

**GEEKS AND GLOBAL JUSTICE:
ANOTHER (CYBER)WORLD IS POSSIBLE**

by

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Abstract

This dissertation is an exploration of alternative visions of social organization beyond the horizon of capitalism. As such it is both a critique of the status quo in its current neoliberal capitalist configuration and a proposal for another world, a better world that has humanity—humaneness—as its central concern. The research trajectory parallels the transformation of the author from activist journalist into radical scholar, employing an open source methodology that interweaves the subject matter and infuses core of a new mode of social existence. Thus the dialectic between theory and practice comes alive for both researcher and “researched” even as the dialectical interplay between liberation and domination, as well as between society and technology, form the theoretical assumptions underlying this dissertation.

A critique of post-industrial theories framing Information Society discourse as well as a consideration of the “newness” of information in the digital age provide fertile ground for a discussion of tech activism in contemporary social movements. Using the framework of critical constructivism, I analyze how tech activists consciously design technology that embodies values of equality, freedom and justice. Their creation and appropriation of free software indicates a more general argument for open knowledge production as the basis for a new mode of work, and indeed, a new set of social relations. In reconstructing the internet along a democratic model and through a democratic process, I argue, tech activists are creating a model of social organization that is radically transformative, refusing the reductive limits of the neoliberal world order, and enacting the possibility of a better world now.

Keywords: Democracy; Social Justice; Social Movements; Anti-globalization; Neoliberalism; Open Source; Internet; Online Activism; Copyleft

Research Areas: Critical Constructivism; Critical Theory; Marxism; Science Technology Studies

For Charlotte, Helena, René, Rodger and Debbie

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Introduction: Portrait of an activist as a radical academic

In April 2001, I travelled in a beat up van to Quebec city—a 12-hour road trip from my adopted home in Windsor, Ontario, City of Roses, armpit of the nation. The journey was a road trip—an adventure—but also a quest, or perhaps a mission. I was going to cover the protest against the Free Trade Area of the Americas (FTAA) summit, a meeting of the economic oligarchs of the global south and the global north for an alternative newsweekly I had helped start seven years before. I had learned much in those years, reporting on labour, environmental, civic and community issues from a grassroots perspective. Windsor's bleak industrial landscape, dotted with strip malls, factories and Tim Hortons, and urged on by urban sprawl, provided a different lens through which to view the world. Viewing this scene from a grassroots perspective, I began to perceive the myriad injustices, small and large, that reproduced themselves at the local level, in the lived experience of everyday life. As I became more engaged in my community, drawing connections between corporate profit and exploitation, activists around the world were starting to make the link between local injustices and the structuring force of neoliberal globalization. A global movement was starting to coalesce around a shared experience of the ill effects of capitalism, the reigning economic model whose failures “had suddenly become impossible to ignore” (Klein, 2002, xiv). That there was a money trail leading from power and privilege to environmental devastation, impoverishment and economic injustice, and breathtaking human immiseration was becoming apparent—not just to activists or professional do-gooders, but to farmers and

factory workers, teachers and tree huggers, feministas and campesinos, and students of all ages. When I arrived in Quebec City to witness the manifestation (as the French call it) first-hand and bring the story to readers in Southwestern Ontario, I became part of that movement. Roaming the streets of the historic capital for another 12 hours, I experienced a city under siege as the state mobilized against the democratic expression of its people. Doubled over in the snow, retching and blinded from tear gas that rolled over the city in great clouds, I understood the struggle: it was no longer a matter of coffee shop debate, but an embodied experience. My transition from journalist to activist was complete.

Unity in diversity and lines of flight: The global justice movement

The FTAA protest was not the first major public mobilization against capitalist hegemony and corporate rule, nor would it be the last. The global justice movement (GJM) had stormed the international stage two years earlier at the infamous Battle of Seattle, 1999's massive public demonstration against the World Trade Organization. More fittingly called a "movement of movements," it gathered a variety of diverse interests and groups under the broad banner of global social justice and advanced a critique—at times scathing—of the neoliberal new world order. Starr (2001) describes the unprecedented joining of causes as a "unity of many determinations" (160). This deliberate invocation of Marx raises the spectre of communism, retrieved from the dustbin of history and dusted off for our reconsideration. Marx's (1973) notion of the "unity of diverse aspects" suggests an holistic condition—a synthesis and summing up of difference which aptly describes the GJM. Rather than a homogenizing and hegemonic monolith, the new activism is more aptly characterized as a globally distributed network

of diverse affinity groups working on an array of social justice issues, including environmental and economic sustainability, racial and gender equality, and human, labour and civil rights. These affinity groups do not converge around an overarching ideology (despite an oft-advanced critique of capitalist globalization) but around what Day (2005) calls “groundless solidarity.” This is an “ethico-political commitment” to seeing one’s own privilege and oppression in the context of other privileges and oppressions as so interlinked that no particular form of inequality—be it class, race, gender, sexuality or ability—can be postulated as *the* central axis of struggle (18).

Narrowly construed, this might appear as a theoretical sleight of hand, or a displacement of Marx's historical agent of change, the proletariat. A more expansive interpretation is useful, however, in discussing contemporary expressions of resistance and social change that transgress myriad social and geographical boundaries, simultaneously local and global. A robust concept of societal transformation must account for multiple and intersecting lines of oppression and as many lines of flight. “Territorialities, then, are shot through with lines of flight testifying to the presence within them of movements of deterritorialization and reterritorialization” (Deleuze & Guattari, 1987, 55). Territorialities—occupying forces— are social relations, and as such are never immutable or static, but contain the seeds of their own destruction and reinvention (deterritorialization and reterritorialization). Lines of flight are everywhere, according to Deleuze and Guattari (1987), etching the pathways of escape from the forces of social domination (territorialization, colonization). For every instance of subjugation, a liberatory impulse; power, resistance to power and reconfigurations of power co-exist within spheres of repression and control and are in fact, deeply intertwined: “Where there is power, there is resistance, and yet, or rather consequently, this resistance is never in a position of exteriority in relation to power” (Foucault, 1978, 95).

This engenders a vision of social change that rejects capitalism as monolithic, and necessarily emanates from its margins, from within its cracks, a deterritorializing force in Deleuze and Guattari's (1987) sense. Agents of change are not revolutionary vanguards but the dispossessed, the unassimilated and the unapproved. They are not human beings as conditioned and tolerated by the ruling forces but Žižek's (2005) monster-rejected, despised, feared, and mounting a critique from the outskirts of acceptability. In modernity, this is the terrain that agents of change have occupied: the periphery, the minority perspective. They have occupied the role of subjugated subject: the factory worker and the faggot, the coloured and the poor, the whore of the home and the street. Any theory of change must arise at the margins, from the bodies and lived experience of the subjugated. In this sense, as Foucault (1977) said to Deleuze, “theory does not express, translate, or serve to apply practice: it is practice” (207). Theory as practice can be nothing less than “a struggle against power, a struggle aimed at revealing and undermining power where it is most invisible and insidious” (208). Emancipation is not, therefore, a reified product of some formulaic revolution but an embodied practice that redefines social relations. “Libertarian forms of organization have the enormous responsibility of trying to resemble the society they are seeking to develop. They can tolerate no disjunction between ends and means,” observes Bookchin (2005, 446). Emancipation is both a goal and vision of the future and a future-now.

In highlighting the ill effects of global economic policies on the world's most vulnerable—the poor in developing nations (Stiglitz, 2002)—the activism gathering under the broad umbrella of the global justice movement caused a tremor of doubt in the public imaginary. Characterized by an “affinity for affinity,” the “newest social movements” organize around “non-universalizing, non-hierarchical, non-coercive relationships based on mutual aid and shared ethical commitments,” thus enacting the

change they seek more broadly in society (Day, 2005, 9). They call into question a socio-economic system whose acceptance was previously ratified by mere assumption and whose dominance was near universal. Fundamentally, global justice activists challenge the logic of capitalism and its generalization to a mode of social organization that mobilizes human beings as capital. Almost a century ago, Lukács (1971) recognized the need for capitalism to colonize every aspect of society and thus to create a form for the state, shored up by a system of law corresponding to its needs. Operationalized as capital within this all-encompassing form, people become mere objects, standing reserves in Heidegger's (1977) terminology, to be used and disposed of according to the naturalized laws of a market-based economy. In reducing human relations to commodity relations of exchange, however, capitalism reveals its serious limitations as a mode of organizing and experiencing social life (Lukács). It is this key insight that served as the foundation and focal point for the newest social movements.

While the global justice movement is part of a continuum of contentious political action that has characterized modernity (Tarrow, 1998), it is distinguished by its use of the internet with which it shares structural similarities. The internet is the matrix in which the GJM took root, with early manifestations in the Zapatista resistance in Mexico in 1994 (Cleaver, 1998) and the North American anti-MAI (Multilateral Agreement on Investment) networks in the later 1990s (Deibert, 2000). Uniquely, the internet facilitated the GJM's borderless and unprecedented growth, adding to the repertoire of contentious action by generating a new, virtual mode of social organization, mobilization, resistance and education. As a "movement of movements" the GJM is inclusive, fluid and porous, mirroring the internet's configuration as a "network of networks." Both have been described as rhizomatic, a term appropriated by Deleuze and Guattari (1987) from biology to designate a system of thought that "affirms principles

excluded from Western thought and reinterprets reality as dynamic, heterogeneous and non-dichotomous” (Best & Kellner, 1991, 99). Rhizomes are radically horizontal and non-linear, and thus difficult to control. As such they are deeply subversive, and can be deployed as tactics or practice of resistance to forces and relations of domination.

Deleuze and Guattari describe rhizomes as

finite networks of automata in which communication runs from any neighbour to any other, the stems or channels do not pre-exist, and all individuals are interchangeable, defined only by their state at a given movement—such that the local operations are coordinated and the final, global result synchronized without central agency (17).

This evokes the organizational structure of the GJM, with its decentralized, horizontal and leaderless configuration, and the internet, whose distributed nodes form a network and share resources without the need for central coordination. The “leaderlessness” of the GJM and the peer-to-peer architecture of the internet produce autonomous, non-hierarchical relations and unexpected connections, and as such are destabilizing forces that confront the state and capital with lines of flight.

Undeniably, the internet has been pivotal in the eruption of the global justice movement as a progressive force for democratic change (Donk et al., 2004). As Bennett (2004) observes, “the internet is implicated in the new global activism far beyond reducing the cost of communication, or transcending the geographical and temporal barriers found in other communication media” (144). But what impact have activists in the newest social movements had on the internet? How are they implicated in the (re)construction of the internet to meet their needs and goals? How have they crafted cyberspace to reflect their vision of an emancipated, open and more democratic society, which they work toward in their activism? These are the questions that provide the foundation for this dissertation.

Evolution of a research question

This dissertation builds upon my long-term interest in the dual problematic of domination and liberation. My early graduate exploration of Indymedia and activist journalism grew organically out of my vocational work as a journalist for the alternative press. As the co-founder and editor of an alternative newsweekly in a small Canadian working class city, I became increasingly involved in social justice issues at the community level. However, the global context for these local issues quickly became apparent. I followed with interest the birth of the global justice movement (variously called the anti-globalization, alter-globalization, or pro-democracy movement) and its naming of neoliberal capitalism as the “common enemy.” Eventually, I became involved as a media activist, which begged the question of journalistic objectivity and my professional responsibility to “tell both sides” of any story. It was evident that the corporate mainstream media had difficulty upholding this minimum standard when it came to covering global justice activism and further, that the issues involved were more complex than the conventional binary framework admitted. I finally “crossed over” from journalism to activism as a result of my participation in the FTAA counter-summit in Quebec City, acknowledging my social justice activism as definitive of my professional as well as personal self. Not long after, I left journalism and returned to the academy, eager to pursue my activism along a new tack.

Upon completing my master’s degree in 2003, I suffered another crisis of faith, this one concerning the global justice movement itself. After an exciting, heady couple of years, activists began to question the efficacy of major street demonstrations and counter-summits: some trade meetings were interrupted or even derailed, but ultimately, little about the realities of global trade seemed to have changed. The

frequency and intensity of “anti-globalization” demonstrations lessened in the aftermath of the 9/11 attacks, as physical repression against activists—now labelled terrorists—began to escalate (Morris & Langman, 2002). The echoes of a chilling refrain—“you're either with us or you're against us”—generated a climate of fear and reverberated in the suppression of dissent. The movement had imploded, so it seemed, worn down by years of “summit-hopping”, increasing police brutality and biased mainstream news coverage. Activists had also become mired in their own internal process concerning consensus decision-making, funding and other organizational protocols. As a result, some groups were immobilized, unable to deal effectively with these challenges with dealing with the daily reality of infiltrators, police surveillance and other attacks on their work (cf. Uzelman, 2002). Projects stalled, and the movement appeared to go fallow, or at least underground. Activist groups seemed to disappear, or go dormant, no doubt urged along by the increased state disciplining of dissent sanctioned by the War on Terror. This caused some observers to herald the death of the movement (*Upping the Anti*, 2006).

I had lost my research topic and with it my purpose in the academy, or so it seemed. Then I stumbled upon a radical Vancouver-based project that approached global social justice from a technological perspective. The activists involved in Resist! (www.resist.ca) sought to appropriate internet technology for their fellow activists involved in social change work, providing them with web space, email services and technical support. In the wake of the Battle of Seattle, much has been made about the impact of the internet on progressive activism, particularly the ways in which activists have used the internet as a communication medium, as a forum for information dissemination and as a tool for organizing (Deibert, 2000; Kahn & Kellner, 2004; Meikle, 1999; Smith, 2001). Applications like websites, email and Internet Relay Chat

(IRC) have largely facilitated the new movement as a global phenomenon (Bennett, 2004; van Aelst & Walgrave, 2004). Cyberactivism—political activism on the internet—emerged as a new mode of contentious action, and new practices such as virtual sit-ins, online petitions and email campaigns have enhanced the repertoire of contention (McCaughey & Ayers, 2003). My masters thesis contributed to this burgeoning research area, examining how media activists used the internet to subvert the status quo and inaugurate social change through media democratization. My chance encounter with Resist! led me to “look under the hood” of the technology that birthed a new movement and consider the interventions activists had made into the ongoing invention of the internet.

Inspired again, I set out to study “tech activists”—programmers, coders, and hackers who subscribe to the philosophy of the free software movement (FSM) yet are committed to the pursuit of freedom, justice and equality—in a word: democracy. This affinity group of social justice activists is at the fore of a movement to (re)invent the internet as a space of community rather than commerce. They take seriously the idea that “another world is possible,”¹ and further, that their activism in the realm of digital communication technology will aid in the quest the democratic reorganization of industrial society (Feenberg, 1991). Not only are tech activists responsible for the design of the virtual infrastructure used by activist groups (e.g. websites, wikis, blogs, email accounts and mailing lists), these self-described geeks develop and customize free software to serve the needs of activists. My working thesis was that in using and developing technology toward democratic ends, tech activists were also enhancing

¹ Taken as the official slogan for the 2001 World Social Forum, this phrase has become something of a rallying cry for the global justice movement. It is not a vision of a specific other world, as Naomi Klein (2001) astutely observes, simply the idea that, in theory, another one could exist. This contradicts the truism of capitalist hegemony, which states that the current socio-economic configuration of modern Western society is the only possible one, whatever its flaws.

cyberspace as a virtual public sphere and augmenting the democratic potential of the internet. Their work, therefore, changes not only the way people “do” activism by adding to the activist toolkit; it alters social and technical meanings of the internet itself.

Through their free and open source software (FOSS)² development and use, tech activists contradict capitalist norms, intentionally translating values that define the FOSS community, such as co-operation, community, trust and mutual exchange, into technical terms. The result for the broader community of users is an increase in the “margin of manoeuvre” (Feenberg, 2002), enhancing the internet as a space and tool for democratic communication and practice. Considering the dialectical relation between the social and the technical, one can imagine the bleed of open source values and practices to the offline world, and hope this brings for the radical reconceptualization of society.

I was excited by the direction this new research focus was taking me, and reassured of the value of further inquiry. Then I encountered yet another impasse: tech

²Free software and open source refer to the same category of software. Their difference may be described as ideological. Open source claims to be a development methodology that produces better quality software, more efficiently and on these grounds is considered superior to proprietary software (Raymond, 1999). “It’s a pitch for “free software” because it works, not because it’s the only right thing to do” (Open Source Initiative, n.d.). In contrast, free software is a social movement concerned fundamentally with users’ “essential freedoms:” the freedom to run, study, modify and redistribute source code (Stallman, 2002). These are important for only individuals but for society as a whole “because they promote social solidarity—that is, sharing an co-operation.” In addition to being a mode of software production, Kelty (2008) calls free software a cultural practice that “exemplifies a considerable re-orientation of knowledge and power in contemporary society—a reorientation of power with respect to the creation, dissemination and authorization of knowledge in the era of the internet” (2). Juris (2008) further notes that many radical global justice activists view the free software development process “as a model for postcapitalist forms of social and economic organization” (285). In this dissertation, I self-consciously refer to the development method as FOSS (free and open source software). Where I use “open source” as shorthand—for example, in my discussion of open source as philosophy, method and mode of production—the ideology and freedoms of free software should be inferred. In this dissertation, I self-consciously refer to the development method as FOSS (free and open source software). Where I use “open source” as shorthand—for example, in my discussion of open source as philosophy, method and mode of production—the ideology and freedoms of free software should be inferred.

activism had gone dormant, following the ebb of global justice movement activity. There are a number of possible reasons for this—all likely implicated to some degree—including increased police surveillance and interference post 9-11 (Lyon, 2007); a shift away from global justice to peace organizing (*Upping the Anti*, 2006); and activist burnout leading to re-absorption of techs back into industry. Indymedia, still the major site of tech activism, continued to suffer various attacks from state censorship, corporate bullying, and right wing trolls, and its functionality was seriously compromised. The global website's wiki—intended as an interactive space for online organization, collaboration and documentation—was locked for six months in 2006, and technical activity on the site was limited to dealing with seemingly endless but minor glitches. Little to no work was done on the Indymedia project overall, in terms of technological innovation or code development.

Reviving Indymedia?

Once again my research topic disappeared before my eyes, and I began to consider moving my sights to the non-profit technology sector, a less radical arena that tends to rely on innovations emanating from the tech activist community. I accepted this new direction, albeit somewhat reluctantly, as I had become increasingly interested in constructivist technology studies; however, I lamented losing the explicitly social justice orientation that comes with studying progressive social movements. Then, during one of my cursory checks of Indymedia, I discovered what I had hoped for all along: a resurgence of tech activism. There had been a flurry of global activity, involving what seemed like every tech activist in the world. Despite differing activist affiliations, they had been mobilizing for over a year around how to overhaul and revitalize the Indymedia website. The working group, called IMC-CMS Proposal, came together virtually and

physically during a series of distributed “tech meets” during October and November of 2007 to report the findings of a year-long study of content management systems (CMS).

When the Independent Media Centre (a.k.a. Indymedia or IMC) started in 1999, the internet was still relatively uncharted and uncolonized territory. The idea for an alternative news publication online was still novel and no suitable CMS existed, certainly not one that employed ground breaking functionalities such as open publishing. At the time, Indymedia's custom-built CMS, called “Active,” was pioneering; it would serve as the model software upon which a number of subsequent Indy codebases were based. By 2006, however, Indymedia had long since lost its status as a technological innovator, with new commercial and FOSS products outpacing IMC's “old-fashioned” software. The goal of the IMC-CMS Proposal group was to return Indymedia to its former cutting edge status by moving the entire network (130+ independent nodes) to a “turn-key” free and open source CMS that could support Indymedia's needs on limited resources. Rather than “reinventing the wheel” by developing another custom codebase from scratch, IMC Geeks could concentrate on developing Indymedia-specific features to layer atop the standard features of a “ready made” CMS. Importantly, this technological update would help Indymedia increase usability and regain relevance.

The many nodes that make up the Indymedia network are fiercely autonomous and it remains to be seen if the techs can mobilize enough support to implement a CMS switch. The IMC CMS Proposal seeks a major renovation of the technical infrastructure of Indymedia, as well as a shift in the approach to creating social change through technological change. Indymedia was literally built on activist code that was self-consciously imbued with the social justice values of the global justice movement. “It’s clear that the technology we use and process by which it’s constructed and articulated is

deeply political. We are creating the technical systems that prefigure the change we want to see in society” (Henshaw-Plath, 2001). Techs regard their design and development of internet technology as prefigurative of the broader social change that the movement seeks to bring about. In the case of Indymedia, however, tech activism appears to be moving away from building software for social change toward the customization of existing free and open source software that meets their technical *and* social objectives. That is to say, IMC Geeks are not so much developing Indy-specific codebases as making use of existing FOSS applications that generally reflect their values, and adapting them to their particular needs. Tech activists have not given up entirely their dream of creating democratic technology, and continue developing activist software, including Samizdat, a custom CMS being developed for Indymedia, and Crabgrass, a social networking web application designed specifically for progressive social movements.

Research question(s) and objectives

My initial contention was that through their free and open source software development, tech activists were democratizing technology, by creating, customizing appropriating certain technical affordances to fulfil unmet social needs (Feenberg, 2002). In demonstrating user agency at the level of technical design, I hoped to show how ordinary citizens³ could intervene in the technical sphere. I wanted to argue that tech activism was democratizing the internet, altering its configuration at the application level, and reconstituting it as a space and tool for democratic communication. Such an outcome has two significant implications: first, it reconstructs the internet along the community model, staving off relentless corporate and state encroachment; and second,

³ Here I am using citizen as distinct from a state or corporate entity. Clearly, tech activists have a level of technical skill that typically exceeds the “average” person. Thus, they are not “lay people”, but nonetheless remain citizens, absent the political motives of the state or profit motives of the private sector.

it provides a virtual arena for prefigurative practice—that is, the enactment of social values and skills necessary for deepening democracy offline, subversive practices like co-operation, collaboration, mutual aid, equality and trust. This suggests a dialectical relation between the virtual and material worlds; indeed, it is this sociotechnical dialectic that provides a foundation for my theoretical framework.

While tech activists undoubtedly remain involved in FOSS development (Coleman & Hill, 2004), it no longer appears to be the main thrust of their activism in the context of the global justice movement. This complicated any neat application of constructivist approaches, like social construction of technology (SCOT) or critical constructivism, both of which consider user agency in case studies of technological development. This reorientation of tech activism does not foreclose research possibilities in the spirit of these methods, however. My research objective therefore expanded to include a study of how tech activists appropriate software technology from another social movement (FOSS) with overlapping ideals and social goals in order to build technical systems intent on providing an alternative to and/or undermining the current social order. My research was driven by questions that sought to understand why people engage in social justice struggles—struggles that threaten their livelihood, their sanity and sometimes their physical safety. I wanted to know why tech activists do the work they do, and what vision of society underpinned this work. I further sought to understand the role of internet technology in helping them achieve a better world, particularly as this mediates new communicative strategies and practices that also facilitate the spread of neoliberalism.

Hacking the knowledge factory and other revolutionary acts

Graduate school has been life-changing: it was here that I discovered the theoretical and philosophical foundations for the social justice claims I intuitively made. As in my journalistic work, I have continued to be guided by the notion of praxis—the dialectic of thought (or theory) and action. Whether in the fourth estate or the academy, I have remained committed to applying ideas accessed and generated through institutional privilege to the cause of progressive social change. As an activist academic, I wanted my work to have relevance and meaning beyond the printed word, and beyond a rarefied, and perhaps uninterested, audience. I wanted it to be *useful*. In my teaching, this led to an exploration of radical pedagogy. In my research, it encouraged my engagement with the communities I was studying. In scholarly practice, it reinforced my commitment to public intellectualism. The desire to be useful also caused me to realize that not only the product of my research—journal articles, conference presentations, this dissertation—but the *process* was also an essential part of my activism. I must be an activist scholar in practice, as well as in theory.

This was easier said than done, however. As I moved deeper into the academic labyrinth, I became increasingly aware of the disciplinary function of the university. Foucault (1991) explains this process with his concept of governmentality, a wide range of control techniques that includes the way the state and its apparatuses attempt to produce citizens best suited to fulfilling the needs of the ruling order, as well as the way individuals discipline themselves in anticipation of these needs. I came to understand the socially reproductive role of the university as a disciplinary institution insofar as knowledge enables individuals to govern themselves, leading to greater and more efficient social control. Foucault links governmentality to the current incarnation of

capitalism, neoliberalism: "Without the insertion of disciplined, orderly individuals into the machinery of production, the new demands of capitalism would have been stymied" (Dreyfus & Rabinow, 1982, 135).

I discovered that academe no less than the corporate media system was implicated in the maintenance of the status quo that I sought, as a life vocation, to change. Not the last bastion of free thought I had presumed it to be, the university was an ideological state apparatus that materialized in its subjects (students and professors) the social practices required for the self-perpetuation of capitalism as the natural horizon and limit of human interaction. To my dismay, higher education was business as usual. With the transformation of the academy into a "significant site of capital" came a shift "in social perception which has resulted in the systematic conversion of intellectual activity into intellectual capital and, hence, intellectual property" (Noble, 1998). This was most apparent in the reification of knowledge as an object to be consumed in the classroom, and then possessed in the form of a degree. In turn, the degree facilitates entry into the labour market, where the graduate herself becomes a commodity. Thus the University of Windsor (my alma mater) brands its product as "the degree that works." Noble (1998) points not just to the commoditization of the university's "educational function" but also of its "research function," wherein scientific and technical knowledge is converted into commercially viable products fit for market, rather than the marketplace of ideas.

The privatization of publicly funded research contributes to the production of knowledge along a closed model, resulting in what Innis (1955) calls monopolies of knowledge. The "successful transformation of knowledge into a capitalized commodity and economic driver" has created an age-of-information paradox, according to Willinsky

(2006, 17): within academe knowledge production is at an historical peak yet access to academic research and scholarship is declining. Closed knowledge production is a departure from the classic academic model of knowledge production, whose qualities of openness and collaboration have fuelled passionate intellectual inquiry since the Ancients. The scholarly tradition of open knowledge production is the basis of science, as codified in the scientific method and practised through the peer-reviewed publication of findings. Indeed, science is the “quintessence of non-proprietary production,” according to Benkler (2004), a method has generated some of humanity's great advances. Jonas Salk, developer of the first safe polio vaccine, exemplified the spirit that infuses open knowledge production in his refusal to patent his discovery in order that it be disseminated as quickly and widely as possible. When asked who owned the patent, he famously replied: “Well, I would say the people. There is no patent. Could you patent the sun?” (in Cohen, 2001, 34).

Open knowledge production: A praxis of social change

My deepening critique of intellectual property and the commoditization of the academy's research function interestingly paralleled my research on tech activists, and their FOSS development. Indeed, the open source method of software production pioneered by the original hackers and taken up by tech activists served as the inspiration for other intersecting contemporary movements, including the free software movement (FSM), the copyleft movement and the open access movement. The free software movement (FSM) emerged out of the 1960s academic hacker culture and is based on the hacker ethic of freedom, sharing, collaboration, voluntarism and mutual aid. It aims to protect users' freedoms to access and modify software, freedoms that must be “permanent and irrevocable as long as you do nothing wrong” (Stallman, 2002, 44). The

copyleft movement grew directly out of the FSM, and continues as a complimentary but distinct movement, embracing social currents such as free culture and creative commons. Copyleft represents the legal mechanism to support and defend the sharing of knowledge works, be they software code, academic research, music or other cultural creations. It uses private rights enshrined in copyright law to create public goods, playfully declaring “all wrongs reserved” or “all rights reversed.” Where copyright regimes increasingly seek to restrict access and constrain use of published works, copyleft contests the very notion of intellectual property—the concept that thought and creativity can be privatized. The open source method of producing software absent financial incentive and property relations, and the copyleft regime that emerged to enable it prepared the way for the open access movement within academe. The open access movement seeks to reclaim the tradition of open knowledge production on which the academy is founded. Like the free software movement, it is guided by the fundamental belief that information should be free as a matter of public good. It thus promotes the sharing of scholarly research beyond the exclusive domain of the university, a system of closed knowledge production maintained in large part through the proprietary journal publishing system.

The intersection of the free software, copyleft and open access movements points to the scalability of open source. Initially, open source appealed to me as a fruitful theory for examining societal alternatives, and for critiquing a non-free society based on the privatization of labour and the commoditization of social relations. Actualized in practice, however, open source becomes a powerful tool for social change. As a mode of software production, open source demonstrates the viability of alternate labour processes and relations; as a method of knowledge production, it creates an alternative orientation to information based the ideal of a common good, a just society rather than

the requirements of capitalism. It occurred to me that open source could provide the scaffolding of an academic methodology as well. Combining open source with participatory action research (PAR) allowed me to craft an approach that reflected my affinities as a radical scholar and my commitment to useful, practical (not just theoretical) activism. This approach further enabled me to engage in open knowledge production in a way that was methodologically congruent with the software production of the tech activists I interviewed. In short, I open sourced my dissertation. Practically, this meant that the tech activists participating in my study had access to the code—the text in progress was posted in a wiki on Crabgrass (the activist social networking website)—throughout the writing and editing process. Activists whom I had interviewed, consulted or quoted from published work were invited to join this process. Participants also had complete access to their own transcripts, which they were free to edit, making changes, additions or deletions as they deemed appropriate. The final research product—this dissertation—will remain available to the tech activist community and indeed, anyone at all, through the its Creative Commons Attribution Share-Alike copyleft license. Like the original copyleft license for software, the General Public License (GPL), Attribution Share-Alike allows anyone to freely use, modify and redistribute the work, but requires that subsequent distributions properly attribute the work, and carry the same license, so that all derivatives remain accessible.

The idea of open knowledge production at the heart of the free software, copyleft and open access movements is subversive, undermining capitalism's fundamental requirement of profit based on inequality and exclusivity, and challenging Information Age rhetoric of digital technology as progress. As a mode of producing software, scholarly knowledge and creative works free from financial incentive and property relations, open knowledge production facilitates a praxis of social change, an

embodiment of theory that produces the new and the different out of the old. Open knowledge production generates information outside the bounds of capitalism, enabling it to circulate freely based on public need and interest. The property relations that attend the social factory are thereby displaced by lifeworld social relations that are non-commodified and non-instrumental. Open knowledge production provides the link between my theory of progressive social transformation, my methodological approach and the core subject of my dissertation—tech activists for whom open source offers theoretical and practical grounding. The uninhibited circulation of information in the interest of making a better world is a critical component of the social justice work in which tech activists engage. Certainly, tech activists have been central to the global justice movement, facilitating a novel type of activism that marries grassroots agitation with interactive digital technology. Not only do tech activists develop free software, which is by definition copyleft, they premise their social movement objectives upon its founding principle—that information should be free. Implicit in this notion is a radical critique of capitalist society that attempts to privatize everything, from DNA, the foundation of life itself, to essentials like the water that sustains us and intangibles like the information that empowers us. Tech activists further imbue their technology with values consonant with their social justice struggles, values that contest the capitalist status quo, developing software applications “that encourage cooperation, solidarity, an equal field of participation” among users (Henshaw-Plath, 2002). Thus the political objectives of activists in the global justice movement translate into technical terms.

The new activism: In pursuit of 'groundless solidarity'

Tech activism is a social current that arose out of multiple and overlapping social movements. As complementary and intersecting social movements, the free software,

global justice and copyleft movements have provided rich and mutually supportive environs for tech activists, who both produced and were produced by technological advances in computing and computer networking. As part of a global movement contesting the transnational rule of capitalism and armed with a belief in the liberating potential of technology, these geeks contribute to progressive social change in two ways. The first is by reshaping the internet “from organizational business tool and communication medium [to] a lever of social transformation” (Castells, 2001, 143). Feenberg and Bakardjieva (2004) call this the community model of the internet, which stands in stark contrast to the commercial model advanced by the corporate-state nexus. Secondly, tech activists prefigure progressive change offline by constructing alternative technologies that both embody and promote democratic values that challenge the reified relations of the social factory. These include social values of trust, equality, mutual aid, volunteerism, and co-operation, and organizational values of autonomy, decentralization and collaboration. As free and open source software, these technologies have the explicit goal of creating a freer society. As activist technologies, they work to undermine the existing social hierarchy, suggesting the possibility of organizing society in ways that enhance democracy rather than capitalist efficiency and control. In this dissertation, I hope to show how the democratic development, use and control of internet technology enables a different internet and, broadly considered, a different world.

Chapter breakdown

My dissertation attempts this impossible task in six chapters. Chapter 1 critically surveys the constellation of post-industrial theories which serves as the invisible backdrop for much of the literature on the internet and its role in a post-Fordist, communication-centric globalized world. My intent is to challenge positivist

assumptions of the “information age” and accompanying Information Society rhetoric, which lack explanatory power not least for their tendencies toward technological determinism and historical myopia. This chapter further grounds information within material moorings, tracing its gradual intertwining with capitalist techniques of control from the Industrial Revolution up through the Network Society and its emergence as a new form of capital. I call upon Feenberg's (1991, 1999, 2002) critical constructivism to refute the deterministic notion of technology as destiny, and follow the roots of social constructivism all the way back to Marx, from whom we get the first hint of the sociotechnical dialectic. This theoretical trajectory is more promising for identifying power imbalances that emerge in and through the technical sphere, and for exploring the democratic potentialities of “technology for the people.”

