances also bring concerns and limitations. Beyond fears of co-optation or state surveillance, municipal priorities also change regularly with electoral

cycles and are limited by the structures of the institutions. As such, despite progressive changes since 2015, Barcelona continues to host large corporate technology events and continues to encourage myriad forms of investment from large technology firms, reflecting what some activists see as the administration's broader failure to break with the city's capitalist development model and posit a real radical alternative (Delgado 2017). At least some of the shortcomings of the administration stem from the lack municipal authority in relation to regional and national governments; while *Barcelona En Comú's* lack of a majority on the city council further limits their ability to implement radical changes. Yet, it is also important to consider the limits of what can be accomplished through current forms of administrative power and the dangers of looking toward that state as a solution. Thus, while many projects benefit from municipal programs and many activists see the city as the territorial base of digital transformation, most TS initiatives remain autonomous.

5. Conclusion

This paper has explored the possibilities for alternative modes of digital development in urban life through the example of a movement toward “technological sovereignty” in Barcelona—an informal network of initiatives experimenting with locally-rooted postcapitalist digital economies. This discussion makes several significant contributions to geographic scholarship. First, it moves beyond the now well-established critiques of the “smart city” to consider the ways traditions of prefigurative urban politics and experiments with postcapitalist economic models may offer possibilities for re-thinking digital urban futures. A rejection of contemporary “smart city” programs does not need to mean a rejection of digital innovation and development, which instead can become loci for imagining and building alternatives. Second, by engaging existing

literature on urban politics and alternative economies, I highlight the way emerging digital technologies open possibilities for pursuing different political economic logics and experimenting with alternative practices. Digital technologies can facilitate new forms of political organizing and democratic decision-making, and can help drive new arrangements of work, property, production, and consumption in urban life. Further, by framing technological sovereignty as just one of multiple entangled “sovereignties”—conceptualized around food, energy, culture, health, etc.—the TS movement raises important questions about the complex, entangled, and far-reaching nature of ongoing processes of digitalization and the dangers of leaving these processes to capitalist firms.

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