Chapter 2 is devoted to a consideration of method and of the interplay (rather than delineation) between theory and methodology in the research process. I discuss my decision to blend two methods—the open source method borrowed from free software production and participatory action research (PAR), a radical academic methodology that helps bridge the gaping divide between academe and activism. This methodological mashup is recursive, in that it applies a method (open source) employed by participants in this study and uses a FOSS application (Crabgrass) developed by participants in order to open source the dissertation-in-process. It also uses an activist method (PAR) to study activists. The recursive nature of my hybrid method pervades one of the main themes of this dissertation: computing. Recursion is one of the central ideas of computer science, and is essential to most computer programming languages. Recursive naming is a tradition within the FOSS community of selecting humorously self-referential acronyms for software, a playful habit that originated in early hacker culture. One of the most

famous examples of this is GNU (GNU's not UNIX), the operating system and subject of the first copyleft license.

My discussion of PAR takes up the political aspects of knowledge production, and considers how methods used in the course of research can animate social change beyond the conclusion of the study. That is to say, the research process is committed not simply to studying how communities make social change, but to contributing to ongoing social justice struggles. It does this in part by transforming the passive subjects of academic inquiry into active knowledge practitioners who bring an essential and invaluable expertise to the research project. I also explore the potency of open source—variously considered a philosophy, method of knowledge production, and mode of production—as a framework capable of guiding academic inquiry. I conclude by situating my hybridized method in the context of qualitative online or internet-mediated research, and discuss the various ethical obligations of the activist researcher.

Chapter 3 reconsiders information beyond the post-coital glow of post-industrialism. Rather than the quantitative approach to information practised by Information Society evangelists, I examine the qualities of information that make it resistant to capitalism, even as it supplies the backbone of “informational capitalism.” I argue that the unique properties of information that make it incompatible with the property form also offer avenues for oppositional practice and lines of flight. The privatization of information is linked to the informatization of labour, whereby worker knowledge is objectified in workplace technology. The control of labour power required for this process depends upon both coercion and co-operation. I investigate both the dominative and liberatory aspects of co-operation in the labour process, particularly as this forms the basis of immaterial labour. Control of the labour force as codified in

Taylorism and perfected in the “science” of human resource management has been generalized to all of human relations in the form of the social factory. This discussion of information's relationship to capital and the labour process provides traction for a critical analysis of open source as a mode of production in the digital age. Importantly, labour process theory provides an entry point for conceptualizing open source as an alternative model of social organization, one that resists the reifying and hence dehumanizing tendencies of capitalism while presenting moments of intervention and means of social transformation.

Chapter 4 is a theoretical excavation of social constructivism and its practical application to the internet. An understanding of the internet as a scene of struggle requires an historical detour to Marx and his idea of technology as a congealed set of conflicting social relations. This helps uncover the potential and reality of human agency in the design of the technical infrastructure, setting the stage for a democratic (re)invention of the internet.

The constructivist framework laid out in Chapter 4 provides the foundation for an analysis of the democratic politics of technology as practised by tech activists. Chapter 5 follows the rise of tech activism in three waves, focusing on the development of the free and open source (FOSS) software, which forms the digital infrastructure of the global justice movement. It details a number of tech activist collectives and software projects to demonstrate how radical geeks literally re-code cyberspace in ways that reflect and anticipate their progressive social change goals. Their creation of radical tech collectives to support activism online shapes the internet along a community rather than commercial model and reclaims cyberspace as a place for democratic communication and practice.

The various threads of this dissertation come together in Chapter 6, which tells the story of tech activists, largely in their own words. In the same way that Indymedia served as a conduit through which activists could reach the public, enabling them to bypass the gate-keeping corporate mainstream media, I sought to provide a platform from which tech activists could speak. The chapter begins with a demographic snapshot, clearly situating tech activists within the philosophical and ideological terrain of the newest social movements—those affinity-based groupings that draw upon post-anarchist and autonomous marxist thought. What emerges is a portrait of radical desire: a non-reformist and more often than not non-revolutionary drive to create the new society within the shell of the old. Those interviewed could not identify a singular or apprehensible motivation for their activism, for why they put themselves out, put themselves in harm's way, gave of their time, their energy, and their psychic well-being. But it is the same thing that fuels all grassroots social justice work: love. Love in the context of the global justice movement manifests in a variety of ways: environmental sustainability, economic justice, labour rights, racial and gender equality. There is no explanation for what motivates people to help others, to cast their glance beyond their limited personal sphere, and ask, How can I help?; no possible reason other than a deep, abiding and somehow intrinsic love of humanity that awakens to action.

While they might not have an explanation for *why* they do what they do, tech activists have developed a sophisticated analysis of the problems plaguing the world, and what they are doing to affect change. Most of those interviewed displayed familiarity with liberatory theories, most typically marxism and anarchism. These theories are not abstract, however, nor were they extraneous phenomena to somehow be applied to this or that historical context. Rather theory and practice are dynamic, organic and intertwined, “embedded in mutually interpenetrating networks that defy any attempt at

separation into discrete components or moments” (Day, 2005, 10). The most important theoretical thread that interweaves this account is the social construction of technology: tech activists are conscious of their role in rebuilding the technical code of the internet, and of designing democratic values into the technology they make. They are acutely aware of the sociality of technology, and of the need to actively intervene in the technical sphere: “There are no technical barriers to a totalitarian future,” observes one tech activist (Sparrow, 2008). There is only us. Thus in the face of state repression, corporate encroachment and personal difficulty, tech activists continue building the technical infrastructure of a better world.

Chapter 1: Beyond the Information Society

This chapter begins with a survey and critique of the constellation of post-industrial theories that ground this dissertation historically and theoretically, and contextualize my study of tech activism and the social construction of the internet. These theories are generally positivist, technologically determinist and historically myopic, lacking explanatory power for grappling with progressive social change under capitalism. They nonetheless comprise the backdrop for most analyses and discussions of the “information age” and thus require considered analysis. Feenberg's critical theory of technology provides the theoretical framework necessary for tracing and understanding the technical creation and operation of the systems built by tech activists in cyberspace, and for postulating alternative conceptions of our social world.

From atoms to bits

The role and meaning of information in contemporary society is as elusive as it is complex and multifarious. It has been considered by countless theorists and social commentators, spawning an entire literature, both popular and academic, variously subsumed under headings such as Age of Information, Knowledge Economy, Information Revolution or Post-industrial Society. James Beniger (1986) lists no fewer than 75 phrases coined to describe the social transformation wrought by the new information-processing and communication technologies that were products of Industrial Revolution.⁴ Despite their variety and number, these designations have

⁴According to Beniger (1986), these modern information and communication technologies emerged in response to a “crisis of control” brought on first by the introduction of railroads in the 1830s, and

become cliché in their overuse; now little more than slogans for contemporary society, they have lost much of their explanatory power. That we are living in an era where information is ubiquitous and in so many ways mandatory for the most basic of successes is difficult to deny. But information has always been central to human survival—distilled as knowledge about weather patterns, animal husbandry, metallurgy or the germ theory of disease. Historically, human society has been reliant upon the increasing common stock of information and knowledge. The question is not, therefore, the centrality of information for civilizational development, but whether or not there has been a qualitative change in its aspect. Rephrased, the question becomes: to what extent is the medium the message? In the move from atoms to bits, has the distillation of information into digital form caused a paradigm shift in the way modern western society is organized? For example, are speculative financial data transmitted instantaneously via digital networks across the globe qualitatively different from the code produced by computerized numerical control in the manufacturing process? Does the dematerialization of information represent a seismic shift, a complete break from previous modes of existence, a new “information age”? Or is it only a matter of degree—the “informatization” of society, a reinvention of capitalism or its continued evolution rather than a revolution in information?

Further complicating the picture is the fact that both these processes—manufacturing and “knowledge work”—occur simultaneously: computerized production and digital capital flows. As the so-called first world becomes more and more “informatized,” commercial, government and personal interactions are migrating more

exacerbated by full industrialization after 1880. The coupling of industrial production with fast transportation networks required sophisticated information technology and management, and resulted in dramatic growth in the emergent information sector. The synthesis of industry and information occurs between 1880 and 1920, ushering in the industrial-economic-technological phase in which modern western societies remain. The information society, therefore, was not born with the advent of computers, but well before.

and more online, fuelled by the continuing drive for “connectivity;” at the same time, the developing nations continue to industrialize as multinational corporations relocate production facilities to cheaper and cheaper locales. The contingency and concurrence of “industrialism” and “informationalism”⁵ render impossible a linear history detailing a clear transition from industrial to post-industrial society. This further challenges the equivalence of progress and technological advance implicit in both accounts, demonstrating the limitations of evolutionary and determinist interpretations that see both the Industrial Age and the Age of Information as the inevitable and natural product of advances in technology. An holistic study of information in modern western society calls for a more nuanced approach. It requires historical sensitivity, of course, and here Foucault's (1979) genealogy, with its rejection of any grand scheme of progressive history as the rational outcome of some ineluctable trajectory, is useful. But understanding information in the context of contemporary capitalist democracy—what Kahn and Kellner (2004b) term “technocapitalism—also needs a constructivist sensibility, one that recognizes the imbrication of the social and the technological, the play of the sociotechnical dialectic. These considerations demarcate the starting point of my exploration of the constellation of post-industrial theories—an essential exercise for anyone attempting to grasp the relevance of the internet for progressive social change. They further anticipate the limits of theories of information and of technology, preparing the ground for more holistic and nuanced interpretations. These various theoretical concepts build upon the scaffolding of critical theory of technology, which sensitizes analysis to power relations, and serves as the general framework for my study of the internet and its role in civilizational transformation.

⁵Castells (2004) defines informationalism as “a technological paradigm based on the augmentation of the human capacity of information processing and communication made possible by the revolutions in microelectronics, software, and genetic engineering” (11).

The hour of the machine has struck

It is instructive to consider the “long history” of the information age and so we begin by extending our glance backward from the history of the microelectronic revolution to the prehistory of the Industrial Revolution. The Industrial Revolution marks a dramatic break with the agrarian existence that characterized the Middle Ages, an era when time flowed organically and human behaviour was organized by the rhythms and demands of nature. The attempt to impose order upon this natural yet uncontrollable flow began inside the Benedictine monastery, where bells were rung at regular intervals to mark the canonical hours, lending “human enterprise the regular collective beat and rhythm of the machine...” (Mumford, 1934, 14). It is here, in the segmentation and standardization of time that Mumford (1934) locates the origins of capitalism. The clock represents the technical culmination of the habit of time-keeping; for Mumford it is the “key-machine” of the industrial age due to its role in synchronizing human activity. The clock is arguably the first “information technology”: its products were seconds, minutes and hours—information used to regiment human labour and eventually organize it along the factory system.

The mechanization of time was a prerequisite for the regimentation of social behaviour and the subsequent disciplining required for “machinofacture,” Marx's term for the large scale, capital-intensive, machine-driven modern factory industry. Fuelled by increasing scientific knowledge and the rapid technological innovation this engendered, nascent capitalism displaced an economy based on manual, craft-based labour (Marx, 1976). On this account, modern technologies and technical systems such as the factory appear as the materialization of human knowledge (Leiss, 1990, 13). For Marx, the radical change heralded by the Industrial Revolution was the substitution of machines

for humans as the core of the productive process. “The development of the means of labour into machinery is not an accidental moment of capital but it is rather the historical reshaping of the traditional, inherited means of labour into a form adequate to capital” (1973, 694). Where once tools were the handmaiden of craft labour as the self-action of humans, modern machinery, with its ability to automate and divide the labour process, subjugated the worker to its arbitrary demands. “The hour of the machine had struck,” writes Marx (1976, 601). He describes the capitalist transformation of the process of production “as a martyrology for the producer” where “the instrument of labour appears as a means of enslaving, exploiting and impoverishing the worker; the social combination of labour processes appears as an organized suppression of his individual vitality, freedom and autonomy” (638). Here we have the essence of labour process theory that Braverman (1974) would tease out more than a century later wherein the manipulation of information via technologization and the division of labour is key to control of the worker.

Mumford (1934) acknowledges the dialectical relations between capitalism and “technics,” his term for the interplay of the social and technical realms: capitalism both shapes and responds to the technical sphere. He considers innovation and capitalism as two forms of exploitation, describing a parallel and mutually supportive process whereby the owner accumulates capital by expanding production and the inventor devises new methods of production. Mumford invokes Marx's design critique, which finds a connection between the dominant values of a society and the character of its machines: technics “owes an honest debt to capitalism” and yet suffers for its sins (26). The machine (Mumford's shorthand for the “entire technological complex”) takes on characteristics that have “nothing essentially to do with the technical processes or the forms of work. Capitalism utilizes the machine, not to further social welfare, but to

increase private profit: mechanical instruments were used for the aggrandizement of the ruling classes” (27). Here Mumford anticipates a constructivist analysis, which rejects technical necessity as a rationale for technology outcomes, rather finding social explanations. For example, the machine's potential to enhance profit led to its valorization, even where it was a technical failure. The result was a drive for the mechanization of industry “beyond what was necessary to harmony or efficiency” (27) and despite the cost to human needs or interests, a point Noble (1984) would develop in the context of computerized production. If industrialization owes a debt to capitalism for its rapid development, capitalism likewise was aided by its “support” of technical innovation, particularly as this concerned the appropriation and manipulation of information.

Taylorism and the appropriation of information

The “information age” inaugurates a new phase in civilization where social organization is mediated by human-made artefacts rather than subject to the forces of nature. This broadened scope, which looks beyond the more recent “computer revolution,” expands the notion of “information revolution.” Robins and Webster (2004) date the “original information revolution” as far back as 1880 and the spread of Taylorism, linking scientific management of the factory system to the rise of corporate capitalism. From this vantage point, we see the information society as co-emergent with capitalism.⁶ We see further the reliance of capitalism on the appropriation of

⁶ Monopoly or corporate capitalism arose in the late 19th century as significant portions of industry came under the control of large corporations. According to Noble (1977) corporate capitalism, aided by modern technology, offset “the destructive tendencies inherent in an unchecked competitive market economy by making possible the regulation of production, distribution and prices” (xxiii). Capitalist social relations, what Marcuse (1964) calls the “reproduction of inequality and enslavement,” were not alleviated but fortified by the evolution of industrial to corporate capitalism (35).

information: the organization of human labour—the bedrock of capitalist exploitation—is none other than the appropriation of “skills, knowledge and information within the workplace” (67). As discussed above, the regimentation of mechanical time enabled the ordering of human labour in novel ways; this prepared the way for Taylorism, where the segmentation of work into ever smaller tasks dramatically altered the labour process. Characterized by “the radically refined division of labour, the rigid separation of conception and execution, the standardization and splitting of tasks into the simplest possible form,” (Kumar, 2005, 45) Taylorism claimed to apply the methods of science to the growing and increasingly complex problems of labour control within the capitalist enterprise.⁷ Scientific management did not rely primarily on technological support or innovation, however; Braverman (1974) calls it a theory “which is nothing less than the explicit verbalization of the capitalist mode of production” (60). Because the administration and control of the labour process was founded upon information gathering and surveillance, Taylorism depended on technique rather than technology (Robins & Webster).

Perhaps the most “revolutionary” aspect of Taylorism concerns information. In essence, scientific management is the monopolization of all knowledge about the labour process by management, according to Braverman's (1974) “deskilling” thesis. This thesis describes how the accumulated knowledge of the craftsperson was extracted by dividing it into a series of linear tasks. Thus disaggregated, formerly complex processes that demanded years of training could be converted into simple jobs requiring comparatively

⁷ Braverman (1974) challenges the scientific foundation of Taylorism, noting that it “lacks the characteristics of a true science because its assumptions reflect nothing more than the outlook of the capitalist with regard to the conditions of production. It starts...not from the human point of view but from the capitalist point of view, from the point of view of the management of a refractory work force in a setting of antagonistic social relations...It investigates not labour in general but the adaptation of labour to the needs of capital” (59).

little skill. This was Taylor's "first principle"—that managers assume "...the burden of gathering together all of the traditional knowledge which in the past has been possessed by the workmen and then of classifying, tabulating and reducing this knowledge to rules, laws and formulations..." (Taylor, 1947, in Braverman, 78). Braverman calls this the "dissociation of the labour process from the skills of the workers" (ibid). Taylor's "second principle" urged the removal of "all possible brain work" from the shop floor to the planning department. In addition to deskilling the workers, Braverman sees this as dehumanizing them. Finally, Taylor's "third principle" advocated using management's monopoly over knowledge to control every aspect of the labour process. Clearly, information—its collection, manipulation and deployment—was at the heart of Taylor's method, and indeed played a central role in the development of capitalism as the ideological complement to industrialization.

From techniques of control to information technology

Taylorism as a method of social control in the workplace anticipates Fordism, the technical translation of scientific management into the assembly line, thereby moving from techniques of control to technologies of control. In other words, control was "not only a system of managerial prerogatives, a bureaucratic pattern, but also a technical fact built into the very structure of the machine" (Kumar, 2005, 47). Where Taylor attempted to create a machine-like production process by subduing the human quality of labour, Henry Ford incorporated the extracted worker skill and knowledge into the technology of the factory itself. Thus the assembly line was, effectively, the technological realization of information for control of production. Marx (1973) had already observed this trend nascent in capitalism:

The accumulation of knowledge and of skill, of the general productive forces of the social brain, is thus absorbed into capital, as opposed to labour, and hence appears as an attribute of capital...In machinery, knowledge appears as alien, external to [the worker]...The worker appears as superfluous to the extent that his action is not determined by [capital's] requirements (694-95).

Thus occurred not only the separation of mental and manual labour in the production process but the shift of skill from worker to machine through the monopolization of information, leading to the deskilling and displacement of workers.

The centrality of information to capitalism as a new mode of social organization helps explain the spread of Taylorism to the broader society. Indeed, Taylor and his followers envisioned it as a new social philosophy for the rational, scientific and efficient management of society which, like the factory, would be maintained by a cadre of technocrats and experts (Mandel, 1975). With the mass production made possible by Fordism came the need for mass consumption, and the scientific method found a new application in the manipulation of desire through advertising. Goods were not all that were “manufactured under the regime of Fordism—it also featured close attention to the manufacture of appetite for these goods” (Barney, 2004, 11). The creation of a mass culture of consumption required a mass audience, which new communication technologies, particularly broadcast radio, delivered. Taylor's dream of expanding scientific management beyond the factory and bringing about general social reform was within grasp. As Beniger (1986) observes, “these mass media were not sufficient to effect true control, however, without a means of feedback from potential consumers to advertisers” (20). As quasi-scientific practices of polling, market research and advertising developed into an essential part of mass communications, they became central to not only generating but managing desire in the new mass society.

Beniger (1986) also acknowledges control of information as the foundation and essence of the information age, whose origins he too traces back to the late 19th century. The accelerated pace of innovation caused a “crisis of control” arising out of advanced industrialization, and the concomitant increase in production, distribution and consumption of consumer goods. The crux of the problem was the inability of communication technologies and systems to keep up with the heightened pace of commodity flows that now travelled at the speed of steam, rather than horsepower. The Control Revolution was the response to this crisis. It comprised a series of new technological and social solutions that helped resolve what was, in effect, an information problem: a breakdown in communication. The most important of these social solutions was bureaucracy, as identified and analyzed in depth by Weber (1968). A sort of modern-day megamachine,⁸ bureaucracy facilitated information control and containment of “the societal forces unleashed by the Industrial Revolution” (Beniger, 1986, 6). The major technological fix of the Control Revolution was the “co-evolution” of transportation and communication systems—beginning with that of the railroad and the telegraph. This, for Beniger, marks the beginning of the revolution in information and communication technologies (ICTs), typically miscast as a relatively recent phenomenon. Indeed, as Dyer-Witheford (1999) affirms, ICTs “...represent the consummation of a century-long quest by capitalism to develop instruments of technobureaucratic control adequate to overcome the repeated crises [of control] encountered during industrialization” (244). Thus Beniger concludes that today's information society, characterized in large part by computerization, is a direct result of the Control Revolution.

⁸ Mumford (1970) coined the term megamachine, which he defines as rigid social hierarchies that operate like machines with human parts.

Information has been an essential component of capitalist development, from the emergence of industrial capitalism in the mid-18th century through its reinvention as corporate capitalism by the late 19th century and up until today's neoliberal capitalism, what Kahn and Kellner (2004b) refer to as technocapitalism. As we have seen, the role of information in the evolution of capitalism is not restricted to the rather recent revolution in ICTs. Robins and Webster's (2004) assertion that the "information revolution" began at the same time as Taylorism around the turn of the 20th century recasts the history of capitalism as the intensification of the process of information gathering for the dual objective of increased control and productivity (profit). For example, factory automation served to deepen the application of scientific management, deskilling and disciplining workers while improving efficiency through such innovations as the assembly line after 1913 and, following World War II, computerized numerical control (Noble, 1984). The introduction of adding machines, data-processors and finally computers into the office promised to automate menial labour but resulted in the deskilling of clerical work and the growth of worker monitoring and control.

The particular characteristics of the computer as office technology is its capacity to store and process information which was once the domain and possession of the clerk and to impose internal controls on these operations...which would once have depended on the experience and acquired knowledge of the individual workers (Crompton & Reid, 1983, 175).

Again we see how techniques of information control, as much as information technologies, form the basis for the "information revolution." These techniques underwrite the capitalist enterprise and are eventually translated into technical terms, as Marx (1976) observed over a century ago: "The special skill of each individual machine operator...vanishes...in the face of the science, the gigantic natural forces and the mass of social labour embodied in the system of machinery" (549). Worker knowledge of the

labour process becomes “absorbed into capital,” into the machinery that subverts and makes redundant the worker.

The long view of the information age presented in the foregoing discussion shows it to be less technologically determined and more of a social phenomenon co-emergent with earlier societal shifts, such as the Industrial Revolution and the transition from industrial to corporate capitalism it initiated. Such an historical perspective helps renovate the worn and rather hollow concepts of “information age” and “information revolution”—concepts that are nonetheless foundational for this study. A genealogical approach highlights the formative and mutually constitutive roles of technology and information in the evolution of capitalism. Their fusion in the form of contemporary ICTs represents the culmination of an ongoing “information revolution” rather than its inauguration. In addition, the relatively recent marriage of information and technology represents the technical the embodiment of an old method—scientific management—thus extending what was a “fundamentally political 'revolution' in information (and communication) management” (Robins & Webster, 2005, 75).

From Post-industrialism to the Network Society: Theories of social change under capitalism

While the long history of the information age takes us back to the Industrial Revolution and before, information society theories tend to be myopic, finding a more recent origin for the role of information in social change. The economic boom of the post-war era glossed over the exploitation that lay at the heart of capitalism, causing Bell (1960) to announce the “end of ideology” in anticipation of his post-industrial thesis. The mollification of labour effaced class conflict—or so it appeared—and rising standards of living implicitly justified the capitalist economic order. This refuted the alternatives to

liberal capitalism, in particular socialism as a revolutionary force for radical civilizational transformation. There was no longer any clash of ideologies as triumphal capitalism assumed its position as the natural social form. By the 1970s, however, this optimism had begun to fade.

Industrial society—the unsurpassable pinnacle of modernity, prosperity, and technological advance— went into paroxysm, its military machine stalled in the jungles of Vietnam; its urban ghettos burning through successive summers; its huge automobile factories paralyzed by labour conflict; its university campuses in rebellion; its culture subverted by the music, drugs and politics of youth revolt; its domestic arrangements and relation to nature shaken by nascent feminist and ecological movements (Dyer-Witheford, 1999, 17).

In the history of industrialism, the post-war boom began to look more like a happy accident, an aberration rather than the norm. The fresh class and cultural antagonisms of this period revealed anything but the broad social consensus heralded by the end of ideology, and subsequent iterations of post-industrial theory evolved in an effort to grapple with resulting “mood of crisis” (Kumar, 2005, 30).

Building on the assumption of capitalism as the “natural” or only socio-economic model for modern society, Bell's (1973) post-industrial thesis identifies an emergent role for information in the epochal shift from factory to knowledge production. Where the industrial society was founded on machine technology, Bell predicted that the coming post-industrial age would rely increasingly upon intellectual technology. Information and knowledge would replace capital and labour as the key resources and structuring forces; technical skills would determine individual success and social status would accrue to the intellectual and scientific elite. Bell was not the first to dream of this new dawn: Wiener (1950) predicts the migration of power from capital to the technostructure, where it is realized in technical knowledge. In his exposition of communication and control, Wiener distils the essence of cybernetics: “To live effectively is to live with

adequate information” (27). Echoing Marx's (1976) emancipatory view of technology, he views automation as desirable to eliminate drudgery in human labour and free people for more creative endeavours. But Wiener's cautionary vision of a society run by computers, in which human beings become incorporated in the “learning machine,” is decidedly more dystopic than later post-industrial theorists.

Critical or ethical questions do not arise for many of those surveying change in the modern industrial landscape. Galbraith (1978), for example, sees a power shift within the industrial enterprise itself—from capital to organized intelligence, which he then generalizes to society at large. The father of “modern management” Drucker (1969) describes knowledge as the new capital, and an essential economic resource. Referencing Bacon's (1688) assertion that knowledge is power, Toffler (1970) states that knowledge is change, and “accelerating knowledge-acquisition, fuelling the great engine of technology, means accelerating change” (32). Invoking the technological imperative mantra that typifies modern interpretations of progress, Toffler advises us to defend against the “future shock” that the speedy and inevitable transition to “super-industrialism” will cause. The tone of most prognoses of post-industrial society is positive, however: scientific and technical knowledge would serve as the foundation for what Bacon (1620) had centuries earlier imagined in the *New Organon* as a method to eliminate the conditions of poverty. Under capitalism, however, such knowledge was contained within a technocratic frame and guided by a technological rationality that would warp its liberatory potential, bending it instead toward social domination and control (Marcuse, 1964). That this is not inevitable is the central theme that anchors and interleaves this dissertation: “a despotic marriage of knowledge and power” need not be the fate of technologically advanced societies (Leiss, 1990, 22).

Post-industrialism: Variations on a theme

Widely debated and contested, later post-industrial theories tried to account for changes in Western economies and the cascading effects these had on the intersecting spheres of social, cultural and political life. They took as a foundation the tenet that an “information revolution” driven by rapid innovation in microelectronics was radically altering the traditional industrial base of society. There are numerous terms coined to describe the social transformation inherent in the transition to post-industrialism—evasive and slippery terms that overlap and borrow concepts from one another, or collapse entire theories into each other—which makes it difficult to offer any neat delineation or strict periodization of post-industrial theories. What follows is a general overview, from early prophecies of information society through post-Fordism and up until current formulations of the network society, in an effort to provide the historical and theoretical context necessary for a contemporary discussion of tech activism.

Information Society

The various interpretations of the “information revolution” maintain the key theme from Bell's (1960) original thesis: that scientific and technical knowledge was the most important aspect of the new society. After heralding the end of ideology and the stability of the industrial mode of social organization, Bell (1973) switched tacks, addressing instead the crises of industrialism. He predicted a revolutionary reconfiguration of society based on new ways of gathering, processing and distributing this knowledge. In this light, the crises appear as nothing more than “growing pains” associated with the rupture of the old social order and the development of a radically new one (Dyer-Witheford, 1999. 17). In the post-industrial society, information would be the main source of value and the catalyst for growth, in keeping with Enlightenment

ideals of rationality and progress. Bell described the approaching transition as driven by an increasingly intertwined relationship between discovery in science and its application through technology, ironically one of the factors Marx predicted would lead to communism. Other indicators of the dawning era would be the shift from a manufacturing to a service economy; the superiority of professional and technical work over manual labour; increased ability to forecast, assess and control technological outcomes; and the development of “intellectual technology” like cybernetics and game theory. The vision was of a society “organized around knowledge for the purpose of social control and the directing of innovation and change” (20). In other words, “the post-industrial society is an information society” (467).

Post-Fordism

Another variant of post-industrial theory is encompassed by post-Fordism, an assortment of theories that gained popularity in the 1980s. Arising out of the Regulation School, a group of French intellectuals—the “rebel sons of Althusser”—these analyses sought to explain the enduring nature of capitalism, conceiving of it as a dynamic succession of “regimes of accumulation” (Lipietz, 1987). Post-Fordism recovers Marx's more hopeful view of technology, anticipating the “technological reconciliation of workers with capital” (Dyer-Witherford, 1999, 55) at the expense, it seems, of marxism's critical edge. Defined by and responsive to new technology, post-Fordism theorizes the restructuring of capitalism in most industrialized countries since the late 20th century. It builds from Fordism, a social theory that describes the fusion of Taylorism's division of labour with the assembly line production pioneered by Henry Ford. Where Fordism offers an account of the golden age of industrial capitalism after World War II, post-Fordism identifies ruptures in economic production, consumption and social relations

brought on by rapid technological innovation during the 1960s and 1970s. On this positivist account, the “informational principle” embodied in the creative potential of computers comes to displace the “mechanical principle” exemplified by the monotonous assembly line (56).

While Regulation School interpretations view post-Fordism as yet another reinvention of capitalism, the “flexible specialization” school of thought asserts that significant changes within the practices and patterns of capitalism have led to a “second industrial divide,” in other words, a systemic change (Piore & Sabel, 1984). This is evidenced by the new mode of flexible, specialized and localized production with “just-in-time” delivery replacing mass production in a globalized capitalist economy. Similarly, new social movements, rooted in the local and particular, and focused on identity politics, supplant national and international working class movements (Kumar, 2005). Above all, there is a new individualism—as customized as post-Fordist production, as pliant as the post-Fordist worker—that supplants the “solidaristic unionism” and “collectivist presumptions” of the mass industrial workers (Webster, 2006, 81). There is a heightened role for information in the post-Fordist economy, enabled by a technological infrastructure of communications and computer networks. According to the theory, this information infrastructure facilitates globalized production and a new international division of labour, horizontal rather than hierarchical work relationships, and a cybernetic work flow that allows for employee participation in design. Webster acknowledges certain differences—changes in occupational patterns and work organization to which information is integral—but he is sceptical of the claim that a post-Fordist era represents a radical break from our industrial heritage. “Features of capitalist continuity are too insistently evident for this: the primacy of market criteria, commodity production, wage labour, private ownership and corporate organization continue to

prevail, establishing links with even the distant past” (96). One of Marx's key insights—that capitalism is itself a dynamic product of history, a constantly revolutionary force that is always in flux—resonates here. On this view, post-Fordism represents a re-configuration or extension of capitalism rather than epochal change.

Network society

Castells (2000a, 2000b, 2004) offers perhaps the most comprehensive treatment of the role of information in contemporary society in his trilogy *The Information Age*. For Castells, “information society” has little analytical power, information being fundamental to all social organization (a point Bell (1973) made almost three decades earlier). He argues, nonetheless, that we are entering an “information age” and the dawn of a new era—the network society. This new era is fraught with unceasing change, and supported by global communication networks enabled by the proliferation of ICTs. “Informational capitalism” characterizes the network society, where the source of productivity derives from the action of knowledge upon itself within a familiar economic framework (capitalism). The flow of information supersedes the flow of power, and the logic or form of the network takes precedence over its content. The result, according to Castells, is a radical transformation of all aspects of social life as it is increasingly organized around networks and networking logic; in other words, he presents “the reproduction and institutionalization...of networks as the basic form of human organization and relationship across a wide range of social, political and economic configurations...” (Barney, 2004, 25)

Castells (2000a) identifies general “themes of change” associated with contemporary life, including: technology as the undercurrent of change; globalization of all aspects of social life; a decline in national sovereignty; the “death” of communism and

thus of any alternative to capitalism; loss of the working class as the historic agent of change and the de-stratification of social life generally; and the rise of individualism accompanied by a consonant decline of community. Globalization is a central feature of the network society and the context within which it emerges. A contested term, globalization may be broadly understood as the planetary expansion and interconnection of financial markets, trade, production, and social and political movements. Though not a new phenomenon, it is accelerated by the “informationalism” that now dominates the economic, political and cultural realms. Indeed, globalization is a key aspect of both information society and post-Fordism, both of which inform Castells' analysis of the network society. For all his talk of information, however, Castells does not offer a clear definition nor does he postulate any role for theoretical knowledge in the network society. Webster (2006) levels this critique among others, including Castells' jettisoning of class and his “lingering technological determinism” (123).

Beyond the information age: Toward a critical theory of technology

Generally speaking, “information society,” “information age” and the host of derivative notions represent a new phase in modern technocratic thinking, spawning a “whole machinery of apologetic discourse” that suggests social relations must adapt to the requirements of technology (Mattelart, 2003, 1). Information society rhetoric, with its deterministic tendencies, has become a new ideology, according to Mattelart (2003) and the dominant paradigm for theories of social change. This only serves to confuse our understanding of the sociotechnical sphere, creating instead a “misinformation society” where “we over-emphasize the characteristics of techniques and undervalue the dynamic aspects of the societal matrix in which they are used” (Leiss, 1990, 127). In the realm of

policy this translates into efforts to control social responses to technology by persuading people of the inevitability of so-called progress (Leiss, 1990). In the global economic arena, the new ideology underpins corporate strategies for worldwide expansion based on technological innovation (Mattelart, 2).

Few question that the amount of information generated by modern societies has vastly increased. There is little doubt that a significant shift in the mode of managing information—its accumulation, storage and transmission—has occurred, particularly in the aftermath of the microelectronic revolution and the ensuing computerization of society. That information plays an increasingly central role in the labour process—both in knowledge work and in manufacturing—is generally observable and empirically supported (Castells, 2000a, 2000b, 2004). The information component of the economy and, relatedly, the proportion of information workers, is growing (ibid). Finally, as the literature shows, the relationship between information, technology and social control is historic, and appears to be growing more tightly coupled. The contention that epochal change is underway is more difficult to accept, however, particularly due to the apparent continuation and intensification of capitalist relations. Theories of post-industrialism do not provide a sufficient framework for a critical analysis of the internet or democratic interventions into technology, and so we turn to critical theory for a more robust foundation.

Technological hyperbole? Instrumentalism and substantivism

As the steam engine was to the Industrial Age, so is the computer to today's "information age." Such technological hyperbole is typical of information society rhetoric, equally evident in utopic and dystopic predictions of the social outcomes of

computing technology. The instrumentalist discourse that posits technology as neutral nevertheless perceives technological innovation as innately good. Part of the inheritance of modernity, technological progress ensures social progress, including the liberation of (hu)man, eradication of want and misery, and control over nature. So while the uses of technology may be questioned for their ethical implications, technical progress as the herald of health, wealth and prosperity, may not. The substantivist discourse, by contrast, takes a more ominous view of technology as the embodiment of particular morals and modes of existence. On this account, technology represents “the empire of instrumental rationality, standardization and homogenization, the celebration of mastery over human and non-human nature...and the cult of accumulation and efficiency” (Barney, 2004, 39).

Instrumentalist and substantivist critiques inform theories of the information society, shoring up both the euphoric and cautionary accounts of the computerization of society. Feenberg (1991, 1999, 2002) offers another perspective that counters technological hyperbole and the determinism that underlies most information society theories. This is not a binary view of technology—for example, that computers are either dominative or democratic, or that they can be used in ways that oppress or liberate. “In neither case can we change it: in both theories, technology is destiny. Reason, in its technological form, is beyond human intervention or repair (Feenberg, 2002, 8). Instead Feenberg develops a “composite view” of technology that recognizes the political nature of technology, the contingency of technological development, and the potential for human intervention in technical design (Barney, 2004). In this, Feenberg's critical theory of technology draws on social constructivism, a theoretical approach that affirms the social character of technology.

Social constructivism: A corrective to determinism

Social constructivism challenges the assumption that technology is governed by an inherent, autonomous logic, and that technological change occurs independently of other factors. It further contests the notion of the technological imperative—the determinist belief that society must adjust to advances in technology. Beginning with Pinch and Bijker (1987), social constructivist analyses invert the truism of “technology shapes society,” suggesting rather that “society shapes technology.” From this perspective, technology is not isolated and independent but is interwoven into the social fabric; technological development on this account is contingent rather than fixed, heterogeneous rather than singular, multi-directional rather than linear.

Mild social constructivism, also known as the “social shaping” model, emphasizes that “technology does not follow its own momentum nor a rational goal-directed problem-solving path but is instead shaped by social factors” (Bijker, 1996). As Mackenzie and Wajcman (1999) point out, however, this process is not dominated by one particular force. They further remind us that this shaping should not be understood as always a direct and conscious effort, noting that technologies originate in processes that no set of human actors fully controls. In this process, “the role of a recalcitrant material world cannot be ignored” and non-social factors play a role in technological change (14). The social shaping approach therefore attributes “properties and effects to technology, although these properties and effects are usually claimed to be defined relative to a particular social context” (Brey, 1997). In this way, social biases and politics are “built into” or “embodied by” technologies.

While social constructivism provides a corrective to the technologically determinist approach to understanding technology, it falters on several grounds. The

first is the apparent lack of political or normative evaluation; that is, it does not provide an obvious opening for social critique. Further, the emphasis placed on agency seems to ignore structural factors⁹ and power relations that imbue technology from conception and design through to development and diffusion. According to Klein and Kleinman (2002) “...power is either ignored or deployed in an ad hoc fashion” (34). Yet the power asymmetries that configure societies through self-reproducing structures penetrate the technical sphere and must be considered when attempting to understand how the social world influences the content and meaning of technology. Another issue with social constructivism is its narrow empiricism, the result of its concentration on historical case-studies. Based on the assumption that technology is neutral, this method reveals how a technology develops from conception through consumption, but not the impact of attendant technological choices (Winner, 1993). “Constructivism thus risks descent into a form of apolitical and amoral relativism, leaving us able to describe heterogeneous technological outcomes, but unable to say anything critical about them” (Barney, 2004, 43). If we consider the theoretical origins of social constructivism, however, we uncover its potential as a force for critical analysis and social intervention.

The long history of constructivism

While social constructivism as a method and theory for understanding technology's role in society originated in the late 1980s, its roots lie in the writings of Marx. It is therefore instructive to explore the long history of the idea that society and technology are mutually—or to use marxist terminology, dialectically—formed. Indeed, the marxian legacy of technology studies is fundamentally the sociality of production. By

⁹ Giddens (1993) defines structure as the “rules and resources, recursively implicated in the reproduction of social systems” (117). Structures organize social practice, of which institutions are broadly constitutive.

no means does Marx offer a definitive statement on technology: in some places, he appears to link social development inexorably to preceding technological progress. In others, there appears to be an understanding of the dialectical relationship between social and technical change. Marx further oscillates between a view of technology as neutral, merely requiring a change in the dominant ideology to free it from its oppressive uses, and a notion of technology as reflective of the dominant social order (e.g. capitalism), such that human liberation would require a reorientation of technology at the level of its design, not simply its implementation and use.

The timeworn conception of Marx as a technological determinist may yet resonate with the public imaginary as do many other misunderstandings of Marx. The charge of determinism derives from various sources, including *A contribution to the critique of political economy (Preface)* and *The poverty of philosophy*, from whence derives the famous “hand-mill” quotation. Heilbroner (1967) opens his discussion of the impact of technology on the socio-economic order with this very quote: “The hand-mill gives you society with the feudal lord; the steam-mill, society with the industrial capitalist” (Marx, 1935, 92). “As a succinct précis of technological determinism,” writes Heilbroner, this statement “has few rivals” (in MacKenzie, 1996, 23). Heilbroner identifies technological determinism as the “marxian paradigm,” dividing the deterministic thesis into two parts. The first part treats the question of a “fixed sequence” in technological evolution, acknowledging its progress as linear, logical and apparently self-regulating. The second part asks if technology imposes determinate patterns on society, to which Heilbroner responds affirmatively. On this account, technology influences both labour force composition and labour process organization. He concludes by linking capitalism directly to the development and growth of the modern technological project.

Do machines make history?

The theory of technological determinism relies on the causality of technology for social change, and on the primacy of this relation. However, a stronger version is founded on the belief that technical change is autonomous, unloosed from any social moorings. MacKenzie (1996) calls these, respectively, the thesis that machines make history and the thesis of the autonomy of technical change. The former is typically, though not altogether correctly associated with Marx. The idea that the mode of production (society) is determined by the forces of production (technology) is almost a marxian meme. As Braverman (1974) dryly observes, the concrete forms of society are not accidental and as such they are determined. However, it is the “determinacy of the thread-by-thread weaving of the fabric of history, not the imposition of external formulas” (21).

Following Braverman (1974), it useful to attend closely to the definition of the verb “to determine.” MacKenzie (1996) notes two divergent meanings for our context. The one refers to a lack of power against an outside force; in other words, a determination, for example, by a legal court. The other is less authoritative: to bound or limit something, as in determining the parameters of a contract. The less authoritative definition offers no causality—boundaries delimit but do not predict human agency. Importantly, these boundaries are malleable, and respond to pressure from human actors. There is also another meaning: to resolve or establish something. This nuances a dialectical understanding of the sociotechnical, teasing out the complexities of the way in which society and technology imbricate to establish a social milieu and to address the problems of human existence. There is thus no prime-mover: machines are not autonomous deities—they do not make history on their own.

Reconstructing Marx: Technology as a social process

How then might we dispel this nagging rumour of Marx's technological determinism? For Braverman (1974), this problem is only navigable by a concrete and historically specific analysis of both technology and social relations as well as the way they combine in existing societies. Marx takes up just this challenge in *Capital, Vol 1.*, which Braverman describes as an essay on how the social form of capital "completely transforms technology" (20). But it is not only here that Marx considers the dialectal relation between technology and society. MacKenzie (1996) defends Marx against accusations of technological determinism, noting that there are alternative readings to the "hand-mill" quotation. These are not different interpretations so much as more complete or holistic treatments of the text. The sentences preceding the damning quote reveal a concern for the social aspect of technological production. Here Marx admonishes Proudhon for only grasping one aspect of the capitalist formula—that people work, under certain relations of production—while missing another fundamental component: "that these definite social relations are just as much produced by men [sic] as linen, flax etc." (Marx, 1940, 92). It is difficult, when considering the quote in its immediate context, as well as in the broader context of marxian dialectics, to envisage a linear, autonomous, formulaic theory originating in Marx.

A new image of Marx comes into focus: rather than as a determinist offering a predictive theory of technology-led social change, Marx now appears as the first theorist to advance an in depth critique of the role of technology in modernity based on an analysis of industrial capitalism. We can detect a "theory of the social causes of organizational and technical changes in the labour process" developing in Marx's discussion of the machine in *Capital Vol. 1.* (MacKenzie, 1996, 38). Fundamental to this

is the insight that social relations shape technology, and not the other way around, as has been assumed by the canonical critics of technology (e.g. Mumford, Ellul, McLuhan etc.). If, indeed, as Marx (1976) posits, capital is not a thing but a social relation between people mediated by things, then we can begin to grasp the implications of capitalism as it articulates with relations of power and domination in technical design.

According to Braverman (1974), analysis of the interplay between the forces and relations of production can be found in most of Marx's historical writing. Marx's holistic understanding of labour is yet another indication of his constructivist approach to technology: the forces of production comprise human labour power as well as material instruments—tools and machines. Human agency is thus a social determinant of history; contra Heilbroner (1967), people *and* machines make history (if not under conditions of their own making). Feenberg (2002) asserts that Marx was the first to uncover the social interests concealed behind the mask of technical imperatives and Dyer-Witheford (1999) suggests that Marx might be considered as one of the first theorists of sociotechnical systems (40). By consistently linking the social and the technical, Marx revealed the political nature of technical development and exposed capitalism as an historical and ideological (versus natural or evolutionary) social outcome.

Machine as network?

In addition to Marx's (1976) conception of the forces of production, his definition of the machine is significant for social constructivism. The explanation of the machine as a complex of more basic parts, a combination "of simple mechanical powers" (e.g. lever, inclined plane, screw etc.) is insufficient (492-493). As one might expect, Marx provides an historical definition: the machine, he writes, "is a mechanism that, after being set in motion, performs with its tools the same operations as the workers formerly did with

similar tools” (495). Here Marx locates the machine’s historical position (the start of the industrial revolution of the 18th century); at the same time he identifies its unique role in objectifying the labour process. Historicizing technology is not enough for a constructivist approach, however. Marx’s exposition of the machine is further distinguished by the identification of actors (workers, other tools, or the forces and relations of production) involved at different stages of its development who form a tightly coupled network together with capitalists, managers, consumers, money and capital (cf. Callon, 1987; Latour, 1987). Marx’s formulation of the machine as network works on three interconnected levels: as a technical artefact comprising an arrangement of mechanical components; as an historic moment that interacts and feeds back into other historic moments; and as a part of a sociotechnical system involving human and non-human actors, whose interaction comprises the forces and relations of production.

Marx’s understanding of technical change is neither unilinear nor entirely predictable, much like the configuration of a network. On the former point, technologies from manufacture and machinofacture¹⁰ co-exist for some time in the transition to industrial capitalism. On the latter point, and against the determination thesis of autonomy, Marx clearly posits the contingency of technological development, particularly in response to social factors. One example Marx notes is technical innovation in response to worker insubordination, such as strikes. The phenomenon of developing technology to subvert worker independence was affirmed by Taylor (Braverman, 1974) and later by Noble (1984), who shows that the automation of the

¹⁰ For Marx (1976), manufacture is the period of handicraft production immediately preceding modern industry, which he refers to as “machinofacture”. In *Capital Vol. 1*, Marx describes manufacture as the result of co-operation of labour assembled under the auspices of one capitalist, arising either from the union of formerly independent handicrafts to produce a singular product or from the detailed division of labour of artificers who formerly completed the entire production process. Machinofacture “abolishes the role of the handicraftsman as the regulating principle of social production,” revolutionizing old methods of production and heralding the Industrial Revolution (491).

factory was based on the requirements of operational autonomy and not technical efficiency. Feenberg (2002) defines operational autonomy as the power of capitalists to make decisions without considering the consequences beyond their own narrow interests; such decision-making is typically oriented to strategies of domination that ensure that the technical infrastructure serves the needs of capital (75). This fully exposes the ideological nature of efficiency posing as technical imperative. Although the interventions into technical design like those described by Braverman and Noble serve to shore up capitalism, with values of domination and control achieving material realization, the very crucial fact remains: the machine is not monolithic.

“Moments” of the labour process

Marx’s conception of the forces of production further confounds the determinist indictment, which in any case “misses the spirit of dialectical materialism,” and lends credence to a constructivist interpretation of his work (Lukács, 1966, 29). He does not equate technology to the productive forces; such an assertion would support the idea that machines do, in fact, make history. As Lukács (1966) points out, the equivalence of technique with the forces of production “is neither valid nor marxist” (ibid). Neither does Marx perceive the forces of production as independent of the relations of production. Rather, he presents this former concept as inclusive of the “instruments, energy and labour” involved in the labour process, reflecting a nascent conception of the sociotechnical totality grounded in Marx’s dialectical approach. Marxist theorists from Lukács through to Braverman, Noble and MacKenzie take up the notion that it is social relations, manifest in the need of capital to exercise total control over the valorization process, that shape machines. Rather than producing social relations, technology is produced by the social relations of capital (Braverman, 1974). On this account,

machinery—or technique, as Lukács puts it—is only a “moment” in the forces of production, and not identical with them (29).

Valorization, another moment, is the exploitation of the worker in order to extract surplus value; herein lies the sociality of the productive forces. The valorization process—the creation and perpetuation of capitalist social relations—requires alienation, both of the collective and intellectual aspects of work. Such alienation is technically incarnated in the machine; in other words the machine “embodies the power of the capitalist” (MacKenzie, 1996, 35). This is what Wiener (1950) calls the “inhuman use of human beings,” their reduction to near slaves in their “two-way” relationship with automata (16). For the first time, the inversion of the worker-machine relation, whereby the worker who once commanded the machine now becomes a tool in the service of the machine, acquires “technical and palpable reality” (Marx, 1976, 548). That is, the values and interests of the ruling strata are materialized in technical artefacts, which then reproduce those norms, now barely detectable under the ideological veneer of self-sustaining technological imperatives. Thus internalized, there is no apparent reason for a resistance or protest. The valorization process necessarily precludes the needs and concerns of workers, such as autonomy, creativity and self-actualization. Here Marx hints at the legislative power of technology that Feenberg (2002) would flesh out in his concept of the technical code of capitalism. As “the rule under which technical choices are made in view of preserving operational autonomy,” the technical code is instrumental in maintaining the status quo, with its attendant imbalance of power relations, via the production and reproduction of the technical infrastructure (77).

Beyond the horizon: Radical civilizational change

Critical theory of technology nuances what is little more than a hunch in Marx—that capitalist social relations achieve technical embodiment in order to perpetuate capitalist hegemony. One foundation of this hegemony, according to Feenberg (1999), is the “cultural horizon of technology,” the backdrop of social life made up of generalized cultural assumptions that remain unquestioned (86). It is clear that Marx aimed to challenge these assumptions with his design critique, although this remained underdeveloped. He was not talking about reforms under the existing cultural horizon; rather Marx advocated transgressing its limits in pursuit of radical civilizational change, in short, communist society. However, Marx equivocates on the nature and role of technology in modernity. He alternates between positioning technology as neutral, a hapless victim to ideological forces, and conceiving of technology as a social process, responsive to human intervention. For Marcuse (1982) social transformation could be achieved only by reorienting rationality away from domination and toward the needs of the natural world. Following Marx, he argues that the “technological process implies a democratization of functions” through its dismantling of hierarchies, and attendant power relations (152). Like Marx, Marcuse does not regard technology as mere technical apparatus, but as something more akin to Mumford's notion of “technics.” This expansive definition considers technology as a social process in which human beings are inevitably engaged (138). Whereas Marx does not give a definitive statement on the question of whether social relations condense and materialize in technical design (MacKenzie, 1996), however, Marcuse (1964) conceives of a new direction for technological development (not simply a humanist façade) suggesting changes in the design as well as use of technology. Nonetheless, support for a constructivist interpretation of Marx may still be found in the arguments debunking his reputation as a

technological determinist—in his formulation of the machine as network, his articulation of the social relations of production, and the potential for agency he accords actors in capitalism.

Marx has been foundational to the theory and method of social constructivism, whether or not this is embraced or even admitted. The doctrine of technological determinism evidently lacks the explanatory power for, let alone the possibility, of societal transformation. Without the capacity for human agency, such a theory condemns humanity to Horkheimer and Adorno's (1972) totally administered world. With its attendant notions of technical imperatives, autonomy and unilinear progress, technological determinism is inadequate and thus dismissed. If Marx remains branded a technological determinist, his theories, by association risk the same dismissal; Marx is essential, however, if the goal for critical technology studies is to uncover and critique ideological manifestations of the technical sphere in capitalism. This is required if the explicit links between the socio-economic organization of society, its mechanical substructure and the relations of power and domination that unite them, are to be held firmly in view. Without the political understanding of technological development that Marx inaugurates, along with an analysis of technology's relation to power structures, and the knowledge that human actors can intervene in this process, a critical approach cannot be sustained. Marx's conception of modern industry transgresses the horizon of capitalism and its cultural limitations, inspiring a vision of an alternative social order (Dyer-Witheford, 1999). The marxian dialectic reveals itself in technology's dual nature, or what Feenberg (1999; 2002) calls its ambivalence: on the one hand, the devastating effects of machines; on the other, their promise of emancipation.

Critical theory of technology: A theoretical mashup

Feenberg's (1991, 1999, 2002) critical theory of technology is something of a theoretical mashup, a heady mix of marxist critique, Frankfurt School critical theory and social constructivism. The result, also called critical constructivism, is what Barney (2004) refers to as a "composite view." Feenberg builds out from all three strands, renovating useful concepts and weaving them together to form an holistic analysis of modern industrial society. From Marx he retrieves the design critique as well as the notion of the sociality of technology, which accounts for its inherently political nature. From critical theory, Feenberg claims the idea that technology is ideology materialized, expanding upon the concomitant insight that the conquest of nature (technological progress) is achieved through social domination. Feenberg retains key components from social constructivism, such as the rejection of technological determinism, the possibility of agency, and the contingency and heterogeneity of technical processes.

Although Feenberg (2002) develops a chronology of technological critique dating as far back as St. Simon, it is in Marx where he finds the kernel of a critical theory of technology. In fact, Marx may be considered

the first serious student of resistance to modern technology. He observed that the technical mediation of work accelerated economic growth but also created new social hierarchies. At the same time, Marx argued, technology brought into being a new kind of lower class capable of democratizing the economy (23-24).

Following Marx, Feenberg (1991) highlights the asymmetry of power relations between human and machine but is unequivocal in his assertion that modern technology embodies and reproduces ruling class values. This recalls Marx's (1970) claim that the ideas of the ruling class are the ruling ideas; the notion that "the class which is the ruling material force of society, is at the same time its ruling intellectual force" (64). In

Feenberg's reformulation, it is the dominant social interests that concretize in the technical base and become self-sustaining. Feenberg also invokes Marcuse's (1964) contention that technological rationality has become political rationality; in other words, "technological rationality is indelibly marked by the presupposition that production goes hand in hand with social domination" (Feenberg, 2002, 67) But, following the constructivist schema, this same technology is necessarily subject to social control. Openings for democratic intervention appear during the design process, making possible a radically different technology that serves a broader swath of human needs.

Democratic control of technology suggests the possibility of an alternative industrial civilization based on values different than those that currently underwrite globalized capitalism. Technology, on this account, is not neutral; rather, it is ambivalent. The concept of ambivalence opposes the determinist insistence on the neutrality of technology, stating that the real issue is not technology per se, but the array of choices involved at the level of technical design and the many possible outcomes of the design process. This makes technology available for "alternative development with different social consequences" (Feenberg, 1999, 7). What is at stake, then, "is not merely the limited range of uses supported by any given technical design, but the full range of effects of whole technological systems" that comprise the material infrastructure of society (ibid). Critical theory of technology, therefore, imagines a different mode of social organization, one that constructs and builds from an entirely different technical base. This new society fosters vocation in technical work, collaborative self-organization, and the incorporation of life-affirming values into technology, values not limited by capitalism's limited goals of power and profit. In this sense, critical theory of technology "charts a difficult course between resignation and utopia," seeking to discover how

modern technology can be redesigned to support the needs of a freer society (Feenberg, 2002, 13).

Technology as “social battlefield”

The technical order is not merely a collection of tools but instead acts to structure the social world in a way that is largely autonomous (Feenberg, 1991). “In choosing our technology we become what we are, which in turn shapes our future choices. The act of choice is technologically embedded and cannot be understood as a free ‘use’” (14). This echoes Marx's (1963) contention that human beings make history but not under conditions of their own making or control. Neither Marx nor critical theory is fatalist, however; the future of civilization is not determined by the “immanent drift of technology” but can be—and is—influenced by human action (Feenberg, 1991). Political struggle continues to play an important role; this role, however, is tenuous and success is by no means assured.

In societies organized around technology, such as modern Western nations, technological power is key to the exercise of political power. Feenberg (1991) explains how elites in modern western capitalism retain their political power through his concept of the technical code. Whereas earlier constructivist notions, like momentum (Hughes, 1987) and path dependency account for certain technological trajectories, the technical code describes the embodiment of social mores and norms at the level of technical design. In capitalism, the technical code translates ruling class interests into technical terms; it “invisibly sediment[s] values and interests in rules and procedures, devices and artefacts that routinize the pursuit of power and advantage by a dominant hegemony” (Feenberg, 1991, 14). A technical artefact reaches closure when disputes over its definition—its social meaning—are settled by privileging one over any number of

possible configurations. Such disputes in the design process often involve conflicting ideological visions rather than questions of efficacy or technical necessity. Their outcome, according to Feenberg (1999), often aligns the technology with dominant social forces, rendering the technical code a direct reflection of the prevailing social order.

The exercise of technical power, although dominative under current capitalist social relations, engenders political resistance as those shut out of the design process experience negative consequences of technologies and begin to protest. The idea of the technical code, discussed in more detail in Chapter 4, reveals an opening in the closed system of total domination envisaged by the Frankfurt School. Rather than a reified “thing,” technology is cast as a process that is ambivalent, one pregnant with both liberating and oppressive possibilities. If technology is a process, a mode of production as Marcuse (1982) observes, and “a mode of organizing and perpetuating...social relationships” rather than a series of finished products—the chance for intervention and hence change exists (138-39). In this way, technology is a social battlefield (Feenberg, 1991) or a contested terrain (Kahn & Kellner, 2004a), wherein outcomes with weighty implications for civilization are decided.

As critical as the design process is for progressive social change, critical theory of technology also finds potential for resistance in the end user, extending the notion of ambivalence from technological design to use, from process to products. The notion of creative appropriation describes a phenomenon wherein “users innovate new functionalities for already existing technologies” (Feenberg & Bakardjieva, 2004, 16). It is a process whereby users develop new functions and “layer” them atop the existing structure. The creative appropriation of computer networking technology by users since the internet's inception is one of its definitive aspects. The communicative character of

the internet, beginning with email, is the most dramatic example of this, and today characterizes popular understandings of the internet (Hafner & Lyon, 1996). Layering in this sense involves re-appropriating the network in unexpected ways as participants innovate or actualize new or dormant affordances. Participants tend to see the technology from a different angle than its designers, enabling them to perceive and actualize overlooked potentialities not envisioned in the technical, economic and political rationality already inscribed in the network (Feenberg & Bakardjieva). In the case of the internet, the original designers largely comprised the limited pool of users. Today, with the increasing ease of use of ICTs and the continued transparency of activity on the internet, users can become designers, to a greater or lesser degree, through experiment and practice. This makes the internet, arguably the world's most powerful communication tool, much more malleable and susceptible to creative appropriation at the level of design as well as use. For the moment, then, the internet's democratic potential, both as a medium of resistance and as a platform and instrument of progressive social change, threatens to transgress the cultural horizon of modern western technocapitalism.

Technology for the people

In developing a theoretical framework for this dissertation, I have explored varieties of post-industrial theory and found them largely wanting for a critical analysis of the role of information in late capitalism. This excursion is justified, however, in that these theories provide obvious context for any academic study of the internet. As well, the general tenets of the “information society” reverberate, more or less explicitly, in much of the literature concerned with computer networking in the context of neoliberal globalization. It is necessary to keep a sharp eye open for the positivist assumptions that

emanate from these discourses, and to guard against their unwitting adoption, especially the tendency toward determinism, the absence of power dynamics and the assumption of capitalism as the starting point for analysis. There are some key insights, however, that are invaluable for this dissertation. The emergence of a new form of capital—information—is a particularly salient feature of modern western societies. That it continues to grow in importance, extending and deepening its influence in all areas of the economy, politics and social life, can hardly be denied. This transformation of capital from (material) property to (immaterial) information signals an adaptation within capitalism, however, not the dawn of a new era ushered in by a revolution in the mode of social organization. Nevertheless, this phenomenon is significant because it creates another novel effect: the dematerialization of the object and outcome of labour. On this account, information is both capital and commodity. Certainly, capital and commodities still exist in material form; but the increasing sway of concepts like “intellectual property” and “informational capitalism” have cascading implications for how work and activism are organized on and through the internet—in short, for another world.

Critical theory of technology provides a more robust framework within which to understand the variegations of modern technological societies as well as the means and modes by which people act upon and within their world. It provides for a more finely tuned analysis of the dominative and liberating potentialities embedded within the technical infrastructure that undergirds these societies. Building upon the critically rich heritage of Marx and the Frankfurt School, and the historical approach of social constructivism, critical theory of technology forges a composite theory that sets human freedom in its sights, with the just society as its end goal. Feenberg (2002) rejects varieties of information society theory that “claim that post-industrial capitalism will evolve spontaneously into a participatory, skill-based society” (63). Instead, he calls for

the invention of a politics of technological transformation that will rebuild society from its material base. In reclaiming technology from its ownership and control by the technocapitalist class, the citizenry will, in dialectic fashion, become conscious of technology as both means of oppression and democratization. From here, the objective is to generalize the democratic tendencies of “technology for the people” to the political and economic structures of domination. My analysis of the internet as a technology-in-process and tech activism as a constitutive part of this process, uncovers just such a possibility: that of translating critical intervention from the technical base to the socio-political realm, transforming a technological practice into a social praxis of liberation.

Chapter 2: Remixing method

The design of this project was conceived with the intention of creating a reflexive and interpretative framework to guide the research process, and to employ a methodology that was consistent with my politics of radical social change. I approached the research design as an holistic process from the outset, avoiding strict delineation between theory, method and the practice these inspired: all would necessarily inform and feedback into the work as it unfolded in a dynamic and recursive way. To that end I blended two methods with strong theoretical underpinnings: open source and participatory action research (PAR). The dynamic holism of theory and method eliminates the need to mould the data to fit a preconceived theoretical framework, or to find a theory that complements the resulting data set. Padgett (2004) calls this a “conceptual framework” which eschews grand theorizing and offers “a schema for understanding a phenomenon” (300). This breaks down the conceptual separation between theory and method, instead considering them dialectically as interdependent parts of a totality that is always becoming, never finished. There is no final research “product.” Rather, there is critically informed analysis and action that relate dialectically in the quest for progressive social change; each responds to and produces the other, unfolding in an ongoing, integrated and ever-changing process.

The open source method used by tech activists in their software development appealed to me as a fitting research methodology for this project, congruent theoretically, philosophically and practically with my objectives as a radical scholar. Considered as a method of knowledge production, rather than simply a mode of

(software) production, open source provides the philosophical ground for theories of resistance and change, as well as a working model for alternate models of social practice and political organization. Open source is complemented by participatory action research, a method that facilitates activism within the formal constraints of academe. PAR enables theories of social change held by the researcher to be actualized in the research process, challenging the doctrine of objectivity, the neutrality of the researcher and the apolitical nature of academic work. Thus PAR was critical in allowing me to politicize my research program.

The theoretical elements that underpin my research design are ones that can be enacted in the course of data collection as well as data analysis, illuminating the dialectical relationship between theory and practice. For instance, the theory of open source translates into a method informed by the values of open source—freedom, collaboration, co-operation, trust, sharing, mutual aid, equality and accessibility. The tech activists I interviewed were given full access to their transcripts via a wiki, and invited to modify them—editing, adding, and deleting content as they saw fit. This method of open knowledge production, also known as the “wiki way,” coincides with the software production in which tech activists, as free and open source software (FOSS) developers, engage. Similarly, PAR's philosophy of emancipation and empowerment of oppressed communities reflects the practice of tech activists in their social justice work at the same time as it facilitates my study of this community.

Although the conceptual framework for this dissertation hybridizes two distinct methods, important commonalities interweave the methodological approach. The first is an acknowledgement of the need to analyze power and the social domination that often flows from it, as well as to address the human deprivation caused by inequitable power

relations. The next is a commitment to active participation, rather than passive observation, in order to achieve progressive social transformation. This idea of creating a better world is by no means a new one: it served as a central inspiration for Marx (1970), who derided criticism without action. “The philosophers have only *interpreted* the world, in various ways. The point, however, is to *change* it” (123). Methodological affinities between open source and PAR are also found in the rejection of the ideal of objective knowledge as epitomized by the scientific method and its concomitant valorization of authorized knowers. The neutral and dispassionate expert who seeks to discover and predict with law-like certainty a reality that is ontologically independent of the “expert” seems antiquated at best. Rather, this dissertation relies on an understanding of, and trust in, the partial, situated knowledge (Haraway, 1988) of the researcher and her respondents.

Participatory Action Research

The choice of participatory action research as a methodological foundation for this dissertation provided a bridge between academe and activism, lending the veneer of credibility where both the object of and approach to my research might be suspect. As an activist, I was not motivated to study other activists for the sake of “discovering new knowledge” but to understand the real conditions of human oppression and to search out possibilities for liberation and justice. PAR seeks to be an emancipatory method that produces knowledge with and by oppressed groups to further their self-determination, a method that throws into relief the “political aspects of knowledge production” that inform and interleave this dissertation (Reason, 1994, 328). According to Reason (1994), PAR’s liberatory aim is twofold: to produce knowledge and action that is useful to a particular group, and to empower people through critical consciousness, or what Freire

(1970) calls conscientization. As a process of “learning to perceive social, political and economic contradictions and to take action against the oppressive elements of reality,” conscientization becomes the motivating factor for liberating action, enrolling people in their self-emancipation (35).

PAR is perhaps better understood as a philosophical perspective, a mode of living and a co-operative process for knowledge creation. Rather than a formal academic method with a set of rules for data generation, Fals Borda (1985) calls it both a philosophy of life and a method, based in sentiment as much as conviction. PAR is rooted in action research, which posits a strong relationship between theory and practice. Pioneered in the 1940s, action research envisioned theory as self-reflexive, and responsive to the results of social research and experimentation. In essence, action research proposed a way of generating knowledge about a social system in the process of trying to change that system. From these origins, action research developed on the assumption that a theory can be explicitly reflected in action—enacted or actualized—with the action element considered an extension of the idea behind the experiment. Theory alone is insufficient to effect social change; what is needed instead is a broader, more complex understanding of the relationship between theory and practice (Gustaven, 2001).

Gustaven (2001) describes action research in its initial formulation as “raids into reality performed to verify grand theory” (24). In the 1970s, however, participatory action research emerged as a reaction to the failure of academic knowledge production to inform social practice or bring about progressive social change (Babbie & Mouton, 2001). Indeed, academic research often appeared to do the opposite: preserve the status quo and shore up existing power imbalances (Chomsky, 1997). Today, PAR’s central objective

may be understood as an effort to redress inequality and redistribute power by generating practical knowledge that helps people improve the course of their daily lives. It further seeks to forge links between everyday existence and the structural logic that reproduces that existence (Morgan, 1983, in Babbie & Mouton). According to Reason and Bradbury (2001) PAR intends to contribute through this practical knowledge to the increased well-being—economic, political, psychological, spiritual—of human beings and communities, and to a more equitable and sustainable relationship with the wider ecology of the planet of which we are an intrinsic part.

Participatory action research is thus conceptualized as a democratic process that seeks to develop useful knowledge, rooted in a participatory world-view, in support of progressive human development. It is a collaborative, self-reflexive endeavour that is motivated by a commitment to improving the world by changing it, and learning from those changes to improve it further (Kemmis & McTaggart, 1988). Importantly, PAR involves research participants as practitioners or co-investigators in a research problem that concerns their particular community. While PAR seeks practical outcomes, it also attempts to create new ways of comprehending and engaging in the world, “since action without reflection and understanding is blind, just as theory without action is meaningless” (2).

PAR strives for methodological holism with its dialectical conception of action and reflection, theory and practice, summed up by Kemmis and McTaggart (1988) as “ideas-in-action” (7). This recalls the marxian concept of praxis—the marriage of theory and practice required to revolutionize the social order. Marx (1970) conceives praxis dialectically, as revolutionary critical-practical activity that is fundamental to the liberation of the oppressed. PAR owes an obvious debt to critical theory generally, and

marxist thought in particular. It is informed by historical materialism and the notion that the domination of the masses by an elite class lies not only in the means of material production, but likewise in the means of mental (knowledge) production. For PAR, this translates into “the social power to determine what is valid or useful knowledge” (Babbie & Mouton, 62).

Participatory action research is critical in that it strives to improve outcomes and the self-understanding of research participants (or co-investigators) at the same time it assists in the development of social critique. PAR aims to intervene “in the cultural, social and historical processes of everyday life to reconstruct not only the practice and the practitioner but also the practice setting...” (Kemmis, 2001, 92). In this way, PAR connects personal and political spheres in research and action that seeks to overcome social injustice. Finally, PAR is emancipatory, recognizing injustice as the result of power imbalances in society and maintaining social transformation as an overarching objective. Not only does PAR lead to new useful knowledge, it develops new abilities to generate knowledge and to help people challenge—and hopefully change—their world for the better. Unlike other modes of social scientific inquiry, PAR seeks progressive social change as an outcome, rendering it explicitly political. Transgressing cherished notions of objectivity, the researcher is actively involved in this process, a process that can in turn stir participants to social action (Kemmis & McTaggart, 1988).

Despite its legitimating function for activist research, PAR has not been uncontroversial as an academic method, in large part because it dispenses with the formality of conventional research methods, particularly as this is dependent upon the ideal of objectivity. PAR fosters a “view from somewhere” as part of the politicization of the research process, allowing both researcher and research participants “to become

answerable for what we learn to see” (Haraway, 1988, 583). In adopting a view from somewhere, PAR explicitly rejects the doctrine of objectivity so dear to (social) scientific research, rather insisting upon rooted, identifiable, agentic “knowers.” Indeed, PAR belongs to a tradition of radical critique of academic knowledge production. Nietzsche (1968) warns against objectivity as the antithesis to critical thought. He cautions us to beware of

the dangerous old conceptual fiction that posited a “pure, will-less, painless, timeless knowing subject;” let us guard against the snares of such contradictory concepts as “pure reason,” “absolute spirituality,” “knowledge in itself”: these always demand that we should think of an eye that is completely unthinkable, an eye turned in no particular direction, in which the active and interpreting forces, through which alone seeing becomes seeing something, are supposed to be lacking; these always demand of the eye an absurdity and a nonsense. There is only a perspective seeing, only a perspective “knowing” and the more affects we allow to speak about one thing, the more eyes, different eyes, we can use to observe one thing, the more complete will our concept of this thing, our “objectivity,” be (119).

Nietzsche, as this extended quote illustrates, was keenly attuned to the tendency in modern western thought toward the reification of knowledge and the elevation of the all-knowing subject, the absurd omnipotent eye. PAR incorporates Nietzsche's argument for an active seeing grounded in the particular, and embraces a perspective knowing—the idea that multiple and diverse viewpoints produce a more holistic and therefore more authentic objectivity.

Haraway (1988) also challenges conventional academic knowledge production with her radical critique of objectivity. She echoes Nietzsche's opposing ideas of the omnipotent eye and perspective knowing in her provocative concepts of the “god trick”—that ability to see everything from nowhere—and situated knowledges, which oppose the “unlocatable, and so irresponsible, knowledge claims” of science (583). For her, “the view of infinite vision,” this god's-eye view is impossible, an absurdity much like Nietzsche's

“eye turned in no particular direction,” which lacks the “active and interpreting forces” that animate our understanding of the world (582). Haraway insists on “the embodied nature of all vision” in order to “reclaim the sensory system that has been used to signify a leap out of the marked body and into a conquering gaze from nowhere” (581). Rejecting the “pure, will-less, painless, timeless knowing subject” as Nietzsche does, Haraway arrests the “conquering gaze from nowhere” that masks power and in so doing hides its true nature from critical view. Situated knowledges, as local, embodied and particular instantiations of knowing, allow us “to become answerable for what we learn how to see” (582), something that is reflected in the theory and practice of PAR.

In addition to bringing accountability to the research process, PAR admits the agency of both researcher and researched, and validates their contributions; thus both expert and “lay” claims to knowledge are valued. In its legitimation of situated knowledge, PAR recognizes the “object of knowledge” as an actor and further, that “the agency of people studied itself transforms the entire project of producing social theory” (Haraway, 1988, 592). As Haraway (1988) further observes, acknowledging the agency of the research-subject-as-object is the only way to avoid “gross error and false knowledge” (593). Here, feminist objectivity uncovers what objective knowledge claims often conceal—relations of power and dominance embedded in the social, economic and political status quo (Naples, 2003). Because it is sensitive to inequality, oppression and domination, feminist objectivity contributes to a richer, more complete account of the social world. Against this backdrop, PAR challenges the epistemological assumptions of orthodox (social) science, which insist on neutral and value-free research, implying nothing less than a shift in the nature of knowing.

Open source

The open source method that characterizes the free and open source software (FOSS) production engaged in by tech activists served as a philosophical inspiration, a theoretical guide and a practical model for my research. For this dissertation, I developed a more expansive conception of open source, one that reaches beyond its narrow definition as a mode of (software) production to consider it also as philosophy and a method of knowledge production.

...as a philosophy

Open source as a philosophy rests on the necessity of freedom for human existence. It refers to the fundamental belief that information should be free, that uninhibited access to information is necessary for the progressive development of society. This philosophy is the basis for the free software movement (FSM), which represents the formalization of a long history of openness in the computing community (Ceruzzi, 2003). The FSM emerged in the 1980s in response to the growing proprietary nature of the computing industry, and the resulting problems for creativity, collaboration and innovation (Stallman, 2002). Arnison (2002) calls free software, as the original product of the open source method, a revolutionary response to the privatization of information. The essence of free software—and of the open source philosophy—is liberty. Values attributed to open source as a philosophy derive from hacker culture and build from this foundation of liberty; they include individual freedom, independent thinking, voluntarism, sharing, co-operation (Castells, 2001). Other values, rooted in what Levy (1984) calls the hacker ethic, are collaboration, decentralization and artistic creation.

Open source as a philosophy is also influenced by anarchist ideals, such as mutual aid, autonomy and self-determination, and practices like horizontal organization

and non-coercive co-operation, all of which stem from anarchism's central objective: human freedom. For Bakunin, liberty

consists in the full development of all the material, intellectual and moral powers that are latent in each person; liberty...recognizes no restrictions other than those determined by the laws of our own individual nature, which cannot properly be regarded as restrictions since these laws are not imposed by any outside legislator...but are immanent and inherent (in Guerin, 1970, x).

Anarchism is most strongly realized in what Moglen (1999) calls the legal theory of free software. This is the use of intellectual property law—specifically copyright—to protect the “freeness” of collaboratively developed, open source code software. Known as copyleft (all rights reversed), the most famous example is the GNU General Public Licence (GPL). The GPL uses copyright “to counterfeit the phenomena of anarchism,” asserts Moglen, adding that “this use of intellectual property rules to create a commons in cyberspace is the central institutional structure enabling the anarchist triumph” (20-22). The GPL represents something of a return, insofar as it attempts to formally legalize the commons ethos that flourished on the early internet (Dyer-Witheford, 2002). It does so by ensuring that the freedoms guaranteed under the GPL automatically apply to future uses and derivative works; in other words, the GPL fosters the propagation of free software to non-free applications that wish to use GPL source code.

The General Public Licence, and copyleft generally, can be considered a sweeping critique of capitalism; at the very least, it is quite clearly a rejection of the commodification of information. This is evidenced in the *GNU Manifesto*, which opposes “the privatized appropriation of the fruits of a collective and cumulative programming culture” (Dyer-Witheford, 2002, 144). In this sense, the GPL inverts the “individualizing force of copyright” by transforming the singular right of the creator to exclusivity into a collective right “not to be excluded from a shared body of work” (Soderberg, 2008, 20).

Copyleft as the legal embodiment of open source philosophy provides the structural foundation for the free software movement while exposing the failure of capitalism to colonize the informational commons.

...as a method of knowledge production

Open source as a philosophy of freedom of information becomes a method of knowledge production as it is applied to technical use. As a method, open source is centred on four essential user freedoms: the freedom to run, study and adapt, redistribute (gratis or for a fee) and modify software (Stallman, 2002). The realization of these freedoms depends upon the open source values discussed above. Users must share their innovations as well as problems (bugs), relying on their community of peers to scrutinize results. For this and other reasons, open source has been compared to the scientific method. This method of scientific inquiry, founded largely upon the writings of Bacon, Descartes and Mill, refers to a set of techniques for investigating phenomena, developing new knowledge and correcting or integrating previous knowledge through the formulation of hypotheses and their evaluation through the collection and observation of data, and experimentation. Certainly, there are discrepancies between the scientific method as an ideal-type and the culture of scientific practice, as Kuhn (1962) and Latour and Woolgar (1986) make clear. This renders an adaptation of the scientific method to social scientific inquiry problematic, complicating any discussion of the production of knowledge. Without ignoring the importance of such critiques (including the critique of scientific objectivity discussed above), we can still observe some parallels between the open source method of knowledge production and the scientific method's mode of inquiry.

Collaboration

This characterizes the history of modern scientific practice and may be considered one of the defining elements of modern western science. Collaboration is one of the essential components of free and open source software projects.

Peer Review

This process is fundamental to both methods, serving to protect the integrity of the project and improve the general calibre of the work. In contemporary science, journals facilitate the peer review process, where manuscripts are submitted anonymously to fellow scientists for scrutiny and evaluation prior to publication. This process is intended to eliminate fraudulent work, reduce errors and improve the quality of the scientific literature. The quality and suitability of free software “is achieved through an elaborate peer review process performed by a large community of users, who act as co-developers to identify and correct software defects and add features” (Senyard & Michlmayr, 2004, 1). Raymond (1999) famously dubbed this Linus' Law, which he considers key to the superiority of FOSS compared to proprietary software: “given enough eyeballs, all bugs are shallow.”

Documentation/Replication

Scientists document their work in order that others working in their field may observe and attempt to replicate the results of their experiment. This practice enables the verification and validation of hypotheses while deterring deliberately false results.

Documenting FOSS projects is essential: “A piece of software without documentation is not useable” (Hill, 2008). Over the comparatively short history of software development, a blend of tradition and necessity has created a semi-standardized system of

documentation. Documentation gives users the information needed to install and run the software while comments in the code help programmers better understand the software they wish to use or develop further.

Data sharing

This is an historical practice within the modern scientific community, often required for the replication of an experiment. It is also an essential component of the open source method: source code must be accessible; that is to say, shareable. Data sharing is a self-conscious practice rooted in the technical development of the computer and computer networking. The custom of sharing computer source code has a long tradition in the computing community, where early users were also developers (Ceruzzi, 2001). This mutual exchange of information came to characterize the nascent software industry, providing a foundation for the free software movement, and contributing to the commons ethos upon which the internet was founded.

Redefining/Forking

Neither science nor software are fixed enterprises; rather they are malleable, flexible and “in play.” Indeed, science is an active process; “science in action”—as Latour (1987) and others stress—is the ongoing social construction of facts and artefacts. In science, subjects, problems and experimental methods may be redefined; in software development, projects can be forked when one or more developers redefines the problem or objective. A scientist can carry out an experiment based on another's hypothesis or interpret results of an experiment conducted by someone else. Similarly, a FOSS developer can create a competing project based on the same code, taking the software in a different direction than the original project.

Confirmation

Both science and FOSS are social enterprises, wherein outcomes are accepted once they are confirmed. As Kuhn (1962) so clearly demonstrated, scientific “achievements” are normalized when they create paradigms that attract a large number of scientists who commit to the same rules and standards for scientific practice; “normal science” is thus the “genesis and continuation of a particular research tradition” (11). The key to this practice is that results can be reproduced, or confirmed, by others in the community. In FOSS development, the community of programmers works collectively to produce quality code within a project. The peer review process is the means by which free software is “confirmed.” That is, the more people collaborating on development, the more likely (and quickly) mistakes or missteps will be discovered. Although it is rare, forking occurs in FOSS projects when “achievements” are not obvious. Reasons for forking include the belief “that changes are not being accepted fast enough, that changes are happening too quickly for users to absorb them, that the project governance is too closed to outsiders, that the licensing approach is hampering development, or that the project’s technical direction is fundamentally incorrect” (Wheeler, 2007).

The endurance of both scientific and FOSS projects rests with the community of practitioners and their acceptance or rejection. In science, support for a theory or research direction comes from the scientific apparatus; thus what in technoscience begins as “weak rhetoric” grows “stronger and stronger as time passes, as laboratories get equipped, articles published and new resources brought to bear on harder and harder controversies” (Latour, 1987, 103). Access to data and research results is essential for others to replicate and thus build upon previous work, contributing to the longevity and/or success of the research program. Similarly, with FOSS development, a project's stability (and therefore long term success) derives in large part from access to the source

code. As Fogel (2006) notes, “replicability implies forkability, forkability implies consensus” (88); that is, access to the code that makes a fork possible also encourages developers to work harder to maintain cohesion in the group.

Pinch and Bijker's (1987) method illustrating the social construction of technology (SCOT) is useful for understanding this process. According to SCOT, a technology stabilizes when the relevant social groups—those involved in the design process—come to agreement over the meaning of the artefact. This fact of choice reveals technological development as contingent and multidirectional rather than evolutionary or teleological, contradicting the tendency “to accept all that is real as necessary” (Braverman, 1974, 11). Forking occurs only when consensus cannot be reached; though it rarely happens, it is the ultimate indication of choice and contingency in the design process. Because free software development is an ongoing process—FOSS software is never “finished”—closure in the sense Pinch and Bijker discuss does not occur. That is, free software cannot be black boxed. However, as the SCOT method illustrates, problems are regularly resolved (or redefined) through group consensus and the software advances towards its next version. Thus a FOSS project depends upon acceptance or confirmation by the community, for example, of its technical, political and social structure, in order for it to continue (Fogel, 2006). Rejection, as in science, means failure.

...as a mode of production

Open source is a mode of production in addition to a philosophy and method. For Marx, the *mode of production* comprises the forces and relations of production. *Forces of production* refer to human labour power plus the means of production—that is, the associated materials, machinery and technology that fuel the labour process (Marx, 1970, 50). *Relations of production* comprise the social, political and legal relations that

characterize the interaction between workers and the means of production, and that govern the labour process and its products. *Relations of production* are property relations, as the the labour power, the means of production and the product of the labour process all belong to the capitalist (Marx, 1976). For Marx (1970), the mode of production

must not be considered simply as being the production of the physical existence of the individuals. Rather it is a definite form of activity of these individuals, a definite form of expressing their life, a definite mode of life on their part. As individuals express their life, so they are. What they are, therefore, coincides with their production, both with what they produce and with how they produce. The nature of individuals thus depends on the material conditions determining their production (42).

Thus the production and reproduction of the material world are inextricably and dialectically bound to social life.

The mode of production is historically specific. To understand how a particular society is organized—how wealth and associated power relations are distributed throughout that society—it is necessary to understand the conditions under which that wealth is created. In the capitalist mode of production, workers

enter into definite relations that are indispensable and independent of their will, relations of production which correspond to a definite stage of development of their material productive forces. The sum total of these relations of production constitutes the economic structure of society, the real foundation, on which rises a legal and political superstructure and to which correspond definite forms of social consciousness. The mode of production of material life conditions the social, political and intellectual life process in general (Marx, 1968b, 182).

The mode of production of any given society is therefore formative for that society. The capitalist mode of production based on profit forms the foundation of a consumer society guided by market logic. The mode of production is also contradictory: it creates social stasis—the reproduction of the status quo, as well as social change, as the forces and

relations of production inevitably come into conflict. “As individuals express their life, so they are.” Through their surplus labour, the labouring class remain wage slaves and in the quest for survival, the worker maintains capitalism as the dominant mode of socio-economic organization. But when new productive forces (e.g. computer technology) or new social relations (e.g. open source) develop that oppose or present alternatives to the existing mode of production, that mode of production confronts its contingency: it must adapt, or it will start to break down. At this point, a new social order, founded upon a new mode of production, emerges on the horizon of the possible.

Chapter 3 will flesh out the concept of open source as a mode of production, particularly as it relates to the labour process. Here let it suffice to state briefly that the notion of open source as a mode of production serves as both a foil and challenge to dominant labour and property relations, opening up avenues for contestation and change. As a mode of production, open source offers a glimpse of a new social order, offering an alternative model for social organization. This is no mere conjecture: open source currently serves as the mode of production for a significant portion of the computing industry. For example, SourceForge.net, a code repository and the world's largest open source software development website, had more than 230, 000 registered Free and open source software projects and two million registered users as of February 2009. There are more than 10,000 FOSS software packages available and about 70 FOSS software licenses (Tiemann, 2009). As of February 2009, GNU/Linux distributions held 21 percent of the operating system market (Johnson, 2008) and the Firefox web browser reached 21.9 percent market share (Keizer, 2009). FOSS “is arguably one of the best examples of open, collaborative, internationally distributed production and development that exists today” (Ghosh, 2007, 4). As a working alternative to capitalism, open source provides an example of a collective and voluntary work effort that destabilizes

assumptions about the centrality of profit to the labour process and associated requirements of managerial leadership, hierarchical structure, and command-and-control organization.

Emancipated labour and the fulfilment of species being

As a means of expressing life—as a mode of life—FOSS thus enables the fulfilment of species-being, Marx's term for human nature. Species-being represents that which is universally human, realized in the productive or creative work of human beings through history. According to Fromm (1961), Marx considers emancipated labour (distinct from labour under capitalism) as a “process of genuine activity” in which a person develops herself: “work is not only a means to an end—the product—but an end in itself, the meaningful expression of human energy; hence work is enjoyable” (41). This aptly describes free software development (or hacking), which is commonly referred to as joyful (Himanen, 2001), fun (Raymond, 2001), playful (Levy, 1984; Torvalds, 2001) and humourous (Stallman, 2002). This individual joyfulness in work produces a social outcome, what Torvalds (2001) calls the networking effect. This is “where you have a lot of hackers working together because they enjoy what they do” (xvii). There is no higher motivation for hackers, says Torvalds, who further notes that this motivation has a “powerful effect” in realms beyond that of FOSS development. Soderberg (2008), too, links the open source mode of production to a “much broader undercurrent revolting against the boredom of commodified labour and needs satisfaction” (44).

The forces of production that characterize the open source mode of production include human labour—the necessary “man” hours—as well as the hardware and software components that comprise computer and networking technologies. These material components of the labour process are not necessarily owned by the capitalist

class; the means of production—for the IT industry, as well as the culture industries—are now also in the hands of the non-elite classes of Western society¹¹. The relations of production involved are complex, intersecting and multiple, and otherwise distinct from those engendered by the capitalist mode of production. The relationship between capitalist and worker is difficult to identify, as the FOSS developer behaves in a manner more closely resembling the hobbyist than the white collar professional (Ghosh et al., 2002). Whether self-employed or hired by a firm, whether they work in the IT industry or not, these software programmers almost always contribute unwaged labour to FOSS projects. When they are employed by a firm, the waged labour performed does not typically include FOSS development; it is not uncommon, however, for developer to write FOSS code during work hours, with or without their employers' knowledge or consent (Lakhani & Wolf, 2005; Glott & Ghosh, 2005).¹² Social relations between workers and the objects of their work are not alienated, as in the capitalist mode of production. Rather, the developer stands as a free and autonomous agent in relation to free and open source software as the product of emancipated labour. The property relations of exclusion, scarcity and oppression implied in alienated labour, where the worker confronts the fruits of her labour as something foreign, are absent. For the FOSS developer, “the computer itself is entertainment” (Torvalds, xvii); FOSS is attractive precisely because it enables freedom and innovation. These social relations are present both in the labour process and in the product itself, in the software, which cannot be

¹¹ This is not necessarily an emancipatory situation, as distribution channels remain privatized. In the same way that drivers may own their individual vehicle, but the state and private companies control the infrastructure that supports the automobile (oil, gas stations, roads etc.), a few major corporations own the the internet “backbone”—high-capacity data routes and core routers that comprise the main “trunk” connections that form the foundation of the internet. In addition, Internet Service Providers control the “last mile,” which is users' gateway to the internet, and recently the subject of a contentious debate over the internet's future as a neutral network.

¹² The growing exception is firms that finance the development of FOSS, including IBM, RedHat, Sun Microsystems, and Cisco.

“owned” in the traditional capitalist sense—or is rather owned and available to all who so desire it—and thus cannot appear to its producer as something alien.

Finally, social relations among FOSS developers are diametrically opposed to those fostered by the capitalist mode of production, where workers labour for and under the capitalist. “All directly social or communal labour on a large scale requires, to a greater or lesser degree, a directing authority, in order to secure the harmonious co-operation of the activities of individuals...” (Marx, 1976, 448). Capitalist social relations are competitive: with the growth of the means of production (machinery/technology) comes increased competition for wages, which simultaneously decrease. Workers under capitalism are independent of each other, isolated in their waged labour: “they enter into relations with the capitalist, but not each other” (451). In sharp contrast, the open source mode of production is fundamentally collaborative, relying upon the free association and co-operation of open source programmers. While coding itself can be a solitary activity, FOSS projects are conducted in a collective manner by volunteers who self-select to the project and freely establish their own terms of participation, including what, when and how much they will contribute. Success comes “from harnessing the attention and brainpower of entire communities” in “sustained co-operation” rather than through hierarchical management based on unequal power relationships such as “leadership by coercion” (Raymond, 2001).

Competition amongst individuals does not occur in the open source mode of production due to the absence of wage or profit as a driving force and the presence of other motivations enframèd by a distinct set of cultural norms, as Chapter 3 discusses. Labour is distributed in FOSS development, meaning that it occurs in geographically diverse locales. Nonetheless, coding is often done “together”—that is, working online in

real time with other project members (via Internet Relay Chat or instant messaging) or asynchronously (via email and discussion fora). Real time collaboration also occurs at “code fests” or “hackathons” where members gather face-to-face (f2f) over a short time period for intense programming sessions. While these gatherings often serve as a means to get a large amount of work done in a short period of time—for example, before new version releases, more importantly they allow developers to meet in person, socialize and enhance their remote communications (Wikipedia, n.d., *Hackathon*). Social relations in the open source mode of production are thus horizontal, voluntaristic, and communal in the sense that they are self-organized, co-operative and characterized by shared goals and mutual aid. They are also recursive, in that the method for organizing distributed volunteer labour can also serve as a model of governance for larger projects, suggesting the “scalability” of the open source mode of production or, in other words, the possibility of generalizing open source beyond the limited arena of software development.

Methodological intersections

The preceding discussions of participatory action research and open source reveal how the two methods intersect on several epistemological fronts. The most obvious is their common dedication to creating an alternate system of knowledge production that aims to create a qualitatively different kind of knowledge; a knowledge that is at once subversive and emancipatory. In both approaches, knowledge is liberated from elite domains: in the case of PAR, from the professional “objective” researcher; in open source, from the narrow requirements of capitalism. Further, both approaches value knowledge derived through praxis over knowledge legitimized (and thus made exclusive) by the dominant socio-economic system. In PAR, participants are valued for their experience-based knowledge while the FOSS community evaluates contributions

based on a strict meritocracy: “Hackers should be judged by their hacking, not bogus criteria such as degrees, age, race or position” (Levy, 1984, 43). As a result of these alternative valuations of practice and practitioners, a different way of generating knowledge develops. This different way nurtures a free relation to work, which in turn fosters new social relations based on human welfare rather than the profit motive, displacing the dominant attributes of capitalism, such as individualism, competition and greed.

Another commonality between PAR and open source is the emphasis on involvement by participants. As an academic methodology, PAR is radical in its reconfiguration of the research “subject,” according her the status of “co-investigator” and minimizing the hierarchical distinction between researcher and “researched.” Both parties bring different yet equally necessary contributions to the research project; “participation is understood in the sense of co-managing the research process and co-generating problem solutions and new knowledge” (Babbie & Mouton, 2001, 64). Without the unique expertise or “insider knowledge” of research participants to complement the researcher’s technical expertise and “formal” knowledge, the process of validation and sense-making is hindered. Open source as a mode of production relies entirely on participation from the community, including users, in order to achieve success. Guided by a rigorous process of peer review, open source projects are collaborative efforts, with problems experienced and solved collectively.

Lastly, both PAR and open source have the same attitude toward the outcome of collaboration: it must be freely shared—not enclosed by intellectual property regimes. “PAR postulates participation to the extent of shared ownership of the research enterprise” (Babbie & Mouton, 2001, 61). Similarly, the “four essential freedoms” of

FOSS stipulate that all software produced using FOSS code must remain accessible to all (Stallman, 2002). This contrasts post-Fordist practices of knowledge production, where the profit requirement of capitalism dictates that information be made exclusive in order to be sold. A system of closed knowledge production also characterizes the academy, where the increasing privatization of education has led to the commodification of scholarly research. A similar situation prevails in science, where major profit incentives have eroded the once-common notion of research in the public interest, to be replaced by the cynical objective of research for economic gain. On the contrary, the practice of open knowledge production has a long history in modern western culture, in science, law, education and music. “The marketplace of ideas,' the continuous roiling development in thought and norm that our political culture spawns, is itself an idea that owes much more to the distributed, non-proprietary model than it does to the special case of commodified innovation.” (Boyle, 2001, 48).

Research design

As an activist scholar, I confront the academy as an institution of social reproduction—or ideological state apparatus, as Althusser (1971) terms it. Any research I conduct under the auspices of this institution will necessarily be critical—in terms of the content of the study, but also in terms of its relationship to the university as a knowledge factory. For this dissertation, a qualitative approach afforded a critical perspective that broadly seeks radical, progressive alternatives to modern western society in the death grip of capitalism. The interpretative and critical paradigms of qualitative inquiry offer “complex epistemological and ethical criticisms of traditional social science research” and eschew the notion of the objective, politically neutral researcher (Denzin & Lincoln, 2005, x). Standpoint theory (with its debt to marxism) and feminist critiques in

particular contribute the notion that there is no omnipotent observer, no theory- or value-free knowledge: all observation bears the mark of its observer and the social conditions of its environment. Participatory action research embodies and advances this line of inquiry as it maps out an alternative mode of knowledge production and, in the tradition of critical social science, strives to understand the operations of power and ideology.

Online research falls within this tradition of critical qualitative inquiry. The internet served as both the terrain and tool in my investigation of FOSS and tech activism and as such provided the structural framework for my research design. Because the internet is participatory and collaborative (both in its architecture and its commons-based ethos), online research offers the chance to join “the researcher with the researched in an ongoing moral dialogue” (Denzin, in Johns, Chen & Hall, 2004, 7). In this way, online research aligns with PAR, and makes possible questions like: Does the work provides the basis for social critique and action? The inclusion of ethical criteria indicates the social justice orientation of internet-mediated research, facilitating a research design that complements the methodological and philosophical components of this project.

As a relatively new and rather explosive phenomenon, online research warrants a brief explanation. The growth and popularization of the internet since 1995 has proffered an ever-widening range of research tools, sites, and practices (Mann & Stewart, 2000) to augment existing research traditions. Email, internet relay chat and instant messaging brought new means of communication; online communities like chatrooms, message boards, newsgroup and multi-user domains (MUDs) emerged as fresh ground for academic investigation; and online surveys represented the latest in an growing stock of

computer-assisted survey tools. The benefits of online research are numerous, including increased speed in communication and accuracy in data collection; increased access to research materials; improved efficiency in data storage; elimination of time-space constraints; and reduced costs associated with all of these (Christians & Chen, 2004). There are also limitations, such as technology failure and the absence of non-verbal cues that aid face-to-face communication (Selwyn & Robson, 1998). Novel practices like “lurking” demonstrate the malleability of conventional research methods. Akin to participant observation offline, lurking consists of reading participant contributions in an online community without responding. As a research act, lurking can serve as both data collection and as part of the socialization process in an online community (Johns, Chen & Hall, 2004).

While the internet has proven a fertile terrain for academic research, Feenberg, Bakardjieva and Goldie (2004) note resistance from online communities whose members refuse to be objectified as grist for the academic mill. The authors link this negative reaction to a narrow interpretation of online research ethics, one that is indifferent to the needs, interests and goals of research subjects as human beings. “The preoccupation with individual rights and protection of subjects must be complemented with an adequate conception of participants' interests in the research process and its results” (344). It is important, therefore, not only to inform research subjects of the objectives of the study and their role in it, but to approach them as co-collaborators at each stage of the study design. This awareness has guided my research, from its conception and design through the interview process, data analysis and writing.

Over the past 15 years, a critical, qualitative mode of inquiry that variously utilized the internet as both a topic and site of study as well as a research tool, has begun

to take shape (Mann & Stewart, 2000). Internet-mediated inquiry requires the researcher to move between online and offline worlds, borrowing and adapting conventional research methods, creating what Denzin (2004) refers to as hybrid or bricolage. As a metaphor, bricolage is particularly useful for this dissertation: it evokes the use, navigation and adaptation of multiple, diverse and even competing methods, theoretical spaces and paradigms. Adapting the method to the research project, rather than the other way around, preserves the integrity of the original research question(s) and ensures a research design that is intuitive, flexible and sensitive to the unique goals of the project.

There is no distinct set of practices, strategies or methods that belongs to critical qualitative online research, particularly as it cuts across a variety of disciplines. Instead, researchers select from among the vast array of traditional qualitative methods available, embracing a multi-method approach. Ethnography, as a general strategy for conducting research, has made a fairly easy transition to the virtual environment, though Bird and Barber (2007) remind that “virtual ethnography” is not a method in itself, but a process of selecting from the methodological toolkit belonging to ethnography for application in an online environment. This dissertation borrows several methods from the ethnographic tradition. In-depth interviews with tech activists—telephone, f2f, and email—comprise a significant portion of my data. Collection and analysis of online documents, such as IRC logs, policy papers, vision and mission statements, FAQs, and essays, complement first-person accounts, and provide context and background for the project. Finally, participant observation, conducted over the course of my graduate studies at technology conferences, workshops and meetings, rounds out the data collection process. In triangulating the results, I have created an holistic account that has both descriptive and analytic power, as Chapter 6 will reveal.

Data collection

Finding participants

During the four years of research for this dissertation I got to know a number of tech activists—through interviews, correspondence and conferences. The snowball approach to finding participants generally worked well, Klein and Kleinman's (2002) critique notwithstanding (Oates, 2006). Initial “cold calls” to key tech activists resulted in an ongoing research relationship with several of them. Introductions from some of these activists helped broaden the pool of participants. I was also able to draw upon and develop contacts made during the course of my masters degree, which focused on Indymedia, one of the largest tech activist projects. Trust built in this previous study went a long way to making new contacts in the tight knit world of tech activists, which is effectively closed to outsiders. I made entirely new contacts through attending technology (un)conferences, such as BarCamp, RecentChangesCamp, Web of Change and the International Symposium on Wikis. By “going where the geeks are” I made critical face-to-face connections, met people I only knew online or through their work, and was able to witness important instances of how this community organizes and develops internet technology.

One recurrent problem I encountered while cultivating my contacts is typical of the broader activist community. This is the difficulty in establishing a connection with a potential participant due to security concerns surrounding radical social justice activism. There is a certain amount of justified suspicion with which activists in the global justice movement rightfully regard the state and its apparatuses; this has certainly hindered my research in the past. Activists face real security risks and have endured surveillance, beatings, arrests and even death at the hands of the state, as well as the seizure or

destruction of their computer equipment¹³ As a result they tend to be wary of members of the “establishment,” in particular the media and to a lesser extent, the academy, regardless of any stated sympathies or affinities.

I have been able to overcome this obstacle to a limited extent by openly engaging in activist scholarship, as well as revealing my activist “credentials” to potential participants. I attempt to make my research process transparent, largely through my research blog (www.geeksandglobaljustice.com) and also by copylefting my work. I license all my academic writing under the Creative Commons Attribution Share-Alike licence, which allows anyone to copy, distribute and transmit my work, as well as to adapt it, as long as it is properly attributed. Where the work is transformed in any way, the end result must be distributed under the same license, thus ensuring accessibility in perpetuity (Creative Commons, n.d.). I have made my work directly available to the activist community, both by providing copies to research participants, and posting drafts and final versions online—on activist websites and on my blog. Finally, I actively solicited feedback from my participants via wikis, list serves and email in an effort to keep the research process as dialogic and participatory as possible. This approach adheres to the collaborative model of internet research proposed by Feenberg et. al (2004), which insists upon benefits to the research participants as much as the researcher. I regard my

¹³ April 2000, World Bank/IMF protest in Washington DC: Police raided the activists’ convergence centre (<http://dc2.indymedia.org/newswire/display/4019>)

July 2001, G8 protest in Genoa, Italy: One of the most brutal attacks on activists occurred when police stormed a school that served as a convergence centre and the on-location Independent Media Centre (<http://www.nadir.org/nadir/initiativ/agp/free/genova/pics4a.htm>). As a result of vicious police beatings there, three activists were left in a coma, and more than 60 were injured. An Italian activist was also killed by the Carabinieri during the street protest (Juris, 2005).

October 2004: The US government seized two UK servers used by Indymedia, shutting 20+ IMC sites worldwide for over a week. The US government never fully explained the incident. See the EFF, <http://www.eff.org/press/archives/2005/08/02>.

June 2007, G8 protest in Germany: In the weeks leading up to the summit, police raided various anti-G8 organizing hubs, including what was to be the protest’s convergence centre. (<https://www.indymedia.org.uk/en/2007/05/370131.html>).

scholarship as part of my activism, which necessitates that my work directly informs and contributes to the values and overall objectives of the global justice movement. There are potential benefits participants might derive from their collaboration in my research. The first is a formal acknowledgement of their contributions to their community, which in some cases are quite significant, and span years. Secondly, they will have a document about their community that can serve as an historical record, and as a basis for further research. Finally, the completed research is available under a copyleft licence, ensuring that anyone may freely access and use the work, and reproducing the open source method by which tech activists operate. In “giving back” to the people who made my research possible, I confirm my commitment to the social justice cause we share. There was an added benefit to this collaborative approach: it helped shift my identity from that of an “outsider”—a mainstream academic presumed to be out of touch with or uninterested in the subversive goals of the global justice movement—to that of “insider,” not merely an investigator or even a sympathizer but a participant in the movement.

In order to re-engage the various contacts I’ve made over the years, as well as to cultivate new ones, I used a multi-faceted approach. As mentioned, I set up a blog, which served as the online hub of my project and a calling card to potential participants. In addition to facilitating data collection, it helped validate my project, establishing a web presence and identifying my research objectives. The blog hosts my older academic work related to the global justice movement (e.g. publications, conference presentations, public lectures), and served as a repository for my ongoing research, including field notes and observations. I used the blog to post a call for participation from tech activists I did not know, as well as invite contributions from those already involved in my project. I also set up an account on Crabgrass, a social networking site for activists built on free software. Unlike my blog, which is open to and searchable in the world wide web,

Crabgrass is a (relatively) secure environment—not only in terms of software design, but also in terms of culture. Designed with the particular security needs of radical activists in mind, Crabgrass has finely grained privacy settings as well as a strict privacy policy based on democratic ethics. This allowed me to create a collaborative and secure environment for tech activists to participate in my project. Within Crabgrass I set up a wiki where I posted my dissertation-in-progress and solicited feedback from the tech activists, whom I invited to read my draft chapters, and make comments, changes or corrections to the text. The purpose of using the blog and Crabgrass was threefold: 1. To earn the trust of my co-collaborators by demonstrating the activist nature of my work. 2. To encourage their participation by trusting their expertise and involving them in the research process. 3. To practice the very ideals that inspire their movement (e.g. voluntarism, trust, egalitarianism, collaboration, co-operation, mutual aid). Using the open source method, tech activists could participate in my project and actively shape its outcome in a process of open knowledge production based on the “wiki way”—collaborative self-organization based on radical trust (Leuf & Cunningham, 2001).

In order to broaden my cast of participants, I targeted specific radical tech collectives by personally inviting members to participate in my study. This was done via email, or by posting to their wikis and list servs. Collectives include: aktivix.org, antifa.net, autistici.org, boum.org, cat.org.au, ecn.org, espora.org, enzyme.org.nz, freegeekvancouver.org, guardachuva.org, indymedia.org, interactivist.net, linefeed.org, moviments.net, mutualaid.org, nadir.org, nodo50.org, poivron.org, protest.net, resist.ca, riseup.net, sarava.org, sindominio.net, so36.net, squat.net, tachanka.org, taharar.org, taktic.org and tao.ca. I also contacted participants who had contributed to my work in the past. A number of these remembered me, and some had even followed my work over the years. While they were all quite supportive of my project, most were too busy to

participate. Their activism, and in some cases their school work, drained their free time. However, some helped by introducing me to other tech activists who were able to contribute.

Data Collection

Interviews: I conducted 22 in-depth interviews (1+ hours) via email, voice over IP and face-to-face with tech activists currently or formerly involved in the global justice movement or other social justice work. Some interviews were followed up with instant messaging chats or emails, in order to clarify points or seek more information. There were also several other tech activists whom I consulted via email or IM on a casual and occasional basis.

Academic literature: There is a robust and diverse literature on the different subjects that intersect my research, including the global justice movement, internet activism, FOSS, copyleft and open access. This is in addition to the literature that provides the theoretical foundation of my thesis, broadly situated in critical theory and social constructivism.

Virtual documentation: There are list serv, IRC and wiki archives for some activist websites that provided a rich primary source of information on the routine work of tech activists. For example, Indymedia's Tech Working Group wiki reveals what and how decisions are taken, updates on software development and implementation, reporting of bugs and other problems, and upcoming plans for the site. Additionally, tech activists frequently post their vision statements, "Points of unity," and policy documents online, the importance of which needs no further elaboration.

(Un)Conferences: I attended as many tech (un)conferences as time and finances permitted. This enabled me to meet new contacts and nurture existing ones. Tech (un)conferences were an invaluable source of “insider” information, complemented by the opportunity for participant observation, a rarity given the predominantly virtual nature of the tech activist community.

Ethics: Generalities and specifics

In the course of their research, scholars delve into the personal lives of other human beings. Along with detailed and intimate information, this brings an ethical obligation. Scholars owe it to their colleagues, to their research participants and to society in general to behave in an ethically responsible manner. While the current focus on research ethics evolved out of biomedical research, in the social sciences, issues of harm, consent, privacy and the confidentiality of data are the main concerns (Berg, 2004). This brings a focus on anonymity, which is a hallmark of social scientific research (Lofland & Lofland, 2006; Waldrop, 2004). But anonymity is not an element of the open source method used in this project, and in some ways, it is antithetical to the objectives of open source. Participants were largely unconcerned with remaining anonymous. With the exception of five, four of whom cited security concerns, interviews were given “on the record.” All participants answered questions candidly, in keeping with the spirit of collaboration inherent in the open source ethos and practice. Tech activists generally shared the research goal of this project: to create more knowledge and analysis of their work. Participants were, to a greater or lesser degree, technically proficient—they were mostly IT workers, tech consultants and hackers. Thus they were highly aware of the insecure nature of internet communication, despite the “illusion of privacy” it fosters, which perhaps accounted for their general lack of concern for anonymity (Christians &

Chen, 2004). Of those who asked for anonymity, four chose to be represented by their cyber-pseudonyms, and one requested complete anonymity, trusting me implicitly to safeguard their information. This is an example of the radical trust that characterizes wiki and other collaborative online communities. Because users have the right to know when their online content is being used in ways other than originally intended, I disclosed my lurking on IRC channels and informed all online communities whose digital repository of information I used.

Social Responsibility

Social responsibility is inherent in the theoretical and methodological elements that comprise my research design. Indeed, it is an obligation that is foundational to participatory action research, open source philosophy, and critical theory. A commitment to socially responsible research moves beyond immediate local concerns and encompasses the broader social, economic and political context. This holistic perspective carries with it a sense of responsibility for “improving social and economic conditions resulting from inequality and discrimination” (Padgett, 2004, 302). The post-modern critique of scientific logic and positivism that emerged in the 1980s was based on the notion of socially responsible research, thoroughly rejecting the value-free and neutral stance of the researcher. In service of this post-modern turn, PAR was “taken out, dusted off and extolled as the ideal way to wed research to the goals of individual and community empowerment” (303). While post-modern epistemology was celebrated for its political sensitivity to questions of representation as well as to relations of power between researcher and researched (Morley, 1997), it offered little traction for taking an ethical stance. However, as Brydon-Miller (2001) points out, critically informed

approaches to research like PAR disavow the notion that knowledge generation can be apolitical.

In PAR, the role of the researcher in pursuing social justice and human liberation through a process of critical praxis is explicit, as is the political nature of the work, demonstrating the important distinction between PAR and more traditional positivist research (80). Padgett (2004) acknowledges the activist nature of socially responsible research. She identifies a “continuum of commitment” that confronts the researcher, and distinguishes between writing about social responsibility, incorporating it into research and enacting it through engaging in social advocacy and agitation (304). Problems arise in the enactment mode, according to Padgett, which brings the risk of bias, loss of credibility and the potential compromise of methodological rigour. “The fusion of social activism and research is particularly risky for qualitative researchers. It raises questions about the limits of the researcher’s capacities (and roles) and whose agenda is being served...” (305). This casts doubt upon the role of PAR in affecting social change, suggesting that as a research method, its potential is necessarily limited.

This is an interesting and not wholly surprising criticism that raises the spectre of objectivity, not long dead after all. On the one hand, it might seem banal that a researcher immersing herself deeply in a project might compromise her perspective, and therefore her ability to maintain Padgett’s (2004) coveted “methodological rigour” (304). On the other hand, the insistence on objectivity does not admit the humanity of the researcher; how then could the results have any connection or relevance for the communities in question? The desire to prevent the collision of humanity and (social) scientific research, to isolate passion from inquiry, latent in the myth of objectivity, serves to isolate scholarship as the domain of experts, and helps limit its circulation to

the rarified sphere of academe. I remain unconvinced that methods like PAR and others influenced by the collaborative model are inferior or suspect.

In this chapter, I have discussed the various theoretical and methodological elements that informed the collection and analysis of my data. What emerges is a conceptual framework that informs both the research process and outcome, as well as potential future action. This framework establishes my study as a political endeavour, and explicitly rejects the notion of objectivity as it pertains to knowledge production. I end with a discussion of ethics, and consider a fundamental challenge to the activist research that inspires me. I do not think it wise to treat this criticism lightly; however, coming from a broad anti-establishment perspective, I take the solemn counsel of the academy and its “authorized knowers” with a few grains of salt.

Chapter 3: The informatization of labour

Information wants to be free but is everywhere in chains

(Wark, 2004, 39)

Post-industrial theory, in its all its slippery and shiny manifestations, is seductive; the allure of Information Society, with its promises of the end of ideology and the end of work, is strong. As detailed in Chapter 1, however, information is not as novel to social and economic development as the *mélange* of post-industrial theorists would have us believe. Rather, information has oiled the wheel of human progress for millennia (Schiller, 1997) and is, according to Benkler (2006) central to human freedom. The supposed transition from Fordist for post-Fordist regimes is partial at best and does not designate an epochal change, but a continuance of capitalist strategies of worker control. This is a process of the “mechanization of the superstructure” whereby the economic instrumentality of the factory is generalized to the rest of society—a dystopic realization of Taylor's dream (Mandel, 1975).

For all these caveats and qualifications, we cannot shake the idea that there is something new under the sun in contemporary western society, something qualitatively different from our recent past. And that something has to do with information. Information society theorists assess information in “non-social” terms, “having jettisoned meaning from their concept of information in order to produce quantitative measures of its growth...” (Webster, 2006, 27). Bell (1979) established the tone with his limited definition of information as “data processing in the broadest sense...” (168),

inaugurating a trend in post-industrial theory “to endow 'information' with a scientific accent to differentiate it sharply from [the] realm of meaning and consciousness” (Schiller, 1997, 107). Such a quantitative approach is unable, it seems, to deal with questions of social transformation. It is not the quantity of information (look how much of it we have!) but rather its quality (what is this information?) that offers an opening for discussion and critique. For the purposes of this discussion, then, I define information as the thoughts and ideas that aggregate as culture, communication and knowledge and are foundational for human health, welfare and freedom in contemporary society.

This chapter examines the privatization of information, following its transformation from a cultural resource and public good into the commodity form, the product of immaterial labour. However, as we shall see, the privatization of information is neither a smooth nor complete process: information is never fully colonized by capital but continually reveals its ambivalent nature. The unique properties of information that prevent its full conversion into property offer avenues for resistance, as I discuss later on. As information is privatized, so labour is informed, and I trace the technologization of the labour process as worker skill/knowledge is increasingly appropriated in objectified labour. The control required for the informatization of labour, although coercive, relies on co-operation. The co-operation of labour-power—a phenomenon that appeared as a pre-condition and product of industrial capitalism—is the basis also for immaterial labour, a new form of work generated by the informational economy. Co-operation under capitalist relations of production is also ambivalent—while it releases the general intellect or socialized collective intelligence of the worker, this powerful productive force stands against living labour on the side of capital. The control of the labour process is codified in the scientific management of work, which is generalized to the lifeworld in the form of the social factory. These ideas, which derive in part from

autonomous marxism, provide the traction necessary for a critical analysis of open source as a mode of production in the “age of information.” In this analysis I use labour process theory as an entry point for conceptualizing moments of intervention or affordances for social transformation.

What is an author? The privatization of information

Information has been essential to human survival and development throughout the course of history. Civilizational advances are doubtless connected to the accumulation of information and its gradual fermentation into knowledge. What is decisively new, what is qualitatively different about information in modernity is its transformation into the commodity form. Foucault (1984) locates the historical moment that marks the beginning of the privatization of information. “The coming into being of the notion of “author” constitutes the privileged moment of individualization in the history of ideas, knowledge, literature, philosophy and the sciences” (101). Foucault locates the “author function” within a discourse, which is none other than an “object of appropriation” (108). Authorship as a form of ownership is closely linked to the birth of copyright. It originated in the desire for social control after the introduction of the printing press in Britain, and the resulting increase in literacy from the 15th century onward. In order to squelch heretic and seditious writings, authors were required by law to sign their names to their works. “Texts, books, and discourses really began to have authors,” comments Foucault, “to the extent that authors became subject to punishment, that is, to the extent that discourses could be transgressive” (ibid). Beginning as a form of censorship “in order that the King knew whom to flog or hang...,” the proprietary function of authorship emerged as a central tenet in 1709's *Statute of Anne*, widely referred to as the first copyright act (Scott, 2001). Acknowledging the financial harm

experienced by authors when their works were printed without their consent, the statute codified rules around the ownership of discourse, firmly establishing the property right of authors. This initiated a fundamental shift in thinking about information that follows the trajectory of nascent capitalism, from the need to censor ideas to the desire to own them. Discourse, as Foucault observes, was initially an act, not a commodity: “Historically it was a gesture fraught with risks before becoming goods caught up in a circuit of ownership” (108).

Tightly bound to the proprietary function of authorship is its authentication function, which serves the creation of a hierarchy of knowledge based on exclusion of illegitimate discourse. Prior to the birth of the author, a literary text's authentic and authoritative nature was not dependent upon the author. But from the 17th century onward, literary discourses were only accepted when bearing the “author function.” In academic knowledge production authorship came to denote credibility and reliability, forging a link between the information provided in a text and the information purveyor, between discourse and author, helping to establish monopolies of knowledge (Innis, 1951). Peer review, a method adapted from science, supports this mode of knowledge production and has become the standard process for verifying and admitting new knowledge into the academic canon.

New information technologies challenge the author function, however, particularly as it serves to authenticate discourse, thereby creating monopolies of knowledge and knowledge hierarchies. Wiki software serves as an exemplar: specifically designed to facilitate collaborative knowledge production in a virtual space, wiki demolishes traditional notions of authorship. Wikipedia, the online user-generated encyclopedia, is perhaps the most well-known example of collaborative authorship,

whereby the singularity of authorship is transgressed and the exclusivity of knowledge is subverted. Wikipedia remains a source of vitriol and confusion within academe, in large part due to its contravention of the author function: despite multiple authors, entries remain “authorless”—unclaimed and thus invalid, inauthentic, inadmissible. The original wiki engine, designed by computer programmer Ward Cunningham, is described as a composition system “in which collaboration creates and develops new ideas” (*What is wiki?*, 2002). Users are invited to engage in the ongoing creation of a wiki, editing pages or adding new ones in a process that relies upon the self-moderation and maintenance of the wiki community. In allowing the collaborative management of content, as well as its modification, wikis facilitate the democratization of knowledge production. The process of open editing “encourages democratic use of the Web and promotes content composition by nontechnical users” (ibid). Wiki software thus obliterates the modern concept of author as guarantor, and text as property. It re-calibrates our ideas of what can constitute the truth or knowledge. Rather than playing the “role of regulator”, a role “quite characteristic of our era of industrial and bourgeois society, of individualism and private property,” (Foucault, 119) the author function ceases to be about property and rather becomes a property of collaboration, of open knowledge production. Instead of answering concerns about authenticity or verifiability, the collective author function stimulates new questions about discourse, such as “Where has it been used, how can it circulate and who can appropriate it...?” (120). All of these beg the ultimate question—the most radical, and indicative of a paradigmatic change in knowledge production in the aftermath of the internet: “what difference does it make who is speaking?” (ibid).

New properties of information: Information as property

Where Foucault (1984) finds the origins of the privatization of information in the criminalization of the author, another line of inquiry can locate its advance in the resolute march of capitalism through modernity. Ultimately what this inquiry reveals is the failure of the information enclosure movement, the drive to contain information within strict bounds of capitalism. The development of intellectual property regimes follows the birth of the author and the evolution of the author function, and represents the legal codification of information. Modern copyright regulation evolved to keep pace with technological change, generally aiming to reward creators while ensuring public access to their works within a framework of property rights. But digitization, ushered in by the micro-electronic revolution that began in the mid-20th century, troubled the ever-expanding notion of information as property. Prior to the translation of human readable information into binary code of ones and zeros, information was contained in material form, easily recognizable as property, and thus something to which a monetary value might readily be assigned. Digitization converted information back into its immaterial form, and with the advent of the internet, this enabled the transmission of information at a speed and reach unprecedented in the history of human communication.

The digitization of information has further allowed near infinite reproducibility at almost no marginal cost. This historically specific transformation of information combines with inherent properties of information that contradict the rhetoric of Information Society, informational capitalism and the like. Because information is immaterial, it is non-rival; in other words, information is not depleted through its consumption. Unlike material goods, when intellectual goods are “consumed”—read, heard or otherwise processed by the senses, they remain available for use by others. The

peculiar character of an idea, wrote Thomas Jefferson “is that no one possesses the less because every other possesses the whole of it. He who receives an idea from me, receives instruction himself without lessening mine; as he who lites his taper at mine, receives light without darkening me” (in Lessig, 2001, 94). Similarly, information is non-excludable, which means it is difficult to prevent people who have not paid for it from enjoying its benefit. Prior to technological protection measures (TPMs), there was no effective way to prevent the sharing and exchange of digital information, and software “crackers”¹⁴ continue to make sport of breaking digital locks. The non-rival and non-excludable nature of information conflicts with the constraints of scarcity and exclusivity required by capitalism. In other words, information wants to be free.

It is on this basis that information can be classified as a public good after the fashion described by Jefferson—“an item for which one person's use of or benefit from...does not affect its use by or benefit to another person” (Baker, 2002, 8). Public parks are a public good; so is a lighthouse. A person can watch the news, see by the light of a streetlamp or download a music file without limiting another's use. These special and complimentary properties of information—its sharability and its accessibility—underlie the hacker ethic and inspire the free software movement against proprietary software (information). The hacker ethic is attributed to the first generation of hackers working on the internet's forebear, ARPANET. The original hackers eschewed locks of any kind—digital or physical—and shared computer source code in the collaborative spirit of advancing collective knowledge. The notion that information could be “owned,” much less bought or sold, was utterly foreign (Levy, 1984). On this account free software

¹⁴ A software cracker is someone who breaks computer security without authorization, modifying software to remove protection methods including copy protection, trial/demo version, serial number, hardware key, date checks and adware (Wikipedia, n.d., *Software cracking*).

can be considered a response and a challenge to the privatization of information (Arnison, 2002) .

The inherent properties of information—its non-rivalry (shareability) and non-excludability (accessibility)—coupled with the infinite reproducibility brought by digitization—appear to make information incompatible with the commodity form, to be exchanged like any other good in a market economy. Such a state of affairs is at odds with the need for capitalism to turn everything under its horizon to profit. Schiller (1997), borrowing from marxist political economy, defines a commodity as “a resource that is produced for the market by waged labour” (110). For more than 150 years, innovation in communication technology has “tended to concentrate and commercialize the production and exchange of information” (Benkler, 2006, 29). This is in part due to the tendency under capitalism towards reification in the creation of exchange value; that is, capitalist social relations subsume non-material aspects of human life into objects recognizable only in market terms. Although information is immaterial, it yet cannot exist apart from its material moorings, as Wark (2004) observes; it is contained within a book, a newspaper, a CD—all tangible “things,” and undeniably property. “Information, once it becomes a form of property, develops beyond a mere support for capital—it becomes the basis of a form of accumulation in its own right” (18). In this way, information becomes aggregable and quantifiable.

As Vaidhyanathan (2004) points out, “an appeal to ‘property’” removes information from the realm of public good and places it firmly within the familiar terrain of commercialism, where copyright regimes reify information and obscure any difference between material and intellectual goods (xiii). Wark (2004) explains the result:

The privatization of information becomes the dominant, rather than a subsidiary, aspect of commodified life. As private property advances from

land to capital to information, property itself becomes more abstract. As capital frees land from its spatial fixity, information as property frees capital from its fixity in a particular object (15).

The result of the abstraction of property in information is “intellectual property”—a dangerous euphemism according to Doctorow (2008), one that denies all value in information except for its exchange value. Indeed, Stallman (2002) wholly rejects the term intellectual property (IP) because it carries a hidden assumption that information “is based on an analogy with physical objects, and our ideas of them as property” (193). This assumption obscures the critical distinction between material and intellectual goods, found in the latter's costless reproducibility, non-excludability and perpetual sharability. The notion of intellectual property instead focusses on commodifying information while obfuscating the real issue, which is the restrictions that IP impose on public use of information, and what the outcome of those restrictions might be.

The popularization of the internet in the mid-1990s and the porousness of digital information contributed to a rising tide of information access. In the face of this, efforts to privatize information intensified. One such effort is the World Intellectual Property Organization (WIPO) “Internet treaties,” drawn up in 1996 to address copyright concerns arising in cyberspace. The WIPO treaties inspired the US *Digital Millennium Copyright Act* (DMCA), which expanded traditional copyright protections through digital rights management (DRM) technology (Elkin-Koren, 2000). Canada has proposed similar legislation prioritizing rights holders through technical rather than legal regulation, although it has yet to be passed¹⁵. Though these efforts continue undeterred, they are nonetheless opposed; the recalcitrance of information to the

¹⁵ The federal government has twice attempted modernization of the *Copyright Act* since 2005. Both bills, C-60 and C-61, died on the order paper after elections were called. The current Conservative government pledged as part of its election campaign to re-introduce the content Bill C-61, which met widespread criticism from creators, consumer advocates, privacy watchdogs, education groups and citizens (Nowak, 2008).

constraints imposed by privatization reveals itself in the social relations that embed information in its digitized form. For example, it is apparent in the defiance of programmers: in their development and use of peer-to-peer and circumvention software;¹⁶ in their participation in the free software and copyleft movements; and in their digital lock picking and software cracking. It is manifest in the resistance of users, predominantly through file sharing and other content exchange, and in the rebellion of creators who copyleft their work and/or give it away online. Finally, it is evident in the grassroots opposition of activists—lawyers, academics, politicians and citizens who intervene in the legislative process, educate and agitate for policy change, and organize via the same computer networks they seek to keep open to the free flow of information.

Theory of technological commodification

Thompson's (2006) theory of technological commodification is useful for understanding the resistance of information to the process of privatization. Thompson defines commodification as the absorption of parts of the lifeworld into products of the system. He distinguishes between *structural commodification*, which involves changes in the legal rules, customs or morals that surround systems of exchange, and *technological commodification*, which involves changes in the good itself. He further identifies three modalities by which commodification may occur that are pertinent to this discussion: alienation (the separation of one good from another); excludability (the prevention of others from using the good); and rivalry (the extent to which alternate uses of goods are incompatible). Marx's analysis of wage labour reveals the crux of structural

¹⁶ The high profile case of DeCSS serves as one example. DeCSS is a software program that decrypts the (now-obsolete) Content Scrambling System (CSS) encryption on digital video disks (DVDs). American courts ruled in 2000 that possession and distribution of DeCSS violated the DMCA's anti-circumvention and anti-trafficking provisions. This made the posting or linking to DeCSS on the web illegal, though many websites were not deterred in a phenomenon Eschenfeler and Desai (2004) call "software as protest."

commodification: the offering up of a good or service for monetary exchange that previously had circulated in society by other (non-monetized) means. Thus the social relations, the laws, customs or norms surrounding a good or service are altered, resulting in “practices of exchange that had hitherto been regarded as suspect or had not existed at all” (117). Structural commodification occurs through the legitimization of alienation, exclusion and rivalry as forms of social practice. Rather than as social relations, technical commodification manifests at the level of design: alienation, exclusion and rivalry are built directly into goods. In the case of wage labour, where structural commodification of human activity portends an imbalance of political and economic power in the relations of production, technical commodification further rationalizes labour power through constant technological innovation.

We find the structural commodification of information in the intellectual property regimes that have arisen to contain information within a market framework, for example, or in the propaganda campaigns of corporations to nurture a capitalist morality opposed to sharing, reframed as “piracy.” The technological commodification of information, according to Thompson (2006), is built directly into it. He gives the example of how sound recording transformed live musical performances into packaged products available for sale. In the context of this dissertation, the transformation of information is its digitization; this is the process of the dematerialization of information, its metamorphosis from tangible to intangible form. The structural commodification of information therefore relies on laws that increasingly favour “rights holders” (typically corporate entities rather than authors/creators), engendering unequal social relations (e.g. information “haves” vs. information “have-nots”). This process is abetted by the technological commodification of digitized information through technological protection

measures (TPMs), which promise (but have yet to deliver) iron-clad management of content distributed on the internet.

Alienation

Upon closer examination of Thompson's (2006) modalities of commodification, cracks begin to appear in the veneer of the double commodification of information. Thompson uses alienation in the political economic sense, that is, labour power as an alienable right. Following Marx, he also employs it in the psychological sense, as in the alienation of species-being through the sale of labour power. Technology alters both the social and material character of a good in the commodification process. For example, digitization facilitates the alienation of information from its material container (e.g. paper, books, records, tapes), its re-materialization (e.g. CD, DVD) and its dematerialization into bits and bytes in cyberspace. Information is further alienated as the associated social relations become privatized. Those who would consume information as an act of their species-being, or of being in the lifeworld, become consumers in the economic sense, confronting information on the internet as discrete, alien items for purchase, secured by passwords, subscription fees and pay per use schemes. Yet once thought, once communicated or otherwise released, ideas are impossible to fully contain; thus the alienation of information through technological commodification can never be total. While technology is instrumental in redefining information on largely economic terms, at the same time it provides the means for resistance to the commodity form (e.g. FOSS) through social practices (e.g. file sharing, computer conferencing) thus promoting the reintegration of information into the lifeworld. Such reintegration is possible due to translation of information into binary code, which flattens social hierarchies and travels along a decentralized network

enabling users to access, create and exchange information on the internet on more or less non-commercial terms.

McLuhan's (1964) concept of communication technologies as extensions of human senses illustrates the possibility of the alienation of information (in the same way labour power is alienated through its sale), as well as its repatriation. "After three thousand years of specialist explosion and of increasing specialism and alienation in the technological extensions of our bodies, our world has become compressional by dramatic reversal" (4). Here McLuhan is referring to his famous, much abused metaphor of the global village. According to Willmott (1996), the global village offers not a new historical space but a new way of being. It is "an ideal or utopian process, not product, of the human condition" (165). In this utopian process or practice, the inter-connectedness of virtual networks weaves the electronic fabric of community, where our "fragmented civilization of centre-margin structure is suddenly experiencing an instantaneous reassembling of all its mechanized bits into an organic whole (McLuhan, 93).

McLuhan could not have imagined the internet, but his depiction of the global village seems almost prescient, particularly if one considers the internet's transmission protocol (TCP/IP), where information is sent over a flat network in packets and re-assembled as a message at the final destination. McLuhan's central contribution to communication theory is his insight that technologies have inherent meanings, "messages" that are entirely distinct from the content they might carry, that must be studied in order to understand the sociotechnical dialectic. On this account, the "message" of automation is "integral and decentralist," a description that resonates when considering the internet as a series of routers, cables and wires that transport digital information. If the "message" of any medium or technology is the change of scale or pace

or pattern that it introduces into human affairs,” then the message of the internet could further be read as the acceleration of time, the obliteration of space, the globalization of information, the amplification of communication and, potentially, the destabilization of power relations (24). Following McLuhan's assertion that the “content' of any medium is always another medium,” the content of the internet is information (23). The computer converts information into binary code for delivery over the network; the “message” of binary code can be read as heterarchical and recombinant. In this way, “the new electronic interdependence recreates the world in the image of a global village” (1962, 31). In the embrace of this metaphor, we can envision information, once alienated, returning to the fold of the lifeworld.

Exclusion

As information resists alienation in the process of technological commodification, it also evades exclusion. As briefly discussed, excludability is foundational to the privatization process and essential for the conversion of goods and services into commodities. The classic example of structural commodification through exclusion is the British land enclosure movement of the 15th century. Legal innovations in property rights supported the emerging bourgeois class in their bid to fence in land formerly held in common under feudalism. The *Digital Millennium Copyright Act* (DMCA) is a contemporary example of adaptations in the legal system to support the information enclosure movement in late capitalism. “It is intended to and does to some extent, shape the technological development toward treating information and culture as finished goods, rather than as the outputs of social and communications processes that blur the production-consumption distinction” (Benkler, 2007, 417). Technical commodification by exclusion occurs through direct alteration of the commodity itself, in this case the

digitization of information. It can also result from changing conditions or environment; fencing, for example, is a classic technology of commodification through “the power to exclude” (122). Digital fences like technological locks and other DRM technologies seek to prevent copyright infringement and otherwise enforce restrictions on the use of digital content (information) and devices. This has led to a near-equivalence between laws and technologies of exclusion, which Lessig (2006) sums up in his dictum: code is law. Computer source code (software) regulates cyberspace the way the legal code regulates society, working invisibly and ideologically to enable and disable behaviours and freedoms online. The problem, as has been widely noted, is that the technology oversteps the bounds of copyright law, interfering with lawful access to and use of digital content. This is exacerbated by the fact that technologies of exclusion such as DRM lack the human capacity for judgement and interpretation that embed the social relations surrounding legal codes.

The digital fencing or enclosure of information has had uneven results, despite concerted campaigns by corporate rights holders and manufacturers. Doctorow (2005) points to the “failure of DRM in the developed world, where it has been in wide deployment for a decade with no benefit to artists and with substantial cost to the public and to due process, free speech and other civil society fundamentals.” DRM has proven ineffective at combating the sharing of copyrighted content online, referred to as “internet piracy” in capitalist discourse. “Once upon a time, it may have been enough to create a technological 'speed bump' that would 'keep honest people honest.' With the advent of new technologies, including peer-to-peer (P2P), these approaches have become obsolete...” (von Lohmann, 2003). There are a variety of ways to bypass DRM, compromise DRM systems or break the associated TPMs, including keys, serial numbers,

watermarks and encryption, such that the technology for the complete enclosure of digital information is perpetually playing catch-up.

This “technological treadmill,” as Thompson (2006) calls it, reverses the commodification process: “As the excludability of information-based goods declines, so does their participation in the commodity form” (123). While the ease with which digital information may be copied and shared encourages some rights-holders to turn to intellectual property regimes to recover “lost excludability,” it also pushes a strictly technological issue back into the realm of the social, where it is hotly contested, as the numerous court cases around digital copyright illustrate (cf. www.eff.org). This underscores the social construction of technology: in the case of technologies of exclusion, the contest over their meaning moves them into the terrain of the social (from whence they emerged as a design idea), where they are challenged by social actors, who attempt to reformulate their meaning (through the legal system). It remains to be seen whether the forces of structural commodification will support the technical definition of TPMs and other digital rights management schemes. Nonetheless this shows how the technical commodification of information via exclusion can be subverted, both by the inherent properties of information (e.g. non-excludability) and by the dialectical nature of the struggle over access to information, shown once again as technical and social.

Rivalry

“Like all forms of property, intellectual property enforces a relation of scarcity. It assigns a right to a property to an owner at the expense of non-owners, to a class of possessors at the expense of the dispossessed,” (Wark, 2004, 35). Thus Wark (2004) sums up the structural commodification of information through rivalry. Information is non-depletable, however. If I learn Einstein's theory of relativity, it still remains for

others to learn; it is neither degraded nor made less available. The contrary is arguably true: the dissemination of information makes that information more valuable. Information is very difficult to valorize through scarcity and in this way it eludes rivalrous forms of technological commodification. Beginning with email in the mid-1960s and continuing with bulletin board systems (BBS) at the end of the 1970s up through the advent of P2P file sharing in the late 1990s, users have freely exchanged digital information, nurturing a commons-based culture online. This ethos of sharing stands in stark contrast to the commercial model that corporate interests have attempted to impose since the privatization of the internet backbone, originally funded by the US government and operated by the National Science Foundation, in 1995 (Shah & Kesan, 2007). It exists in part due to the egalitarian architecture of the internet, notably TCP/IP, the set of communication protocols that enables non-discriminatory message delivery over a neutral network. This non-hierarchical form of communication at the technical level bled into the social, creating a foundation for the community model of the internet, one based in non-commodified communication (Feenberg & Bakardjieva, 2004). As Thompson (2006) acknowledges, the lowering of rivalry is a means of decommodification that interferes with the privatization of digital information online. While the internet has been largely commoditized, from its physical layer (the backbone) to its access points (Internet Service Providers) to much of the application layer (world wide web), the cultural layer of internet has yet to be fully monopolized by capitalist interests. It is at the cultural level where resistance to the commercial internet is gathering, particularly in the uptake of free and open source software, which is mounting a serious challenge to the proprietary software that has colonized the application layer.

This resistance is further evident in a range of communicational behaviours, including music and movie file sharing, content sharing,¹⁷ open publishing, blogging, and wide participation in a variety of communal online projects like forums, wikis, list serves, interactive games, and fan and hobby sites, all of which rely on the free circulation of information. Such behaviours are voluntaristic and bear the mark of the early designers of the internet, who instilled “values of collegiality, decentralization of authority and open exchange of information” into the very architecture of the network (Abbate, 1999, 5). In the unexpected development of the internet as a communication medium and the emergence of a commons-based culture, information existed as a shared resource. Not only was the notion of information as rivalrous entirely foreign, rivalry was contradictory to early users' instinct to communicate in ways not mediated by market logic. This is clear in the first communicative exchanges, which consisted of science-fiction fan writing, recipes, and other personal correspondence. Lessig (2004) attributes the viability of “free culture” (as opposed to commercial culture) to the internet. Indeed, the internet has “unleashed an extraordinary possibility for many to participate in the process of building and cultivating” contemporary culture (9). He considers the internet part of a long historical tradition of unregulated, non-commercial cultural creation, founded upon a key premise: the guaranteed right of creators to draw from the cultural repertoire of the past—that is, to freely share. The ethos of sharing and communicational culture that took root early on in the design stage of the internet would enable this heritage of cultural exchange to thrive online, preventing business interests from fully colonizing cyberspace. Thus the technological commodification of digital information through rivalry remains incomplete.

¹⁷ The free sharing of content online is a growing phenomenon, and one of the characteristics of Web 2.0. Users upload home-made videos (YouTube), photographs (Flickr) and bookmarks (Delicious), as well as a wide array of personal content posted on social networking websites like MySpace and Facebook.

The discussion so far has focused on the public good aspects of information, its technical transformation through digitization, and its resistance to commodification. The following sections will reconsider post-industrial and information society theory from a marxist perspective, examining the impact of information on the labour process, including the radical potential of co-operative labour, the social factory thesis and the alternative presented by the hacker ethic.

The informatization of labour

Theories of the Information Society rest on the premise of a paradigm shift in the nature of production wrought by the move from industrialism to post-industrialism. While Hardt and Negri (2000) do not consider information as a causal factor in broad societal change they theorize radical social transformation in the context of the “informatization” of production. Like Castells (2000a), Hardt and Negri identify a tertiary-based economy fuelled by the continual circulation of information and accompanied by new relations of production: “The passage toward an informational economy necessarily involves a change in the quality and nature of labour” (289). They propose the term “immaterial labour” to define the new work which, though productive, results in no material good. They further describe immaterial labour as intellectual, communicative, affective labour, which produces incorporeal products: services, cultural products, knowledge, communication. This builds upon Negri's (1989) earlier discussion of “science, communication and the communication of knowledge” as the basis for high productivity and the only appropriate “raw material” for the intellectual labour force (116). Where Castells' suggests the reconfiguration of society along the network model, Hardt and Negri posit the adaptation of labour practices to the protocols of information and communication technologies (ICTs). “Interactive and cybernetic machines become a

new prosthesis integrated into our bodies and minds and a lens through which to redefine our bodies and minds themselves” (291). McLuhan (1964), as mentioned, had this idea in his notion of technologies as “amputations and extensions” of human senses and bodies, reshaping them in new technical form. Wiener's (1950) view is more cautionary, warning about the potential of cybernetic machines to become extensions of social control mechanisms.

While perhaps overstated, these portrayals of the integration of human and machine in novel ways point to new social relations surrounding an increasingly technologized labour process. These new social relations mark a discontinuity in the labour process—if not a paradigm shift, then a different direction. The concept of immaterial labour as a result of this process is by no means universally accepted. The major objection, proffered by Dyer-Witheford (2001) and others, is grounded in the continuing materiality of labour, both in its process and products. Industrialism persists in the West and is arguably growing in the global South and East, in “the manufacturing plants of the maquiladoras, export-processing zones, and new industrial areas”—ever cheaper sites of production constantly sought by capitalism (76). Without decentering capital as the dominant mode of organizing and exploiting workers to increase surplus value, Negri (1989) posits immaterial labour as a new site of exploitation. At the same time, the intellectual co-operation (communication) that is both a precondition and a product of the informatization of production emerges as the foundation of the new social order. For Hardt and Negri (2000), the radical potential of immaterial labour derives from its basis in co-operation, which they describe as the prerequisite for “a kind of spontaneous and elementary communism” (294). The emphasis on co-operation as the basis of the new society draws out Marx's (1976) analysis of co-operation under capitalism, which warrants further consideration.

For Marx (1976), co-operation is the starting point of capitalist production as well as the result of “despotic” control in the labour process.

As a general rule, labourers cannot co-operate without being brought together: their assembly in one place is a necessary condition for their co-operation. Hence wage-labourers cannot co-operate unless they are employed simultaneously by the same capital, the same capitalist, and unless therefore their labour-powers are bought simultaneously by him (447).

Despite providing the foundation for the extraction of surplus value, however, co-operation appears an ambivalent social practice. While coercive co-operation increases the productive power of the individual worker, at the same time it creates a new productive force: the collective power of the masses, or as Marx terms it, the productive power of social labour. “When the labourer co-operates systematically with others, he strips off the fetters of his individuality, and develops the capabilities of his species” (447). As noted in Chapter 2, Marx uses the term species-being to stand in for human nature; in other words, species-being represents that which is human, humanity. “Man is a species being...in that as a present and living species he considers himself to be a universal and consequently free being” (Marx, 1967, 293). This is only realized through emancipated labour—genuine productive work that enables the realization of one's humanity or “the development of the rich individuality which is as all-sided in its production as in its consumption, and whose labour also therefore appears no longer as labour, but as the full development of activity itself...” (Marx, 1973, 325). It must be further cautioned that *productive work* as I'm invoking it should not be understood in the capitalist sense of production, or the creation of an artefact. Emancipated labour can be productive of any aspect of humanity (e.g. culture, care, affectivity), including but not limited to those material things that contribute to the production and reproduction of life. Emancipated labour, the “product” of which could be thought or art or material

goods, does not confront the worker as an alien object; it is a process rather than a means to an end that is creative, meaningful and free. However, the potential of the co-operative power of collective labour is thwarted by its appearance “as a power which capital possesses by its nature—a productive power inherent in capital” (451).

That labour becomes communal in the historically specific mode of capitalist production, whose only aim is the greatest surplus-value extraction through the greatest exploitation of labour-power, is further evidence of the ambivalence of co-operation in the labour process. “The co-operation of wage-labourers is entirely brought about by the capital that employs them,” and it is just the sale of labour power that alienates workers from the labour process (449). Moreover, the requisite exploitation of labour-power under capitalism produces resistance among the workers at the same time as it generates the need for capital to subdue this resistance. The capitalist control that brings about co-operative labour is thereby conditioned by the “unavoidable antagonism” between exploiting capital and exploited worker.

Another tension is found in the general intellect, which Marx (1973) describes as a socialized, collective intelligence, enhanced by the infusion of science into the technical base of labour. On the one hand, the communal aspect of labour under capitalism releases the general intellect; on the other hand, the general intellect fuels the capitalist mode of production as alienated species-being. In *Fragments on Machines*, Marx writes:

The development of fixed capital indicates to what degree general social knowledge has become a direct force of production, and to what degree, hence, the conditions of the process of social life itself have come under the control of the general intellect and been transformed in accordance with it. To what degree the powers of social production have been produced, not only in the form of knowledge, but also as immediate organs of social practice, of the real life process (706).

“General social knowledge” as a “direct force of production” seems to correspond with Information Society theories that postulate a qualitative change in the mode of production in a post-industrial era. Marx foresees a dematerialization of the resources of production based on continuing advances in scientific and technical knowledge. The general intellect is none other than co-operative labour as it has been socialized under capitalist relations of production: it is immaterial labour, affective and intellectual. Yet Marx prefaces his prediction with an acknowledgement of the material base of production (something many post-industrial theorists neglect), and of the necessary dialectical relation between the immaterial (socialized knowledge, general intellect) and the material, the products of industry as a result of human intervention into nature: “They are organs of the human brain, created by the human hand; the power of knowledge, objectified” (706).

Despite Marx's (1973) acknowledgement of the corporeal aspect of the general intellect, Virno (2001) critiques the concept as limited by its focus on scientific knowledge objectified in machinery. In a conscious incorporation of living labour, he renames the general intellect “mass intellectuality” in which “all the more generic attitudes of the mind gain primary status as productive resources; these are the faculty of language, the disposition to learn, memory, the power of abstraction and relation and the tendency towards self-reflexivity.” This prevents immaterial labour from remaining “entirely on the plane of thought” (Hardt & Negri, 2000, 346) or from dwelling exclusively in the domain of the new “labour aristocracy,” a vanguard of highly educated “knowledge workers.” Marx positions the general intellect under a capitalist regime alongside machinery and against workers: “the accumulation of knowledge and of skill, of the general productive forces of the social brain, is thus absorbed into capital, as opposed to labour, and hence appears as an attribute of capital” (694). Virno nonetheless

finds liberatory potential in the co-operation on which the general intellect depends: “the labouring action of the general intellect presupposes the common participation to the ‘life of the mind,’ the preliminary sharing of generic communicative and cognitive skills.” Hardt and Negri advance this line of thought, stating that the socialization of living labour that occurs through its exploitation creates the conditions for resistance by activating “the critical elements that develop the potential of insubordination and revolt through the entire set of labouring practices” (29).

Taylorism and the social factory

The idea that immaterial labour, with its affective, co-operative and intellectual characteristics, is a potential site of freedom from capitalist control rather than its locus, is attractive. Certainly, this seems to be true of self-organized voluntaristic labour that typifies free and open source software (FOSS) development. It also fits easily within the broad rubric of post-industrial theory, which if nothing else tracks the evolution of knowledge-based work. Yet the concept of immaterial labour draws from a rich body of theory in the autonomous marxist tradition, which develops “a subversive counter-interpretation of the information revolution” (Dyer-Witheford, 1999, 64). On this view, the internet, as a major terrain of immaterial labour, is not necessarily or exclusively the “material and ideological heart of informed capital” (Terranova, 2000, 39). Both the internet and immaterial labour are ambivalent, both are spheres of contestation rather than simple accomplices to the global project of capital. In this way immaterial labour gains conceptual footing for a critical theory of technology; however, it is better understood within the context of the social factory in which it arguably circulates.

Immaterial labour and the increasing centrality of information to capitalism give rise to the social factory. Frederick W. Taylor conceptualized scientific management as a

philosophy suited to the rational, scientific and efficient management of society (Mandel, 1975). In this technocratic dream, society, like the factory, is maintained by a cadre of experts meticulously applying Taylorist principles to the lifeworld. The social factory pushes this idea to its logical conclusion, building upon Marx's (1976) analysis of formal and real subsumption. In formal subsumption, which coincides with the early stages of industrialization, nascent capitalism imposes wage relations on pre-existing craft labour. That is to say, capital infiltrates an existing labour process, monopolizing the means of production and compelling the worker to submit to wage labour while using existing markets to general capital. Real subsumption comprises the complex reconfiguration of labour and machines resulting in the complete transformation of the labour process and social relations, both of which become inculcated with the nature and requirements of capitalism in a process that looks a lot like Taylorism.

Science is systematically applied to industry; technological innovation becomes perpetual; exploitation focuses on “relative” intensification of productivity rather than “absolute” extension of hours; economies of scale and co-operation are systematically sought out; and consumption is organized by the cultivation of new needs... (Dyer-Witheford, 1999, 256).

Real subsumption, the ultimate goal of Taylorism, appears here as the technical code of industrial capitalism, or “the rule under which technical choices are made in view of preserving operational autonomy” (Feenberg, 2002, 77). Marx (1976) identifies operational autonomy in the transition from formal to real subsumption wherein “the command of capital develops into a requirement for carrying on the labour process itself, into a real condition of production” (448). According to Thoburn (2003) Marx's real subsumption thesis reveals the immanence of the machine in the capitalist labour process, and how relations of production are increasingly dominated by, or subsumed under, the forces of production.

In *Fragment on Machines*, we see how real subsumption prepares the ground for the social factory. Labour ceases to be a self-determined activity of species-being and is “subsumed under the total process of the machinery itself, as itself only a link of the system, whose unity exists not in the living workers, but rather in the living (active) machinery, which confronts his individual, insignificant doings as a mighty organism” (Marx, 1973, 693). Marx calls this the appropriation of living labour by objectified (dead) labour an antagonistic process that “does not end with the 'scientific organization of labour,' but becomes a permanent feature of capitalist society” (Braverman, 1974, 96). Real subsumption breaches the factory walls, projecting capitalist relations of production onto social relations in general, thereby creating the social factory. In life, as in work, therefore, “the worker appears as superfluous to the extent that his action is not determined by [capital's] requirements” (Marx, 695).

In the social factory thesis, the factory does not merely impose upon society but absorbs it fully. Tronti (1971) calls this the “process of internal colonization” wherein “the social relation becomes a moment of the relation of production, the whole of society becomes an articulation of production; in other words, the whole of society exists as a function of the factory and the factory extends its exclusive domination over the whole of society” (in Wright, 2002, 37). This began to occur as the private sphere of the household synchronized with the sphere of wage labour in order to support mass production in the post-war era. The home served to ameliorate the punishment suffered by the worker in surplus value extraction, repairing and replenishing the labour power to be expended at work. Capital appropriated the unpaid labour-power of the housewife in this restoration process as well as in the translation of wages into “the consumption necessary for a virtuous cycle of continual capitalist growth and stability” (Dyer-Witheford, 74). Lukács (1971) earlier identified this process as reification or the commodification of social

relations, and asserted that the internal organization of a factory was a microcosm of the structure of capitalist society in its entirety. Thus “the fate of the worker becomes the fate of society as a whole” (91).

The above discussion helps explicate the nature and role of information in a new era—one in which industrial and informational modes of production overlap and imbricate under the horizon of capitalism. In this new era, information is both a resource and product of immaterial labour, of which co-operation is a precondition and a result. Co-operation of free individuals selling their labour power marks a unique moment in the history of work, and calls into being a powerful new productive force, the general intellect, which is at the same time a new means for intensifying capitalist control of the labour process. This “despotic” control, as Marx (1976) calls it, manifests as the social factory, a sphere of capitalist relations that is immanent to the lifeworld and subsumes all social relations in the tight embrace of commodity exchange. Concepts like immaterial labour, general intellect and social factory contribute to a critical understanding of Information Society. The tensions, contradictions and ambiguities latent in these concepts point to fissures in the smooth surface of capital's apparently global sovereignty and serve as the basis for a new praxis. Open source as a mode of production is one fissure, breaching capitalist relations of production and transgressing the social factory by inaugurating a new labour process based on voluntaristic co-operation, self-determination and the fulfilment of species-being.

Hacking

Computer hacking is the technical and cultural practice out of which free and open source software (FOSS) development grew. It emerged in the computer underground, a motley assortment of researchers, graduate students and scientists

developing the early internet protocols within the military-academic complex. In particular, the Network Working Group, composed of talented computer science graduate students drawn from several universities, adopted “self-organizing principles common to scientific practice” in a method that anticipated the open source mode of production (Castells, in Himanen, 2001, 183). The computer underground mirrored the broader countercultural movement sweeping campuses across North America. Early hackers, as Castells (2001) notes, “were permeated with the values of individual freedom, of independent thinking, and of sharing and co-operation” that characterized their more socially radical peers and campus culture generally during the 1960s (24). While the New Left “was noisily advocating populist political revolution...a tiny sub-subculture of the counterculture was quietly, invisibly fomenting a populist computer revolution...” (Brand, in Nelson, 1987).

Hacking is a tradition of the computer underground that exemplifies a fierce egalitarianism, one inspired by a desire to topple the “computer priesthood” (Nelson, 1987) and put computers into the hands of non-experts: fans and hobbyists (by whose hands, not coincidentally, the first personal computer was built). The hacker is characterized by a spirit of adventure, exploration and play; s/he is a fan “who appreciates the options, fun, excitement and fiendish fascination of computers” (5). Writing in 1974, Ted Nelson intuited the significance of computers for democracy and the distribution of power in society. His self-published manifesto, *Computer Lib*, echoed the zeitgeist of the countercultural revolution, with slogans like: “Computer power to the people!” and “Computers belong to all mankind” (6). *Computer Lib* embodied the hacker ethic, a previously unwritten code, an implicit “body of concepts, beliefs and mores” held by the original hackers (Levy, 1984, 39). The “tenets of hackerism,” which laid the foundation of the open source mode of production, include: access to computers (the

“hands-on imperative”); access to information (“information wants to be free”); decentralization (“mistrust authority); art-and-beauty making (computers are creative); and world-improving (computers can be used for good) (Levy, 1984, 40).

FOSS and the labour process

Computer hacking based on the open source method is responsible for constructing the internet from its pre-history through today, including such major developments as email, the world wide web, the web browser and the web server. It also underlies the development of the personal computer, which ushered in the era of computer networking. These innovations were made possible in large part by free and open source software. This set of achievements is phenomenal on its technical merit alone. But it is perhaps the accompanying social relations that are more remarkable, as they contradict the received wisdom and practical experience of capitalism. What is not codified in the hacker ethic but rather implied is that the work—computer hacking, programming, writing code—is done for love and not money. It is on this basis that a new mode of production emerged from within the shell of the old, presenting both an explicit challenge and a working alternative to the dominative social relations of capitalism.

Labour is an historical process, not a universal condition according to Marx (1968a); as such each era is marked by a specific mode of production from which emanate the economic, legal and political structures of a society, and which generates “definite forms of social consciousness.” As discussed in Chapter 2, the mode of production includes both forces and relations of production. Where forces of production refer to the physicality of labour—human labour power and the materials, machinery and technology that together fuel the labour process—the relations of production comprise the interplay of social relations among capitalists, workers and products. Because

historical, the mode of production is tenuous and contingent. Marx writes in the 1859 *Preface to the Contribution to the Critique of Political Economy*:

At a certain stage of their development, the material productive forces of society come in conflict with the existing relations of production, or—what is but a legal expression for the same thing—with the property relations within which they have been at work hitherto. From forms of development of the productive forces these relations turn into their fetters. Then begins an epoch of social revolution (182).

Post-industrial theorists from Bell to Castells agree that there has been a change in the material productive forces of capitalist society and it is difficult to contest this. Clearly, change has been more incremental than paradigmatic and arguably the process has strengthened, rather than weakened, the hold of capitalism as global organizing force. But in the case of FOSS, there has been a qualitative change in the mode of production whereby both the forces and relations of production have been altered, such that one can imagine social revolution in the aftermath of the “end of ideology.”

The forces of production (material productive forces) in FOSS are made up of hackers or computer programmers (wetware), as well as the computers, computer networks and computer programs (hardware and software). FOSS relations of production consist in relationships among hackers as well as between hackers and the software they are producing. The relationship between worker and capitalist is largely absent, however, as FOSS development is predominantly carried on outside the capitalist mode of production. Under capitalist relations of production, “having been forced to sell their labour power to another, workers also surrender their interest in the labour process, now alienated; the labour process has become the responsibility of the capitalist” (Braverman, 1974, 39). This condition is absent in FOSS; even where large companies, such as IBM and Sun Microsystems, have begun to incorporate FOSS into their business model, the self-organized, self-directed nature of FOSS development

undermines traditional relations of production, particularly the control imposed by the capitalist labour process. Raymond (1999) argues that proprietary software production is inferior to the FOSS process because management does not—indeed cannot—deliver on its promises of defining goals, monitoring the labour process, motivating workers, organizing their deployment and marshalling resources (70). While the majority of FOSS programmers do not receive direct financial compensation for their free software development, they tend to be employed in the IT industry (Hars & Ou, 2003) where they frequently subvert the wage relation by “redirecting” their labour power to FOSS projects. One survey, for example, found that more than half of paid FOSS programmers contribute code during work time, a practice often undertaken with employer consent but that sometimes “indicated shirking their official job...” (Lakhani & Wolf, 2005, 9). The hacker ethic offers a lens through which we might view the transformation of forces and relations of production in FOSS.

The Hacker Ethic:

Access to computers

One of the central tenets of the hacker ethic is access to computers as a basic social requirement. The first generation of hackers had a vision of making computers accessible beyond the exclusive domains of the university and the corporation. They dreamt of a small computer “able to run on the kitchen table,” evidently “aware of the political importance of democratizing computer technology” (Soderberg, 2008, 185). The importance of access to computers is summarized in the “hands-on imperative,” in which physical access to computers is required in order to enhance knowledge, and therefore improve society. Lee Felsenstein, one of the original members of the Homebrew Computer Club, co-founded The Community Memory Project in an effort to bring

computing to the masses. Community Memory was the first public bulletin board system with street level access to terminals: “computers out on the streets, liberating the people to make their own connections” (Levy, 1984, 167). At a time when the personal computer was in its infancy and computing was still very much a rare expertise, “It became clear that the crucial element was the fact that people could walk up to the terminals and use them hands-on, with no one else interposing their judgement” (Felsenstein, 1993, 3).

This ethic of access contradicts vectors of power in capitalism that travel along the social bifurcation created by property relations, or the ownership of the means of production. Capitalist societies are distinguished by broad class stratification between owners of capital and workers under capital; capitalist relations of production are property relations, as proprietary software clearly shows. A firm purchases the labour power of a computer programmer, and owns both the means of production (congealed labour, hardware and software) and the product of labour (software, digitized wetware). Yet within the FOSS mode of production, we find an anomalous situation: workers own the means of production. This sets into motion cascading effects, including elimination of dependency on the capitalist as central provisioner of the labour process, the levelling of power imbalances, the invalidation of the wage relation and the re-establishment of an open “craft” knowledge.

While the global digital divide persists, computers have become a household technology in developed nations, where computer ownership continues to grow. In Canada and the US, for example, over three quarters of the adult population own a computer: that computers are ubiquitous in all aspects of western society is a truism (Pew, 2007). Importantly, social software, such as peer-to-peer (P2P) file sharing software, blogs, vlogs, podcasts and wikis, gives users the tools to produce their own

content, rather than passively consume “professional” and proprietary culture and information. The ability for the consumer, or the commodity formerly known as the audience (Smythe, 1977), to become the producer is a much-lauded role reversal in late capitalism. This social phenomenon is arguably rooted in the structural design of the internet itself: the lack of distinction between user and producer in the early construction of the internet led to “a new paradigm for managing the evolution of the system: rather than centralize design authority in a small group of network managers, they deliberately created a system that allowed any user with the requisite skill and interest” to participate (Abbate, 1999, 5). This paradigm is the foundation for the commons-based culture of sharing and collaboration that persists online today, despite the increasing commercialization of cyberspace. Bruns (2005) highlights the productive engagement of users online with his term “produser,” an idea similarly reflected in Indymedia's slogan and call-to-action: “Become the media.” It is wise not to overstate this role reversal: by no means have corporations lost their dominance in the market or the marketplace of ideas. It is fair to say, however, cultural and knowledge production has been democratized in that the barrier to entry has been drastically lowered through the increasing ownership of the means of production—personal computers—as well as access to the online tools that facilitate cultural creation. In this way, the monopolistic hold of the culture industries has been breached, enabling broader access and greater participation.

In facilitating the engagement of users in novel ways, the new “open digital environment” hints at the possibility of something more: the formation of democratic publics that move “beyond representation into direct participation” (Clark & Aufderheide, 2009). This promise is both enabled by and productive of what Benkler (2006) calls “commons-based peer production:” radically decentralized, collaborative

and non-proprietary immaterial labour “based on sharing resources and outputs among widely distributed, loosely connected individuals who co-operate with each other without relying on either market signals or managerial commands” (60). FOSS is the “quintessential instance” of commons-based peer production. Its strategies of collective action and co-operation point the way to non-commodified social relations and indeed, an alternative mode of social organization with profound implications for democratic practice beyond software production.

Access to information

If access to computers is the practical component of the hacker ethic, access to information is its philosophical counterpart. Access to information as a prerequisite for the open source mode of production directly contradicts the capitalist labour process, which relies upon the appropriation of information via the division of labour, refined into the separation of mental and manual labour. Taylor identified this necessity immediately, and made it the starting point for his program of work management. To control the labour process it was necessary to control the skills accumulation and decision-making that was a regular component of work. Thus, in his principles of “scientific management,” Taylor advocated the removal of specialized skill from the labour process, the divorce of conception from execution, and the subsequent monopolization of worker knowledge in the hands of management in order to control every aspect of the labour process. This is Braverman's (1974) famous de-skilling thesis, where the capitalist seeks to extract information (skill) about the labour process from the worker in order to devalue labour and create monopolies of knowledge under the exclusive control of management.

In contrast, the FOSS labour process demands full access to information: hackers, as workers, “produce new information, and as producers need access to it free from the absolute domination of the commodity form” (Wark, 2004, 19). Thus control is returned to the worker/hacker in a process that reflects “the self-organized and self-motivated social labour of a community of producers” (Braverman, 1974, 78). This significantly alters the relations of production as well as the social outcomes of work; access to information preserves and produces freedom; rather than alienation, there is creativity, efficiency, and the voluntary spirit of co-operation (Stallman, 2002). Access to information as a philosophy is a tribute to the operational mode of computers and computer programs, according to Levy (1984): “the binary bits moving in the most straightforward, logical path necessary to do their complex job...In the hacker viewpoint, any system could benefit from that easy flow of information” (41).

The now-famous slogan, “Information wants to be free” is attributed to Stewart Brand (1985), founder of the *Whole Earth Catalog*. Speaking at the first hacker conference, he said:

On the one hand information wants to be expensive, because it's so valuable. The right information in the right place just changes your life. On the other hand, information wants to be free, because the cost of getting it out is getting lower and lower all the time.

Brand links the resulting tension directly to the intellectual property debate, with its questions around copyright and the “moral rightness of casual distribution” but does not make any critical intervention into the discussion. Stallman refocuses the debate by distinguishing between the economic and political meaning of the word “free”: it is “a matter of liberty, not price. To understand the concept, you should think of 'free as in free speech,' not as in 'free beer’” (43). Thus he inserts a normative claim into seemingly neutral observation, reviving the ethical imperative of the quotation, whose lineage

Clarke (2000) traces as far back as the Bible: “You shall know the truth and the truth shall make you free (John 8:32).”

Stallman (2007) calls the freedoms enshrined in free software “vitaly important.”

They are essential, not just for the individual users' sake, but because they promote social solidarity—that is, sharing and co-operation. They become even more important as more and more of our culture and life activities are digitized. In a world of digital sounds, images and words, free software comes increasingly to equate with freedom in general.

Access to information and the free circulation of information have an historic association with ideas of truth, freedom and the public good, all of which are requisite conditions for democracy.¹⁸ Together they contribute to open knowledge production—of software, science, maps, encyclopedias and dictionaries, music, film and academic knowledge. FOSS development is part of the tradition of open knowledge production dating back to the Scientific Revolution and the birth of the scientific method, as Chapter 2 outlines. According to Himanen (2001), the lineage of open knowledge production goes even further back, to Plato's Academy and the pursuit of truth through critical dialogue. The scientific method is founded on this “open academic model,” which is “historically the best adapted for information creation,” pragmatically as well as ethically sound. (69). Similarly, it is difficult to separate ethics from pragmatics in FOSS production; as Raymond (2001) points out: “it's almost a moral duty...to share information, solve problems and then give the solutions away just so other hackers can solve new problems instead of having to perpetually re-address old ones.”

¹⁸ Here and throughout this dissertation, democracy refers less to a formal political structure (which, in any case, exists in western societies) and more to a theoretical praxis that enacts the ideals that underlie the political philosophy of democracy. “Real democracy,” therefore, is the social condition “where liberty and equality would no longer be represented in the institutions of law and State but embodied in the very forms of concrete life and sensible experience” (Ranciere, 2006, 3).

Both the open source method of knowledge production and the open academic model on which it is based contradict the general approach to information creation and dissemination in the Social Factory, which seeks to enclose information within the fold of capitalist social relations. Not only is the closed model of knowledge production opaque to criticism, initiative and self-correction and therefore inefficient, it perpetuates dominative social relations. Innis (1951) discerned the link between social domination and information in his concept of monopolies of knowledge. Such monopolies are biased idea structures that control and legitimate knowledge and, aided by “mechanization,” cause an imbalance of social power while at the same time obfuscating such imbalances. Models of communication are tightly coupled to methods of social control, as Heyer and Crowley (1999) explain:

[T]he media of communication through which the conceptual systems of an epoch are formed disclose as well the blueprint for its domination. The properties of the dominant medium, along with the pre-existing institutional structure, facilitate knowledge, and therefore power, being localized in such a way that it serves particular interests and is always beyond access for a large segment of the population (xix).

In other words, knowledge monopolies develop in conjunction with closed communications in order to maintain dominative social relations.

Resistance to the social control exerted by closed communication models exists, however, even in myth. Leary (1994) identifies the first information hacker in Prometheus, “a technological genius who 'stole' fire from the Gods and gave it to humanity” and who was “sentenced to the ultimate torture for these unauthorized transmissions of classified information” (63). Moving from the mythical to the historical record, it is evident that the information enclosure movement characterizes the history of cultural creation under modern western capitalism, evidenced in intellectual property regimes that encourage commodification over innovation. Innis (1951) highlights the

political nature of the production and distribution (or hoarding) of information in modernity, suggesting that it is fundamentally a question of power. It is now cliché to say “knowledge is power” but Foucault develops the knowledge/power problematic to illustrate how knowledge and social control are tightly coupled. For Foucault (1980), knowledge is a “regime of truth”—the body of information or ideas that a society accepts as true, and that enables a society to function. Regimes of truth interoperate with “systems of power which produce and sustain it” as well as with “effects of power which it induces and which extend it” (133). Thus power (re)creates its own terms of reference through knowledge; knowledge (re)produces and sustains regimes of truth on which the status quo rests.

Foucault (1980) de-reifies power, unseating it from its place in the state apparatus and substituting the concept of “relations of power.” This animates the notion of the circulation of power, rather than its direct exchange (e.g. one monarch for another; capitalism for socialism etc.). In thinking of the networked configuration of power, one can imagine the severing of knowledge from what Foucault terms “negative power.” Networks are structurally rhizomatic, meaning they self-generate through horizontal connections among nodes and hubs, and are thus difficult to control (Lessig, 2006). As networks act as conduits of power, so they serve as circuits of resistance and struggle. Information, like productive power, embeds the body, making it hard to contain within the rules of market exchange. The internet facilitates the flow of information such that the concept of information as property, as a “thing” to be bought and sold on the market is seriously weakened. This challenges the basic regime of truth that is capitalism and presents an opening, the chance for the re-codification of power relations based on detaching knowledge from dominant constructions of “truth.” Innis (1951) acknowledges the historic role of new media in disrupting monopolies of knowledge and their

associated power relations. He cautions, however, that this potential is subverted if those new media are absorbed into the previous “economy of power,” a struggle we see presently occurring with the internet.

Decentralization

“Mistrust authority—promote decentralization.” So reads this tenet of the hacker ethic. It is perhaps a reaction to the centralized social hierarchy that grew up around the first computers—batch processed, room-sized, million dollar machines developed by major corporations like IBM and restricted to an elite group, the computer “priesthood.” A decentralized system is open; it opposes bureaucratic control and facilitates self-correction, creativity and autonomy, all of which are essential to hacking. This theme also appears in non-hacker accounts of the internet, including Leary's (1994) foray into cyberculture. Here he finds a new “electronic ethics”—a cyberpunk code that urges: “Think for yourself; question authority (TFYQA)” (69). What, then, are the implications of decentralization for the FOSS labour process?

Capitalist production, observes Marx (1976), begins with the centralization of labour; that is, when large numbers of workers are gathered together in the same place, at the same time, “in order to produce the same sort of commodity under the command of the same capitalist” (439). At first, the difference is merely quantitative: larger numbers eradicate “errors” in the labour process—discrepancies in individual work patterns—such that the aggregate labour power of a group of workers is greater than that of individual or pairs of labourers under craft production over the same duration. Taylor, as we have seen, sought to eliminate inconsistencies in worker performance through scientific management. But Marx notes “even without an alteration in the method of work, the simultaneous employment of a large number of workers produces a revolution

in the objective conditions of the labour process” (441). For example, the centralization of labour triggers the “law of valorization,” which relies on the extraction of surplus labour in order to produce a profit; thus the socialization of labour makes possible the greater exploitation of workers.

Centralization of the labour process further enables economies of scale to reduce the cost of the means of production—spaces, tools and machinery. It allows for intensified control over workers, beginning with the establishment of the “working day” and other disciplinary techniques. Finally, combined labour through centralization induces not only “an increase in the productive power of the individual, by means of co-operation, but the creation of a new productive power, which is intrinsically a collective one” (443). Centralizing the labour process is, therefore, multiply productive. For the capitalist, it produces value that is converted into profit. Against the worker, it (re)produces social control that alienates her from her labour (species-being) and its product.

What remains ambiguous is the fate of the new productive power of collective labour. Birthed by capitalism and harnessed to produce surplus value, it clearly serves to advance the wealth of the capitalist class. Not only this power, produced through co-operation, but co-operation itself “appears to be a specific form of the capitalist process of production” (Marx, 1976, 453). But Marx (1976) reminds that co-operation is not unique to the capitalist mode of production, despite being essential to capitalism. When considered as it manifests in FOSS production, this collective labour power can be understood as productive in the Foucauldian sense: rather than “weigh on us as a force that says no...it traverses and produces things, it induces pleasure, forms knowledge, produces discourse” (Foucault, 1980, 199). Contrary to labour under industrial

capitalism, co-operation is decentralized in the FOSS labour process. Decentralization is characteristic of networks, which are necessary for the circulation of power, information and now labour under neoliberal capitalism. The FOSS labour process remains distinct among the various iterations of post-Fordist production, however, due to its accompanying social relations.

Benkler (2006) describes the productive power of collective labour, or co-operation, in the decentralized FOSS labour process as “peer production.” This is a “new modality of production” that marks the shift from industrial information economy to networked information economy. The networked environment, according to Benkler, “provides a platform for new mechanisms for widely dispersed agents to adopt radically decentralized co-operation strategies other than by using proprietary and contractual claims to elicit prices or impose managerial commands” (63). Radical decentralization aptly characterizes the FOSS labour process, where programmers living in disparate global locales contribute to projects according to their interest, ability and availability. The distributed nature of FOSS production parallels the decentralized architecture of the internet. It is a recursive process that continues to expand the functionality of the internet (e.g. the Apache HTTP server, the internet address system, Internet Protocol and the internet browser, Mozilla Firefox) while utilizing the internet as a means of co-ordination, production and distribution.

The co-operation that emerges in the decentralized FOSS labour process is its “central innovation and essential significance” (Kelty, 2008, 210). As collaborative labour, FOSS is characterized by a creative “practice of reusing, reworking, rewriting and imitation” (238). This recalls the “wiki way,” a recursive philosophy-practice that facilitates decentralized knowledge production in a collective process through wiki

software. Both the wiki itself and wiki practice are unstructured and self-directed, inviting collaboration through technical and social openness, and the shared goal of the wiki (whatever it may be—anything from software development to the creation of an online encyclopedia). There are many similarities between the wiki way and the FOSS labour process. Both assume good faith, something that is indicated, required and ensured by their openness. Both require radical trust: “You must trust the community to engage positively and productively with you in your work” (AboutUs, n.d.). In his seminal essay on Web 2.0, O'Reilly (2005) lists radical trust as an essential component of user-generated content; in other words, confidence in collaboration is required for successful online communities. The wiki way and the FOSS labour process are also inclusive (which encourages diversity) and transparent (which promotes accountability), while facilitating independent decision-making (what to work on and when) and promoting self-organization. Together these values and philosophical practices inform the social relations that attend the productive power of collective labour as found in FOSS, offering a new model for both work and social organization.

Art-and-beauty-making

A little mentioned but still essential tenet of the hacker ethic is the assertion that hackers can create art and beauty on the computer. For the original hackers “the code of the program held a beauty of its own” (Levy, 1984, 43). Hacking, says Stallman (2002) is less a conscious ethical practice and more “an idea of what makes life meaningful.” The notion of meaningful labour—of joy and creativity and playfulness in one's work—recalls again Marx's discussion of species being. For Marx, species being refers to the distinctively human capacity for self-determined activity. Only humans are “capable of universal, free, conscious (or rationally controlled), social productive activity”

(Buchanan, 1982, 17). Productive activity—labour, the working of the human mind or body—may thus be understood as a meta-capacity for general development and the actualization of a range of skills and talents.

According to Marx (1976), what distinguishes the exclusively human domain of labour from the instinctive work of animals is creativity, imagination, and will:

A spider conducts operations that resemble those of a weaver, and a bee would put a human architect to shame. But what distinguishes the worst architect from the best of bees is this, that the architect builds the cell in his mind before he constructs it in wax. At the end of every labour process, a result emerges which had already been conceived by the worker at the beginning, hence already existed ideally. Man not only effects a change of form in the materials of nature; he also realizes his own purpose in those materials. And this is a purpose he is conscious of, it determines the mode of his activity with the rigidity of a law and he must subordinate his will to it. This subordination is no mere momentary act. Apart from the exertion of the working organs, a purposeful will is required for the entire duration of the work. This means close attention. The less he is attracted by the nature of the work, and the way in which it has to be accomplished, and the less, therefore, he enjoys it as the free play of his own physical and mental powers, the closer his attention is forced to be (284).

The critical idea here is not the superiority of humans to animals but that of human agency, and the fulfilment to be found in self-determination, or what Marx refers to as the realization of purpose. To construe ourselves as architects, writes Harvey (2000) “is to adopt the figure of the architect as a metaphor for our own agency as we go about our daily practices and through them effectively preserve, construct and reconstruct our lifeworld” (200). Agency is connected to another unique feature of human labour: whereas animals, in accordance with the instinctive requirements of their species, produce for the gratification of immediate needs, humans “create also according to the laws of beauty” (Marx, 1967, 295). The free reign of the will and the exercise of the imagination in productive activity are necessary for enjoyment and satisfaction in labour, and for the actualization of one's species-being or humanity. For Marx, the full

development of human beings through labour is only possible in communism. Under capitalism, the freedom, joy and creativity of human productive activity is subverted through wage labour. The “slumbering powers” of the worker are appropriated as surplus value even as they are objectified in the commodity form, which appears as foreign to the worker—the fruit of capital rather than the work of her own hands. The worker is thereby estranged from her species-being, her productive activity reduced to the animal level of instinct. The ability to labour freely and creatively as a form of self-expression is facilitated by the FOSS mode of production. Hacking, as we have seen, is typically described as a creative, joyous, playful activity. It is co-operative, collaborative and based in sharing. Importantly, “free choice makes the effort self-consciously more than either a hobby or a job” (Weber, 2004, 136). It allows for the creation of beauty without consideration of profit.

Economists have sought to explain the motivations for FOSS in the absence of market incentives and other traditional incentives associated with capitalist production. Neither beauty- and art-making, nor self-satisfaction and expression in labour, holds explanatory power. “Many are puzzled by what appears to be irrational and altruistic behaviour by [FOSS] movement participants: giving code away, revealing proprietary information, and helping strangers solve their technical problems” note Lakhani and Wolf (2005, 3). In the absence of capitalist relations of production, it should not be possible to build, maintain and extend a large, complex software system. Yet the FOSS operating system Linux exists. Why, wonder these economists, “do highly talented programmers choose voluntarily to allocate some or a substantial portion of their time and mind-space (that are both limited and valuable resources) to a project for which they will not be compensated?” (Weber, 2004, 11). Motivations like reputation, ego boosting or ideological belief only partially explain the “irrational behaviour” of FOSS developers.

A marxian analysis suggests that FOSS development is non-alienated labour, a creative act that fulfils the requirements of humanity and enables the self-development of the worker/hacker while contributing to the greater social good. The motivation for and success of FOSS derives from somewhere deep in the heart of species-being, and the beauty and joy in freely chosen labour.

World changing

An unstated assumption, observes Stallman (2002) “is that we computer users should not care what kind of society we are allowed to have” (17). The idea that computers can change the world for the better was a subtly manifest belief among the original hackers, according to Levy (1984), and has resurfaced in theories about the democratic potential of the internet. To be sure, a certain utopianism has been associated with the internet since its widespread adoption beginning in the mid-1990s, not unlike the hype that historically has accompanied emergent “revolutionary” communication technologies (McChesney, 1999). In some accounts, the internet is responsible for ushering in a new era, a seismic social change comparable to the Industrial Revolution: computer networking would flatten social hierarchies, topple corporate rule, and extend democracy in Real Life (Turner, 2006). While the claims of the cyberutopians were clearly overstated, the internet's most innovative democratic implications are “new forms of agency that will redefine and enlarge the sphere of politics” (Feenberg, 2006). Social movement scholars have affirmed this in their analysis of the important and dramatic effects the internet has had on struggles for progressive change (Bennett; 2004; Cleaver, 1998; Kidd, 2003; Langman, 2005).

Not only has the internet provided new political opportunities for activists (McCaughey & Ayers, 2003), especially as a space and tool for communication, and a site

of intervention, it has evolved a new model of social organization in FOSS. As a philosophy, a method of producing knowledge and a mode of production, FOSS proposes and enacts an alternative. Thus Kelty (2008) concludes that “the internet is changing the conditions of social organization, changing the relationship of knowledge to power, and changing the orientation of collective life toward governance...” (239). Soderberg (2008) asserts the FOSS mode of production (hacking) must be understood in terms of class struggle and that an alternative to capitalism may be extrapolated. Others have made the more humble observation that the FOSS labour process can be generalized to the production of other goods (Benkler, 2006; Baldwin & Clark, 2006; von Hippel & von Krogh, 2003). At the very least, FOSS could be a catalyst for change-making action, as Soderberg (2008) suggests, serving to invigorate the cycle of struggle, largely impotent since the subsumption of trade unionism within the machinations of capital.

While we cannot hang our hopes deterministically on technology as liberator of humankind, we can find hope for changing the world in some of the real outcomes of the FOSS mode of production. First, FOSS inaugurates a reconsideration of property and thus of capitalist social relations generally. Beginning with Locke's (1980) assertion in the *Second Treatise of Government* that private property is produced through one's labour applied to a previously unowned resource, the notion of exclusion appears as “natural.” FOSS radically inverts this proposition, configuring property around the right to distribute rather than exclude (Weber, 2004). If the reproduction of the Social Factory hinges on the ownership of capital, from which the division of labour and unequal power relations flow, then decentering property as a focal point for social organization has profound implications. If sharing, rather than excluding, becomes the basis for social interaction and exchange, the elimination of scarcity and human want enters the realm

of possibility. The pacification of the struggle for existence as envisioned by Marcuse (1964) hovers just beyond the horizon.

A second and intimately related outcome of FOSS is the re-orientation of co-operation in collective labour toward human fulfilment rather than the devaluation of humanity through surplus value extraction. The transformation of property relations rooted in exploitation into social relations based on sharing leads to collaboration, which is the foundation of the FOSS labour process. Although forms of co-operation are found in capitalism, alienation is the driving social relation. Thus we have another radical inversion of social practice that leads to its antithesis: from alienation based on exclusive property rights to collaboration fuelled by the free exchange of resources. Kelty (2008) calls the forms this collaboration takes “collective social experiments” that generate “an experimental praxis of science extended to the social organization of governance in the service of improving the conditions of freedom” (239). As Weber (2004) points out, FOSS has already created its own set of governance mechanisms to facilitate the distributed production, maintenance, and development of complex software code. Free and open source software development, considered as a social experiment, provides a new model for better world as well as a working example of that model.

Chapter 4: The social construction of the internet

A survey of the varieties of social constructivism opens this chapter, presenting the sociotechnical dialectic as a useful framework for a discussion of the evolution of internet technology as well as the political interventions into its design. A brief history of the internet reveals it to be a scene of struggle rather than a closed black box. Marx understood this view of technology as a congealed set of conflicting social relations, exemplified in his notion of the ghost in the machine. Marx's identification of human agency in the technical process can only be termed an embryonic social constructivist approach. Marx also anticipates Feenberg's notion of the technical code, which prepares the conceptual ground for user intervention into design processes and provides traction for resistance in the technical sphere. The democratic rationalization of technology points to openings for user participation in the ongoing invention of the internet, especially around the micro-politics of resistance in which global just activists, including tech activists, engage.

The parliament of things and the sociotechnical dialectic

The story of the internet is more than the sum of its parts. It is not just about cables and routers and computers; nor is it a tale of academic researchers, computer wizards and military brass. Neither is it a history of great ideas and great inventions vying for superiority. A constructivist approach to understanding technology tells us that all of these “actors”—human and non-human, power relations and politics, circumstance

and happenstance—play a role in the development of a technical artefact, from its conception and design through to its deployment and uptake. Against the thesis of determinism, technological innovation does not proceed in a linear, autonomous fashion nor does it “progress” in any modernist teleological sense (Feenberg, 1999). Rather it is a highly contingent process fraught with tension and conflict. Technology is not a destiny, says Feenberg; rather, it is a “social battlefield, or perhaps a better metaphor would be a parliament of things on which civilizational alternatives are debated and decided” (Feenberg, 1991, 14).

The social construction of technology (SCOT) provides the foundation and starting point for this discussion. There are three central elements of the constructivist method that bring conceptual depth to an analysis of the internet as a sociotechnical ensemble. On this account, the internet is a complex and interactive system comprising human and non-human artefacts (including laws and natural resources) in a way that is “both socially constructed and society shaping” (Hughes, 1987, 51). These elements are relevant social groups, interpretive flexibility, and closure/stabilization. *Relevant social groups* are identifiable sets of actors who share “the same set of meanings, attached to a specific artefact;” they influence the design process, leaving their normative imprint on technical devices (Pinch & Bijker, 1987, 30). *Interpretive flexibility* is a characteristic of the artefact that allows for a variety of interpretations “not only of its functional and social-cultural properties but also of its technical content, that is, the way it works” (Brey, 1997). Simply put, there is no singular, inherent or obvious way of designing a technology nor of apprehending its meaning. Interpretive flexibility is found in both the design process, where designers instil their interpretation, and the end product, which can be redefined by users in ways other than originally intended. Feenberg and Bakardjieva (2004) tease out the democratic implications of interpretive flexibility,

which they term *creative appropriation*. This is a process whereby “users innovate new functionalities for already existing technologies,” something they say has profound implications for democracy (16). Both interpretive flexibility and creative appropriation reveal the contingency of technology, showing clearly how technology has no intrinsic properties or logic, no autonomous trajectory. Finally, when the relevant social groups involved in the design process reach some form of consensus, the technical artefact reaches *stabilization and closure*. This is, effectively, the elimination of technological controversy through negotiation amongst relevant social groups: at this point, an artefact is closed or “black boxed” (Pinch & Bijker). Closure is not permanent, however, as Pinch (1996) points out: “New problems can emerge and interpretive flexibility of the artefact can once more appear” (25). Thus technical development plateaus when a technology is black boxed, or closed, with the possibility of being reopened some time later, and developed further.

In an attempt to develop a conceptual framework for the analysis of society, rather than simply an empirical program for examining individual technologies, Bijker (1993) augments the SCOT methodological toolkit with the notion of *technological frame*. This concept is evocative of the scientific paradigm proposed by Thomas Kuhn (1962), which describes the “entire constellation of beliefs, values, techniques, and so on shared by the members of a given community” (175). Adapted as a technological frame within the constructivist method, this idea accounts for interactions within a relevant social group, including the “cultural values, goals as well as scientific theories, test protocols as well as tacit knowledge” of actors (Bijker, 1993, 123). The concept of the technological frame addresses a shortcoming in SCOT by providing a broader context within which technical change occurs. While the technological frame deepens and broadens the study of technology, opening it up to sociological analysis, it seems to layer

social, political and power relations atop the technology rather than considering the social and technical as integrated. It is not as robust, nor does it approach the relationship between society and technology as holistically or dialectically as another concept: the parliament of things.

The *parliament of things* is a provocative metaphor, conjuring a very different picture than the orderly “invention” of technology based on criteria such as efficiency and functionality. It recalls Foucault's (1991) notion of the “government of things,” which rejects the division between “things and men” in favour of a more holistic consideration of “a sort of complex composed of men and things” (93). In this case, things are “men in their relations, their links, their imbrication with those other things which are wealth, resources, means of subsistence...men in their relation to that other kind of things, customs, habits, ways of acting and thinking...” (ibid.). Here Foucault highlights the social relations that attend things, further emphasizing that things are organized politically. In this formulation, human subjects and material objects not only interact, they are mutually constitutive. Latour (1993) pursues a similar line of thinking in his discussion of the parliament of things. Rather than propose a social and political interpretation, as Foucault does, Latour argues for the elevation of “things” in sociological analysis. In Latour's parliament of things, there is an equivalence between human and non-human actors; there is a reunion of facts and artefacts, of science and politics, all of which come together to discuss their various interconnections “by way of chemistry, law, the State, the economy and satellites” (144).

The critical insight is that there can be no clear distinction between the social and technical realms, no severing of technology from society; instead the two realms co-produce one another in a sociotechnical dialectic. We therefore understand the

emergence of a particular artefact not solely in technical terms—not simply “because it works.” Rather it appears as the outcome of a contingent process that comprises “an alternation of variation and selection,” a process that is embedded in social relations, and the subject of real social conflict (Pinch & Bijker, 1987, 28). This refers to the principle of symmetry, according to which constructivist investigations of technological development are conducted. This mode of analysis, borrowed from sociology of science, does not consider the success or failure of a machine or device as inherent technical properties; instead, technical outcomes are understood as influenced by social factors. It is a technology’s acceptance by relevant social groups that results in its success and not the proficiency of its technical features. In the parliament of things, there is analytical equivalence among all variables: human actors, non-human actants, nature, the economy, law, politics, social norms and the like. Feenberg (1991, 1999, 2002) develops the analysis further to account for the power differential circulating in and amongst the parliament of things in a theoretical mashup of critical theory and social constructivism. Critical constructivism has an explicit political agenda, as Bakardjieva (2005) points out, in its attempt to conceive “ways in which the process of technological development can be made more inclusive and permeable to democratic values” (15). Critical constructivism addresses issues of structure and agency as well as inequality and domination, thereby fulfilling SCOT's promise to “relate the content of a technological artefact to the wider socio-political milieu” by demonstrating how social values translate into technical terms (Pinch & Bijker, 46).

Inventing the internet

The internet, considered as a parliament of things, loses its singular and reified technical character (“the” internet) and begins to look like an organic, shape-shifting

assemblage of hardware, networks and actors functioning under varied and interconnecting sets of decisions, policies, regulations and cultural practices (the “interwebz”). The socially contingent nature of the internet's technical development is well documented (Abbate, 1999; Ceruzzi, 2003). According to these histories, the internet is not simply the culmination of the long march of scientific progress and technological innovation; rather it unfolded precariously, often haphazardly and in unexpected ways. By considering the internet’s development through a critical constructivist lens, we can better understand how the goals and values of the global justice movement (and hence tech activism) are inflected in the internet’s ongoing “invention.”

Initially conceived as a means for connecting government researchers at various military and academic institutions, the internet was designed to enable the sharing of expensive computing resources (Hafner & Lyon, 1996). Built under the auspices of the US Defence Advanced Research Projects Agency (DARPA), the early internet “favoured military values, such as survivability, flexibility, and high performance, over commercial goals, such as low cost, simplicity, or consumer appeal” (Abbate, 1999, 5). From its inception, the internet's progenitor, ARPANET, was planned as a robust and versatile network that could be responsive to unforeseen user demands. The ARPANET's designers were also first generation users, and as such they influenced the design process in ways that strayed from the official vision of military computer networking. Imagined as a device for information dissemination and resource sharing, early internet technology was appropriated and redeployed by designer-users for purposes that differed from official expectations: human communication. Electronic mail—the “killer app” of the ARPANET—is a user-developed application that made the network a “spectacular success” (106). It helped transform computer networking from a research

tool into a communication medium and serves as an example of the interpretive flexibility of the ARPANET as well as the creative appropriation of early computer networking technology (Edwards, 2003). When users intervene in the technical design process, it is in an effort to fulfil unmet needs, needs which are unconsidered by dominant approaches to technological innovation. The internet's first designers thus modified a technology for connecting computers to include the missing function of connecting humans.

According to Feenberg (1999), the technical sphere tends to reflect the values of the ruling elite; in modern (post)industrial society, these values tend to inform and constrain the development of technology. Despite the internet's origins in the military-industrial complex and its subsequent privatization and growing commercialization, however, neither the norms of corporate capitalism, (e.g. exclusivity, profit, inequality) nor those of the military (e.g. secrecy, hierarchy, centralization, command and control) appear as “built in.” While the internet's decentralized network configuration fulfilled the dual purpose of ensuring the survivability of government communications and maximizing scarce computing resources, various other technical features seem to challenge these norms. The most significant of these appears early on, in the internet's “end-to-end” design, facilitated by the peer-to-peer communication protocol (TC/IP). This architecture both required and produced openness in order to maintain a robust, neutral network. The “end-to-end” design feature works to push intelligence to the edges of the network—the end-users—creating a decentralized network that is dumb but efficient. “By vesting intelligence at the edge or ‘end’ of the network, the internet shifted the capacity to discriminate from the network to the user” (Wu & Lessig, 2003, 6). The internet, as a “stupid” or neutral network, inverts the “intelligent network” based on centralized control and scarce, expensive infrastructure, like the telephone system. With

the intelligent network, the functionality (and power) lies with the switch operator; the internet's main function, as Isenberg (1998) cheekily wrote, is to “deliver the bits, Stupid.” Although initially considered a pragmatic engineering philosophy for network system design, the end-to-end principle is nonetheless inherently political, in that it disperses power from a centralized holder and places it with the user. This embeds social values like freedom of speech and participatory democracy in the technical code of the internet while discouraging control by centralizing forces like the state or business elite.

A constructivist account of the internet reveals it as a social and technical mashup, layering hardware and software with information and human communication in an ever-changing, amorphous social complex that so far has resisted rationalization by the market and the state. The internet is characterized by openness—in its standards, its engineering and its software, and its ongoing development; in turn, this openness both cultivates and relies upon values such as voluntarism, co-operation, egalitarianism, sharing and decentralization. This has led many enthusiasts to hail the internet as an inherently democratic medium (Rheingold 1994; Tidwell 1999). Others maintain the internet is just the latest in the long line of communication technologies that support established power relations (McChesney, 1999). Because the internet is a technology still in the making, Lessig (2006) argues that now is the time for users to become actively involved in shaping its development. As a self-generating, horizontal network, the internet is difficult to control and as such it has not been fully enclosed within the state-corporate nexus. But this situation is only temporary, cautions Lessig, as relevant social groups—particularly corporate and state actors—move to regulate behaviour in cyberspace in ways that restrict user movement and maximize profit, surveillance and control. Computer source code functions much like real world legal code, regulating behaviour and enabling and disabling freedoms; unlike legal code, which is static and

slow to change, the code of cyberspace remains, for the moment, in flux. Thus source code offers a point of entry for user agency and the chance for users to influence design at the application layer of the internet, making room for interests and values that subvert the norms of capitalism. Hackers in the free software movement and tech activists in the global justice movement have heeded Lessig's call to action, sharing his assessment of the internet as a social construction and the conclusion that the architecture of cyberspace is none other than its politics.

Technology as a “scene of struggle”

The foregoing discussion portrays the internet as an unfinished and flexible technology, the subject of debate over its technical design and social definition. Relevant social groups—from governments and corporations to hackers and citizens—are at odds over what the internet means, and compete for dominance in cyberspace. Like the internet itself, this conflict is multilayered. It is at once a contest between private and public interests manifest at the application layer of the internet (e.g. the world wide web) and also at the level of infrastructure, the “logical” layer comprising the data transport and transmission protocols (TCP/IP) (Lessig, 1999). Technical agreement has been reached regarding internet standards, which pertain to the interoperability of systems on the internet and function on the link, network and transport layers. Stabilization has also occurred at the physical layer of the internet that provides the hardware over which protocols for sending and receiving data run. That the social meaning associated with the logical and application layers has not been agreed upon is evident in current regulatory struggles over digital copyright and net neutrality, as well as the rivalry between FOSS and proprietary software. Business interests and government agents interpret the internet as a means for profit-making and social control; thus they promote technical

regulation of the network at the logical layer, through technologies like deep packet inspection, complemented by increased legal regulation through restrictive copyright regimes. This is a neat illustration of the technical commodification of the internet (through changes in technology) as well as its structural commodification (through changes in the legal system).

Users disagree with this narrow interpretation of the internet and its redefinition-by-enclosure, and have actively resisted it (Milberry & Anderson, 2009). Further, there is lack of consensus about the internet's technical and social definition at the application layer. This is apparent in the continual development of web-based applications that enhance and alter uses and practices, and indeed reconfigure the “place” of cyberspace. The social networking website Facebook, for example, has created an interactive cyberenclosure that centralizes user content and communication, effectively creating its own layer of the internet by discouraging online travel outside the confines of its proprietary world. FOSS development acts as a counter-force to such enclosures, developing the internet along an open platform, and creating space for non-corporate, community-oriented participation online.

Determinism vs. user agency

Conflicting iterations of the internet arise in corporate and community models: on the one hand, a cybermall dedicated to consumption; on the other, a virtual public sphere capable of enhancing democracy. Because the internet has not reached technical closure, it has not been encoded to support and reflect the values of the dominant (capitalist) social order. In other words, the special interests of the ruling elite, which serve to reproduce the status quo (e.g. individualism, competition, hierarchy, technological rationality and profit) have yet to solidify into a technical code of the

internet, meaning that other values, such as democracy, freedom, equality and community have an opportunity to take root. The technical code is an important concept for understanding the sociotechnical dialectic, and how the technical infrastructure informs and interacts with social life. According to Feenberg (1999), the technical code refers to the values and concerns that prevail in the design process, and are materialized in the technology itself. “Technical codes define the object in strictly technical terms in accordance with the social meaning it has acquired. These codes are usually invisible because, like culture itself, they appear self-evident” (88). This builds upon one of Marx's significant contributions, which was to bring the socially constructed aspect of culture—and thereby technology—into relief, historicizing capitalism as one way among a range of potential others to organize society.

While Marx has long been charged with determinism, his account of social transformation, as well as the role of technology in this, is much more nuanced and dialectical, as Chapter 1 discussed. The theory of technological determinism rests on the causality of technology for social change. In a misunderstanding of marxist theory, this is distilled to the thesis that machines make history; the idea that the mode of production (society) is determined by the forces of production (technology) is practically cliché. The simplistic thesis that machines make history is refuted by Marx's (1968b) central insight:

Men make their own history, but they do not make it just as they please; they do not make it under circumstances chosen by themselves, but under circumstances directly encountered, given and transmitted from the past. The tradition of all the dead generations weighs like a nightmare on the brain of the living. (97).

Here Marx rejects a deterministic analysis of social change, rather affirming human agency in the production and reproduction of society. To be sure, this agentic potential is conditioned and burdened by the past but it exists nonetheless, pointing to a future

beyond capitalism. This future is obscured, as mentioned above, by the veil of inevitability that enshrouds capitalism, shielding it from the discontinuities of history, as Foucault (1991) might say. It is capitalism rather than marxism, that performs a deterministic sleight of hand. According to Feenberg (2002), the theoretical and everyday assumptions of modernity, with capitalism as its attendant form of socio-economic organization, create an imperative universality. Once naturalized, capitalism, despite accompanying problems and paradoxes, cannot be challenged—reformed, perhaps, but not altered in any fundamental way. The prevailing belief in modernity as the result of logical unfolding of technological destiny thus restricts opportunities for radical civilizational change.

Braverman (1974) similarly observes that “traditional capitalist practice” emphatically denies any alternatives to organizing industrial society (15). Such a conclusion, he asserts, is supported by modern social science, with its tendency to accept the inevitability of that which already exists. Rather than marxist theory predetermining social outcomes based on technical imperatives, it is capitalist ideology that attributes the advance of modernity to technical systems and devices. This Braverman recognizes not only as a “‘determinism’ but a despotism of the machine” (16). Like Feenberg, he critiques the way in which theories of modernity naturalize capitalism, thereby foreclosing the possibility of social transformation and positing antagonistic social relations as regrettable or inconvenient but nevertheless “eternal.” On the contrary, Braverman portrays societies as moments in an historical process that can only be comprehended dynamically, within that moment, as part of a process. This is the crux of Marx's formulation: that it makes capitalism visible as a “set of rules” that obtain “at a given period and for a given society,” emphasizing the discontinuities of history rather than a linear historical continuum (Foucault, 1991, 59). Capitalism thereby loses its

ineluctable character and its reified veneer, revealing its contingent, socially constructed aspect. On this account, capitalism appears as a specific social form, rooted in an historical time and place rather than the default condition of modern social organization.

The technical code and the ghost in the machine

As people make history, so they make machines. Feenberg (2002) asserts that Marx was the first to uncover the social interests obscured behind the mask of technical imperatives. Indeed, Marx anticipates Feenberg's technical code when he perceives how capitalist social relations, such as alienation, are technically incarnated in the machine; that is, how the machine “embodies the power of the capitalist” (MacKenzie, 1996, 35). In other words, the values and interests of the ruling strata are materialized in technical artefacts, which then reproduce those norms, barely detectable beneath the ideological sheen of self-sustaining technological imperatives. By consistently linking the social and the technical, Marx revealed the political nature of technology, exposing capitalism as an ideological—not natural—mode of social organization. In conceiving the capitalist mode of production as a sociotechnical system, Marx re-inserts human agency as a social determinant of history, alongside the technical means of production. Thus it is that people *and* machines make history, if not under conditions of their own making.

The social constructedness of both technology and capitalism comes into sharper focus, aided by the conceptual power of the technical code. The technical code of capitalism, for example, translates the values of the ruling class into technical terms, aligning the design and meaning of technology conceived and created under capitalist relations of production with “the requirements of a system of domination” (Feenberg 2002, 76). Capitalist values, such as profit, competition, control, exclusivity, inequality and individualism underpin an array of “unexamined cultural assumptions” that directly

reflect and reproduce the dominant social order. Because these values—products of the prevailing economic and social interests—are “literally designed into the technology itself” (87), they appear as a technical requirement, chosen because “it works.” This, however, is nothing but ideological conjury, as the constructivist method reveals: when the technological design process is historicized, when its genealogy is traced, the social origins of the technical code are laid bare.

The technical code of the internet, though still emergent, reflects the “norms of inclusiveness, access to and relatively open sharing of diverse information, flexible capabilities that accommodate a variety of uses...decentralized control...and freedom of speech...” (Flanagin et. al, 2000, 421). The condensation of distinctly non-capitalistic values in the internet thus far suggests the possibility of a different future, one not organized by the dictates of the market, but rather one where “intellectual and inventive production was free...of centralized control and low cost or no cost” (Boyle, 2001, 49). Recalling the early history of the internet, it is apparent that openness, accessibility and decentralization were purposefully designed into the ARPANET's architecture. This was accomplished by the implementation of the TCP/IP protocol, which established an open, distributed and neutral network composed of autonomous nodes. Socially, these norms coalesced in a commons-based user culture that mirrored their technical counterparts: peer-to-peer architecture translated into the free exchange of information, ideas and code, and contributed to an egalitarian ethos. Other factors had an impact on the internet's design, and contributed to its nascent technical code. According to Zittrain (2006), both resource limitations and the intellectual interests of its makers were formative. From an engineering perspective, it was desirable that basic network operating protocols were kept simple, to encourage an elegant and efficient design that could be deployed easily. Keeping the network's architecture open to future development

and growth was also considered an important design feature. These technical choices encouraged a variety of user freedoms, and nurtured a user culture that fed back into the technical design in a virtuous cycle. The lack of a central hub or centralized management reflects a strictly social decision, explains Zittrain: engineers “had little interest in exercising control over the network or its users’ behaviour” (1988). This illustrates how technical decisions create conditions for social practices and moreover, how social interests infuse the technical code.

Democratic rationalization and the micro-politics of resistance

In revealing how social values and interests imbue technology, the technical code shows that technology can never be neutral; rather the technical sphere helps to reinforce and reproduce prevailing socio-economic power structures and relations. The technical code also signals technology’s contingent nature and the concomitant potential for human agency. This contingency reveals an opening in the design process for what Feenberg (2002) calls democratic rationalization of technology. “Democratic rationalizations challenge harmful consequences, undemocratic power structures, and barriers to communication rooted in technological design” (16). In this way, democratic rationalization highlights the potential for change by those most affected by technology—users. When users intervene at the level of design, they recalibrate technical codes; when they creatively appropriate technologies at the level of use, they reinterpret social meanings and create new uses. Since a panoply of technical solutions could potentially fulfil various social objectives, a progressive process of technical change that is responsive to a broad range of human concerns is a practicable outcome.

Opportunities for the democratic rationalization of the internet abound, particularly as the technology remains in flux. As corporations continue to settle the cyberian frontier, however, the internet has emerged as the locus of a struggle, a turf war with competing goals and interests jostling for position. Commercial interests are poised to dominate the web, pushing democratic and public uses to the fringes of cyberspace while threatening to further enclose and commodify access to the internet (Meikle, 2002). The threat, according to Feenberg (2002) lies in the reduction of the “margin of manoeuvre” of non-commercial users. He defines margin of manoeuvre as the degree of freedom won by the dominated in technical systems, which enables them to “work with the ‘play’ in the system to redefine and modify its forms, rhythms, and purposes” (84). Capitalist intervention at the logical and application layers of the internet serves to restrict user movement and behaviour online and portends an impoverished future for the internet as a communication medium.

Because of the socially constructed nature of technology and capitalism, however, it is possible to seek and implement alternatives, the monolithic appearance of both social structures notwithstanding. The socio-economic system of capitalism and the technical sphere that underpins it have been made; so made they can be unmade, remade. It is this logic that sustains and carries the new global justice activism. Feenberg (2002) argues that the existing society contains the suppressed potentiality for a radical reconstruction of the technological heritage, one that is “rooted in the heritage of actual struggles” (28) Democratic rationalization expands the margin of manoeuvre for users, helping realize this potentiality for an “alternative modernity” and demonstrating how new technology can be appropriated to subvert existing social relations, or to create new ones. It does so on the basis of micropolitics, “a situational politics based on local knowledge and action (1999, 104). This contrasts starkly with the world-historic

revolutionary visions imagined by the counterculture of the 1960s. During this time of social upheaval, the technocratic tendency of modern societies was a focal point for political activism. While revolution did not materialize, important new avenues for contentious action opened up, focusing on racial and gender equality, economic justice, and environmental sustainability, all of which have emerged as integral to the global justice movement. The countercultural revolution nonetheless created a new lens through which to view social life—the personal is the political—and it is from this foundation that a contemporary micropolitics of resistance builds.

Feenberg (1999) draws out the implications for making the personal political in contemporary social justice activism, which he describes as characterized by small interventions in social life that are numerous and diverse. Despite their humbler scale, these interventions represent moments of agency that could converge to produce long-term subversive impacts. “The tensions in the industrial system can be grasped on a local basis from ‘within’, by individuals immediately engaged in technically mediated activities and able to actualize ambivalent potentialities suppressed by the prevailing technological rationality” (105). This offers the hope of reorienting technology, and hence society, in ways that enhance democracy rather than social control. Democratic rationalization proposes a new sort of agency, wherein members of social groups engage reflexively and dialectically with the technical framework that defines and organizes them, recognizing themselves no longer as the passive objects of technology but as active subjects capable of redefining the technical order. In starting at the end, with the consequences of technology, it is possible to envision a new beginning.

Chapter 5: Seize the switches

The social constructivist framework laid out in Chapter 4 provides the base for an analysis of theory in action, of a “democratic politics of technology” as practised by tech activists who reconstruct the internet in their image of a better world. The novelty of tech activism lies in the way tech activists incorporate the democratic goals of the global justice movement into the very technology used to pursue those goals, in what Downing (2001a) calls “prefigurative politics.” In this chapter, I detail the history of tech activism, paying close attention to the philosophical differences between the free software movement and the open source programming community. I consider how tech activists develop free software, literally re-coding cyberspace in a way that anticipates the progressive social change they are working toward. In their creation of radical tech collectives that provide internet services and tech support to activists, they are at once enacting the change they seek as well as carving out space for non-commercial communication and democratic practice online. In both instances, the theory of social change begins in practice, in a theory of the deed, to reprise an anarchist concept. Thus tech activists produce an alternative version of software that is accessible, participatory, collaborative and non-hierarchical as well as an alternative vision of society based on those same ideals. In turn, their democratic interventions into technological design via their free software development both depend upon and enable online communicative practices oriented toward freedom, equality and justice that promise to bleed into the offline lifeworld.

Tech activism's radical roots: The first wave

Tech activists in the global justice movement are at the fore of the drive to shape the internet into a space and a tool for democratic practice. This current strain of tech activism is the third wave of a movement that emerged in the 1960s as a digital counterculture. Hackers working in the Artificial Intelligence laboratory at Massachusetts Institute for Technology (MIT) developed the habit of sharing computer source code based upon a belief that information should be free (Stallman, 2002). They were part of a broader student culture that embraced incipient computer networking as a tool of communication.¹⁹ Among them were the graduate students, members of the Computer Networking Group, who largely designed the protocols for ARPANET. As Castells (2001) observes, few of these students were part of the countercultural movement in the same manner as the radical activists, “and yet they were permeated with the values of individual freedom, of independent thinking, and of sharing and co-operation with their peers, all values that characterized the campus culture of the 1960s” (24).

By the 1980s, these values had become marginalized as the computer industry became increasingly proprietary. One of the MIT hackers, Richard Stallman, quit the AI lab in 1984 in response to this change and started the free software movement (FSM) in

¹⁹ A parallel communication revolution happened via computer conferencing, and later bulletin board systems (BBS) on private networks. In the 1970s, Hiltz and Turoff (1993) predicted the effects of computer conferencing, which they describe as “any system that uses the computer to mediate communication among human beings,” would extend “far beyond science and research from creating networks of inner city and suburban isolates to providing new learning opportunities for the disadvantaged” (xix). Communication via computer networks was also envisioned by Community Memory, the world's first public BBS established in 1973 by countercultural activists in California. Originally conceived as an information and resource sharing network, users soon transformed the network into an “information flee market” (Community Memory, 1972). The first public dial-up BBS system went online in 1978 in Chicago, beginning a tradition of information sharing and communication that would later migrate to the internet, emerging as discussion boards or forums. The proliferation of BBSs led to the discovery of the personal computer's “big function,” according to Felsenstein (1993): communication.

protest. Representing the second wave of tech activism, the FSM constituted the formalization of a long tradition of openness in the computing community. Ceruzzi (2003) traces the custom of sharing source code to 1955 and the founding of SHARE, a support group of sorts for early IBM programmers. He follows this custom through the 1975 formation of the Homebrew Computer Club, a group of hobbyists and hardware hackers who gathered to discuss their prototype PCs and for whom “sharing was the order of the day” (337). Stallman (2002) made the normative claim that proprietary software was antisocial and unethical because it prevented users from participating in their community and contributing to the public good. He began developing an operating system, Gnu’s Not Unix (GNU) that would be completed with the addition of the Linux kernel in 1992. Stallman’s guiding objective was “to build a system where people are free to decide their own actions; in particular, free to help their neighbours, and free to alter and improve the tools which they use in their daily lives. A system based on voluntary co-operation and on decentralization” (138).

Stallman moved the free software movement out of the realm of advocacy and onto the terrain of social movements by translating a rather narrowly focused issue (software development) into one of broad social concern (freedom). Tarrow’s (1998) classic definition of social movement as “collective challenges, based on common purposes and social solidarities, in sustained interaction with elites, opponents and authorities” fits well here (4). The definition’s applicability becomes clearer in Stallman’s (2002) answer to the question “What does society need?”

It needs *information* that is truly available to its citizens—for example, programs that people can read, fix, adapt, and improve, not just operate. But what software owners typically deliver is a black box that we can’t study or change. Society also needs *freedom*. When a program has an owner, the users lose freedom to control part of their own lives. And above all society needs to encourage the spirit of voluntary *co-operation*

in its citizens. When software owners tell us that helping our neighbours in a natural way is “piracy”, they pollute our society's civic spirit (49, italics added) (49-50).

Computer users seek these essential freedoms, which are technically mediated through free and open source software (FOSS), but which also inhere in everyday life. They engage with proprietary software developers and owners, who seek to obstruct these freedoms. The social needs embodied in FOSS—information, self-determination and co-operation—are geared toward societal change and as such issue a challenge to the status quo. According to Stallman, these needs are fulfilled by the “four essential freedoms” of free software: the freedom use, study, modify and share software. Because freedom is considered in a social rather than economic context, writing the four freedoms into the technical code of FOSS does not preclude the sale of FOSS applications. The key point is that FOSS code always remains available, something the GNU General Public License and copyleft regimes in general ensure. Stallman therefore considers free software as nothing less than “a new mechanism for democracy to operate” (179).

Free software vs. open source

It is important to acknowledge the distinction between free software and open source software freedom, which although technically the same comprise different sets of norms and values. Open source refers loosely to a software development method based on maintaining access to the source code. This method “harnesses the power of distributed peer review and transparency of process. The promise of open source is better quality, higher reliability, more flexibility, lower cost, and an end to predatory vendor lock-in” (OSI, *Home*, n.d.). Free software is better considered a philosophy that has freedom and not simply software development and use as its central concern,

making it an explicitly political project.²⁰ This dissertation uses the hybrid term free and open source software or FOSS, which is more inclusive while maintaining a focus on the political aspects and objectives of the free software movement.

According to one tech activist, the FSM comprises “a digital revolution that is social before it is technical” (Obscura, 2005). Indeed, the tech activists interviewed for this dissertation shared a keen awareness of the sociality of technology. But many in the broader programming community are apolitical and do not acknowledge the subversive potential of free software, or the political aspect of technology generally. The Open Source Initiative (OSI), launched by Eric S. Raymond in 1998, is a reaction to the normative approach of the free software movement. Although it assumes an apolitical stance, OSI reveals its bias in its overt support for “business as usual”—keeping source code open through copyleft licensing represents a more efficient method of software production.

The Open Source Initiative does not have a position on whether ideas can be owned, whether patents are good or bad, or any of the related controversies. We think the economic self-interest arguments for open source are strong enough that nobody needs to go on any moral crusades about it... (OSI, *FAQ*).

While the two projects share a similar definition of FOSS, their objectives are different. Activists in the free software movement focus on the user-technology relationship, implying a critique of corporate capitalism. Proponents of the open source program seek to facilitate the production of superior software through access to the source code, without addressing the implications of capitalist hegemony beyond the realm of code development. On the basis of this definition, the OSI is not a social movement but a

²⁰ Another political project founded in defence of freedom on the internet is the Electronic Frontier Foundation. Begun in 1990, the EFF works to protect the public interest in legal battles over digital rights in cyberspace. See www.eff.org.

business strategy. Indeed, Coleman and Hill (2004) note the ease with which FOSS has been adopted by groups across the political spectrum—from radical activists to liberal reformers to corporations—in order to fulfil divergent objectives.

In keeping with its business-friendly approach, the Open Source Definition “logically abandoned all reference to the social and ethical means and motives of free software, not to mention the fight for freedom as a primary aim” (Obscura, 2005). The OSI does not disguise its efforts to make FOSS more compatible with capitalist discourse, describing itself as “a marketing program for free software. It's a pitch for 'free software' on solid pragmatic grounds rather than ideological tub-thumping. The winning substance has not changed, the losing attitude and symbolism have...” (OSI, *FAQ*). For free software activists, however, the issue is the ethics of software use and development—or community practice and values. This vision extends beyond the computer industry and embraces the ideal of a just society. But the very discussion of freedom is contentious, revealing what Stallman (2002) refers to as “a fear of freedom:”

Talking about freedom, about ethical issues, about responsibilities as well as convenience, is asking people to think about things they might prefer to ignore, such as whether their conduct is ethical. This can trigger discomfort, and some people may simply close their minds to it. It does not follow that we ought to stop talking about these things (59).

The free software movement exists to continue the conversation about these ideas, envisioning a new society built upon a firm ethical foundation—a social world based on decentralization, volunteerism, co-operation and autonomy, with the ultimate goal of creating greater freedom for all, not just the powerful or the monied few. The embedding of these values into the technical code of FOSS is an example of democratic rationalization, with users redeploying technology to subvert the dominant social order. The democratic control of software suggests a different internet and by extension, new

modes of communication, cultural development and knowledge production. It is evident, however, that while the FSM continues to advocate its political program, grounding its position in a critique of the alienating tendencies of capitalism, the general programming community has drifted away from the more radical origins of first wave tech activism. Open source advocates neglect the “free” in free and open source software, moving from a philosophical terrain to a pragmatic one squarely located within the parameters of capitalism. Tech activists have moved to reclaim software as a political sphere, appropriating it in service of their democratic goals and ideals, as we shall see.

The global justice movement: Re-politicizing technology

The first generation of hackers established a culture of sharing, which prepared the ground for the free software movement. In turn, the FSM laid the foundation for third wave tech activism of the early 2000s. Part of this heritage is the rift that exists between tech activists in the global justice movement and the generally apolitical advocates of open source software development. While both projects share an affinity for collaboration, with geeks often moving easily between the two, their political, philosophical and technical motivations diverge. Programmers developing open source software derive satisfaction from the creative expression, intellectual stimulation and improvement of technical skills acquired through programming (Lakhani & Wolf, 2005). Doubtless tech activists experience similar benefits in their contributions to FOSS projects, but there is no question as to their overarching motivation: “technical means are directed toward political ends” (Coleman, 2004). Mako, one of the early Indymedia techs, describes his free software development as motivated by the desire to “produce good stuff that could change the way people communicate, work, and understand.”²¹

²¹ Personal communication, August 13, 2009.

Generally, tech activists' political ends include the pursuit of social, economic and environmental justice on a planetary scale—the overarching goals of the global justice movement. Unlike their peers in the open source community, tech activists embrace the political aspect of their work. They self-identify as technologists, programmers, coders and hackers who subscribe to the philosophy of the free software movement and are politically committed to the pursuit of social justice. Alster, a long-time Indymedia geek, sums up his involvement: “I belong to a movement which strives for equal rights (not the written but the real ones) and conditions for all humans (and partially other beings, too) on this planet.”²² Matthew Arnison (2001), another original IMC programmer, lends his tech skills to Indymedia “to help give a voice to non-corporate ideas about how to run the planet.” Tech activists thus share the social justice goals of the GJM, which motivates their (technical) action. This shift in focus—from developing computer source code for its own sake, for glory, or for money, to hacking for social justice—signals a return to the radical tradition of the free software movement and the repoliticization of computer technology.

The reclamation of computing as a political frontier is a hallmark of the global justice movement, which caught the world's attention during the “Battle of Seattle” in 1999. It was here that activists witnessed the power of the internet for organizing on a global scale as the possibility of creatively appropriating the internet or “seizing the switches” of this new communication medium became palpable. The GJM is part of a continuum of progressive social movements with a long history, but the union of such diverse groups and agendas into “super movement spheres” that organize, mobilize and share information and resources via global computer-mediated networks marks a distinct shift in radical collective action (Morris & Langman 2002). Certainly,

²² Personal communication, December 2, 2005.

transnational contentious action pre-existed the GJM; for example, cross-border networks against the North American Free Trade Agreement (NAFTA) and the Multilateral Agreement on Trade (MAI) during the early to mid 1990s directly preceded and likely seeded the new movement. But the GJM's truly global scope, enabled largely by the internet, is unprecedented. Tech activists have been central to this movement, facilitating the novel combination of interactive digital technology and social justice activism, and bridging the divide between geek and activist communities online, and between users and designers of internet technology.

Repertoire of electronic contention

The tech activist “repertoire of contention” includes the technical grunt work of building and maintaining websites, wikis, mailing lists, servers and mirrors. It also involves tech training, and the establishment of temporary media centres, hacklabs and squats (Obscura, 2005). It also involves the design, development and customization of free software to meet the special needs of social justice activists as well as the construction of virtual spaces that embody and advance their social justice goals both online and off. A repertoire of contention comprises the ways in which people work together to advance shared interests; specifically, it is a “limited set of routines that are learned, shared and acted out through a relatively deliberate process of choice” (Tilly, 1995, 26). For Tarrow (1998), an activist repertoire is structural as well as cultural, encompassing what people do, what they know how to do and what others expect them to do. The concept is typically applied to social movement tactics, such as sit-ins, boycotts and protests; more recently, it has been used to understand how these tactics have been taken up and applied in cyberspace (Meikle, 2002). Thus cyberactivism, variously called hacktivism, electronic civil disobedience or cyberjamming, has its own

“electronic repertoire of contention,” including cyberpetitions, virtual protests, sit-ins and blockades, email bombs, web hacks, parody sites and computer viruses (Costanza-Chock, 2004). Following Rolfe (2005), I use the idea of a repertoire of contention more loosely, as a general framework for examining how tech activists pursue their social justice goals within the context of a broader social movement that embraces a diversity of tactics. For example, where “repertoire of electronic contention” describes how activists use internet technology within social movements, I also consider the means by which activists create and appropriate the technology that forms the virtual toolkit for electronic contention.

Running servers for revolution

There is a considerable literature devoted to the influence of the internet on contemporary social movements. Much, too, has been written on the internet's constitutive role in the global justice movement,²³ particularly for organization, mobilization and information dissemination. But scant attention has been paid to the impact activists have had on the technical design and configuration of the internet: how they have moulded the internet to fit their needs and how they have reclaimed affordances that have been eroded with the increasing commercialization of cyberspace. Tech activists straddle the gap between users of technology and its designers, reprising the role of the early makers of the internet. They are responsible for the implementation and continued maintenance of online radical media projects like Protest.net and the Independent Media Centre (IMC); for the creation of radical tech service providers, including Tao.org, Resist.ca and Riseup.net; and for the development of activist software such as Samizdat and Crabgrass. These projects are guided by the values inherent in the

²³ Cf. Bennett, 2004; Deibert, 2000; Kahn & Kellner, 2004; Langman, 2005; Meikle, 2002; Smith, 2001; and van Aelst & Walgrave, 2004.

global justice and free software movements, and actualize these values in their daily operation. This new brand of activism goes beyond simply using internet technology toward particular ends to include the appropriation, modification and transformation of technology itself. As such, tech activists view themselves as, quite literally, (re)inventing the internet:

As radical techies, anar(cho)geeks, hacklab members, keyboard squatters, tech-aware activists, autonomous administrators...we've often directly participated in that evolution, advocating subversive uses of new technologies, hacking free software and sharing knowledge with passion, running servers for revolution.²⁴

Because of its malleability and subversive potential, it is not surprising that the global justice movement would embrace the internet as a communication medium and organizing tool as well as its virtual home. The GJM further adopted an organizational structure that mirrors the decentralized, horizontal, nodal configuration of the internet, once again suggesting the dialectical relation between the social and the technical.

Indymedia and the (re)birth of tech activism

The birth of the Independent Media Centre (IMC) in the lead up to 1999's Battle in Seattle marks the beginning of tech activism as I define it here: the design, construction and support of the technical infrastructure of the global justice movement. Also known as Indymedia, this web-based network of radical media-making collectives went live for the Seattle protest. Like the global justice movement itself, IMC was the culmination of years of activism on different continents, a collaboration between independent journalists and media producers, media and democracy activists, and non-

²⁴ This is taken from the invitation to participate in the People's Global Action Digital Struggles meeting to discuss issues facing radical activists using and developing internet technology. See <http://stamp.poivron.org/DigitalStruggles/ServerDefense>.

governmental organizations (NGOs) at the local, national and international levels. Technical support and expertise were provided by politically aligned hackers and geeks from the free software movement, as well as tech-savvy activists within the GJM. Initially founded to give voice to activists' concerns during the anti-WTO demonstrations, Indymedia quickly became the global media arm of the nascent movement, offering news and views from the under- and misrepresented perspective of social justice activists around the world.

IMC's use of open publishing software was a radical departure from journalistic tradition, enabling anyone, anywhere to upload stories to its newswire, unedited and in near real-time. The elimination of the gate-keeping function by which publishers and editors filter ideas and information and control access to media messaging issued a radical challenge to traditional journalism. Subverting the most cherished of journalistic conventions—objectivity—open publishing called upon all witnesses to become reporters, to tell their stories in their own words, and then to publish them on the internet. Indymedia both defied and presented an alternative to the corporate media system, summed up in its bold call to action: “Don't hate the media. Become the media.” After Seattle, Indymedia became an international phenomenon, with global justice activists from all continents creating their own “locals” and plugging in to the IMC network. From one stand-alone website in 1999, IMC grew to an internetworked global collective of over 130 autonomous nodes, united by a commitment to social justice, a critique of neoliberal globalization and a dedication to free and open source software (FOSS).

Active: Designing values into software

With the increasing ubiquity of internet connectivity, and attendant growth in FOSS and social or participatory media, users have proved a significant force in shaping the sociotechnical configuration of cyberspace. Today, in the “aftermath” of the internet, the plethora of blogs, wikis and participatory media websites provide users with access to non-corporate news and opinion, as well as the means for creation and expression. But this was not the case in 1999, when social justice and media activists were planning the Seattle anti-WTO demonstration. “At the time, it was very difficult to get even quality email. Just getting an IMAP [internet message access protocol] account and getting hosted was hard. Now that's like falling off a log,” recounts Sparrow (interview, 2008), a long-time tech activist. Nonetheless, he says, it remains a “necessity for the longevity of social movements to be able to own their own means of communication and to not be wholly reliant on the state or capitalism.” Tech activists setting up Indymedia recognized this, acknowledging the need not only for non-commercial software but also for internet technology that addressed their specific social justice objectives. The choice of “Active,” the original open publishing software, for the implementation of the first IMC was the conscious decision of “politically-minded geeks” (Coleman, 2004).

Active was pioneered by the founders of Community Activist Technology (CAT) in Australia. Its first iteration, Active Sydney, was the brainchild of an Australian graduate student and cycling activist Gabrielle Kuiper, who aimed to unite the activist community on the web. She envisioned an online autonomous zone—an information hub and meeting place that would facilitate communication, organization and mobilization among activists in Sydney. While the raw material for this plan existed (the internet) both the software and the virtual space had to be created. So Kuiper collaborated with programmer Matthew Arnison (a.k.a. Maffew) of CAT and other local tech activists to

create a hybrid calendar, email and open publishing service that went live in January 1999. The Global Carnival Against Capital, planned to coincide with the Group of 8 summit in Germany in June of that year, introduced new requirements for Active Sydney. Activists wanted to provide international coverage of local events, in real time, without editorial filters, prompting the CAT collective to develop video and audio capacities for the software. Up until this point, Active represented and materialized the interests of a core group of social justice activists organizing in a particular geographical area. However, the software would soon become an international FOSS project, incorporating the collective needs of an emergent global movement against neoliberal capitalism. A chance meeting in the United States between Arnison and activists planning the Seattle protest led to an international collaboration to rebuild Active for Indymedia's debut. Recounts longtime Indymedia tech Henshaw-Plath:

Originally Indymedia, called Rewire at the time, was going to use some ASP Microsoft solution, and wasn't going to have open publishing. Somehow the ASP code didn't work, so at the last minute, a few days before the N30 protests, Maffew came in with Active as a replacement. The IMC activists did NOT want open publishing. The geeks didn't have a system for approving articles, nor was it wanted. So Maffew and others told everybody that it was simply not technically possible to have non-open publishing.²⁵

Such a collaboration among tech activists had never happened before; it was made possible entirely due to the fact that Active was free software. Because tech activists could download the source code from the internet and “look under the hood,” they were able to collaborate in a decentralized, co-operative and asynchronous fashion.

Active's main function was to enable unfiltered publishing to the internet. Within this set of technical objectives nested a social mission: to give activists access to the means of communication, access that had been historically prevented by the political

²⁵ Personal communication, August 20, 2009.

economy of the corporate mainstream media, as numerous media critics have observed (Downing, 2001a; Herman & Chomsky, 1988; McChesney, 1999). The software did this by enabling anyone to upload stories, photographs, audio and video to the newswire from anywhere in the world, in real time without being subject to an editorial process. Active's lead designer Matthew Arnison (2002) explains the process:

[Readers] can contribute a story and see it instantly appear in the pool of stories publicly available. Those stories are filtered as little as possible to help the readers find the stories they want. Readers can see editorial decisions being made by others. They can see how to get involved and help make editorial decisions (331).

Transparency in the news-making process and the ability for people to “publish” their own stories confounds the gate-keeping function of the corporate mainstream media, a system in which “money and power are able to filter out the news fit to print, marginalize dissent and allow the government and dominant private interests to get the messages across to the public” (Herman & Chomsky, 2). Open publishing helps transform consumers of the news into its writers, editors and publishers. It also undermines the hallowed notion of objectivity, blurring the line between activism and journalism and marking Indymedia as overtly political.

The result is a viable alternative to what Meikle (2002) calls the “protest genre” of news writing, typically found in the corporate media. “On the rare occasions when [activists] do gain coverage [it] will be framed along very predictable lines,” he writes. “Conflicts and oppositions will be highlighted or manufactured and discussion of issues will be replaced by a depiction of disruption to the status quo...” (94). The very first post to the IMC website, by tech activists Matthew Arnison and Manse Jacobi (1999) positions Indymedia as a counter-force to the protest genre of news writing:

The web dramatically alters the balance between multinational and activist media. With just a bit of coding and some cheap equipment, we can setup a live automated website that rivals the corporates. Prepare to be swamped by the tide of activist media makers on the ground in Seattle and around the world, telling the real story behind the World Trade Agreement.

This is, in fact, what happened, with the fledging news site receiving 1.5 million hits during its first week as activists reported their eyewitness accounts from the midst of the action, as it was occurring, in some cases countering misinformation emanating from corporate news outlets (Meikle, 2002).

The technical imperative of free software and the social imperative of open publishing converge in a self-affirming feedback loop, or what might otherwise be called a sociotechnical dialectic. Readers of an open publishing news site are invited, by the nature of free and open source software, to participate in its design: “If they can think of a better way for the software to help shape editorial decisions, they can copy the software because it is free and change it and start their own site. If they want to redistribute the news, they can, preferably on an open publishing site” (Arnison, 2002, 331). Indeed, free software and open publishing are functionally the same: the former enables access to the computer source code, opening the development process in much the same way that the latter makes the process of creating the news participatory and transparent. Hill (2003) affirms the political objectives implicit in free software and the resulting affinity with Indymedia: “the ability to...modify [software] to fit your differing needs is one reason that Indymedia is so closely tied to free software—it is essential for software with participatory aspirations.”

Open publishing and free software are also similar in their radical subversion of property relations surrounding information in late capitalism: where open publishing prevents the enclosure of ideas, free software precludes the locking down of source code.

For these reasons, Arnison describes them both as “(r)evolutionary responses to the privatization of information by multinational monopolies”—giant software corporations like Microsoft on the one hand, and giant media corporations on the other (329). In the case of Active, free software enables the technical function of open publishing, which is in turn a social praxis of communication, freedom and self-determination.

As theories social constructivism illustrate, the social character of a technology is evident in the process leading up to the closure or “black boxing” of a technology. Because free and open source software is never permanently stabilized but remains perpetually in flux, the values, interests and norms that inform its design and development are always visible. Those that coalesced in Active produced a horizontal, decentralized network of autonomous nodes, a technical federation whose social functioning would rely upon mutual aid and consensus. Not coincidentally, these features reflect values associated with anarchism, a political philosophy that has been linked to Indymedia from its inception (Downing, 2001b). These values were at play in the development of Active even as its technical features responded to the specific needs of both media activists contesting the newspeak of the corporate media and social justice advocates working toward participatory democracy in the context of the global justice movement. As Hill (2003) points out: “The geeks of IMC-Tech were keenly aware that each technological design or set of features creates a particular publishing structure, and, as a result, empowers users...in an equally particular way.” Thus we see how the practical needs of activists converge and combine to produce software that self-selects among technical alternatives according to pre-defined social justice goals.

Active: The next generation

Today, all the code that runs on the Indymedia network is by charter free software, highlighting how the politics of tech activists converge in their design and use of technology. Many IMCs run open publishing software that is based on an Active hack, but the original Active codebase has fallen into disuse. Within six months of Indymedia's birth, Active's unsuitability for the rapidly growing network became evident. As Hill (2003) recalls, “technical 'under-the-hood' complaints were paired with calls for new features, increased flexibility and maintainability by less technical volunteers.” IMC techs quickly began work on the next generation open publishing software, dubbed “Active 2” but the highly political nature of the project fractured and then paralyzed the effort (ibid).

Debate raged around internal hierarchies that arose within Indymedia, particularly around the selection of feature stories. A small group of authenticated users would emerge in each IMC local to form a de facto editorial collective, leading to charges of censorship as well as the creation of hierarchical power structures. Active's lack of user authentication, whereby contributors remain anonymous, was another contentious issue and considered by some an obstacle to building trust within the collective. Others saw the ability to publish stories without prior registration and without logging IP addresses and locations as essential to protecting free speech, particularly in light of growing the criminalization of dissent post-9/11. Power also diffused along gender lines, with the male-dominated tech collectives retaining much of the decision-making power in what is fundamentally a technical project. “There is a kind of centralizing power because the techies get to do what they want. They're the ones that run the website; they're the ones that have the code” (Sheri Herndon, interview, 2003). Political and social differences led to technical divisions in the software as Indymedia geeks began hacking Active according

to the politics and particular needs of their local IMCs, adding features such as newswire moderation and “nick” (nickname) registration. “It seems possible that Indymedia simply encompasses multifarious political and social ideologies that can only be represented in multiple pieces of software,” comments Hill, an original Indymedia coder. Thus were born Active derivatives SF-Active, Mir, SlashIMC and IndyBayActive, some of which are still in use today.

Samizdat

One IMC codebase inspired by Active but not built upon it is Samizdat, a FOSS project led by Belarussian programmer Dmitry Boradaenko. Samizdat, which means “self-published” in Russian, refers to the social movement against censorship in the former Soviet Union. As an underground political movement, Samizdat was highly critical of the state, releasing reports of dissident activities and news censored by the state-run media as well as transcripts of political trials and analyses of socio-economic and cultural issues. Aligning itself with this radical tradition of self-publishing and critical dissent, the software Samizdat firmly locates itself within contemporary struggles for liberation undertaken by the free software and global justice movements. Samizdat is a generic Resource Description Framework (RDF)-based engine for building open publishing websites, providing users “with means to co-operate and co-ordinate on all kinds of activities, including media activism, resource sharing, education and research, advocacy, and so on” (*What is Samizdat?*). Conscious of the politics of technology, Samizdat's developers have purposefully designed their software “to promote values of freedom, openness, equality, and co-operation” (ibid).

Boradaenko (interview, 2008) began Samizdat as a FOSS project in 2002 and made the first release in 2003. “At the time, a lot of Indymedia sites were still running

the Active codebase. There were some new codebases—Mir, SF-Active—but all of these had a major problem with influx of trolls and the amount of information being published....” He decided that an RDF data model would help organize the massive amounts of information IMC sites often receive, particularly during a protest, while still in keeping with Indymedia's philosophy of open, egalitarian, participatory media making.

I thought that if you want to have participants of Indymedia—all of them—to contribute equally to the way the way information is organized on Indymedia sites you have to use something along the lines of RDF where people can make statements about the way information is supposed to be organized or the way they want it to be organized (ibid).

In Samizdat, this is accomplished by the concept of a focus, now known as a “tag” in Web 2.0²⁶ jargon. “It is a focal point for discussion, theme, a topic of discussion or just a key word. You have site users making statements about which materials or which resources on the site are related to which tags,” explains Boradaenko. “The engine allows people to vote on these statements to see which statements are true and which are not, which are approved by users and which are rejected.”

Samizdat allows users to publish, view, comment, edit, and aggregate text and multimedia resources, vote on site structure and resource classifications and filter resources by flexible sets of criteria. What distinguishes Samizdat from other open publishing systems, such as Active and Scoop, is that it “targets other domains beyond publishing, such as co-operation, education, and resource sharing” (*What is Samizdat?*). It is further unique in its “complete openness and transparency in all aspects of

²⁶ Web 2.0 is a marketing meme used by business interests to re-brand the internet as more user-friendly. The practices and principles of Web 2.0, include user data control, an architecture of participation, re-mixable data, cost-effective scalability and the ability to harness collective intelligence (Wikipedia). Web 2.0 software applications include blogs, wikis, P2P file sharing (Napster, Limewire), content sharing (Flickr, Delicious, YouTube) and social networking (MySpace, Facebook) (O'Reilly, 2005).

operation: publishing and editing, categorization and feature articles, moderation. No other CMS pays special attention to having everything possible decided by all users and accountable to all users” (*CMSSurveyReport...*). Although the technical code of Samizdat reflects the ideals and goals Indymedia as well as the broader global justice movement, it is only used by a handful of IMCs. “Most of the Indymedia-created codebases are behind the times now,” Boradaenko acknowledges.

That includes Samizdat because it has such a small developer community. It is very advanced in terms of organizing the content but it lacks seriously in more mainstream features....Most of the Indymedia engines out there have similar aging issues. They may have been cutting edge when they started but they didn't get enough developer attention and they didn't attract enough developers to compete with mainstream open source content management systems (interview, 2008).

It is this knowledge that led to a reassessment of Indymedia's technical role in global justice organizing and radical media making, dubbed Indymedia 2.0, with an ironic nod to the Web 2.0 craze sweeping the internet.

Indymedia 2.0?

Tech activists have struggled with the lack of programming resources on the one hand, and the desire to create a virtual environment that fostered and supported their activism. In July of 2006, the core developers of SF-Active and Mir (the most popular IMC content management systems) met face-to-face with other Indymedia tech and media activists at Techmeet²⁷ in Sao Palo, Brazil to discuss abandoning custom codebases altogether. They had identified three serious problems plaguing the IMC network. The first concerned the low number of programmers maintaining and

²⁷ Techmeet began as a summit of international developers who had worked online together for several years, primarily through Indymedia, to assess IMC's technical infrastructure and chart a course forward. It has annual f2f meetings and regular virtual meetups. See <http://techmeet.org/>.

developing Indy-specific content management systems (CMS), which was causing workflow bottlenecks and tech burnout. The second concern was the vulnerability of the network to significant downtime due to server seizures by law enforcement, server hardware failures and unexpected withdrawals of donated technology resources (Ryan, 2008). Finally, the technical stagnation of Indymedia's custom software was troubling—the various CMSs used on the network lagged woefully behind their counterparts in the commercial world of user-generated content websites, especially in Web 2.0 functionality—media sharing, social networking and so on. Indeed, IMC's once innovative technology appears positively quaint in an era of uber-networked online interactivity. “One of the big things initially with the innovation of Active is that it allowed you to upload media,” explains long-time Indy tech John Duda (interview, 2008). “That was something that was new at the time: a site where you could post video to it. That’s no longer exactly the case.”

Once an innovator in internet technology (IT), Indymedia's appeal began to fade in the face of the participatory, always-on web and users migrated to blogs and other proprietary online spaces to create and share media. Today, comments Yossarian (2008), another original IMC tech:

A potential Indymedia contributor thinks: I can upload a video but nobody can see it conveniently in the page? I'll put it on YouTube. I can put up a text report but my friends aren't immediately notified via Twitter text messaging? Forget it, my Blogger account can do that. I can announce the existence of my new political group but I can't conveniently link all my articles together and have them accessible via an API for reprocessing and filtering? I'm off to Facebook and Yahoo pipes.

The importance of technical innovation continued as a theme at the Digital Struggles meeting, a decentralized gathering that took place in August, 2006 in Dijon, France as

part of the People's Global Action²⁸ conference. Indymedia users, collective members and programmers convened to discuss IMC's (ir)relevance to the global justice movement and the possibility of reinvigorating the original vision. They agreed that the pressing question of “how to adapt to a changed web is a technical and social issue,” cognisant of the malleability of internet technology and their role in shaping it (*Introduction about Indymedia 2.0*). In addition to regaining Indymedia's technical edge in order to maintain social utility, tech activists highlighted the more general need to develop a secure activist infrastructure on the internet.

The IMC-CMS Group evolved out of the meetings in Sao Paulo and Dijon, based on the consensus that the Indymedia tech collective was not large enough to sustain an entirely custom-built content management system. The group drew up a list of requirements for their ideal CMS, and planned an audit of existing open source CMSs, which they would use to select one project to join “and customize per the unique needs of Indymedia” (Ryan, 2008, 2). Meeting in face-to-face and in online techmeets over the next two years, the IMC-CMS Group evaluated every major CMS, determined to “leverage an established, vibrant open source community with many participants who are not part of Indymedia while “reclaiming Indymedia's past position as *the* innovator in online, participatory media” (ibid).

The requirements for a new CMS included existing features: anonymous open publishing; easy mirroring (to deal with high traffic volume); the ability to host multiple IMCs on a single server (to maximize limited resources); good performance on affordable hardware (due to financial constraints); customizability (to enable locals to

²⁸ The PGA formed in 1998 when social justice movements from all continents met in Geneva to launch a worldwide co-ordination of resistances to global capitalism. It is a people's coalition defined by the PGA hallmarks, manifesto and organizational principles, with a focus on direct action and civil disobedience. It holds bi-annual conferences in different locations around the globe. See <http://www.nadir.org/nadir/initiativ/agp/en/pgainfos/history.htm>.

modify their sites); internationalization (to present sites in multiple languages); anonymous language translation; comments (to facilitate interactivity); anti-abuse measures (to filter spam, trolling, denial-of-service attacks); and easy moderation (to remove spam or libellous postings and hide racist postings). These technical features supported the original goals of Indymedia as a “grassroots organization committed to using media production and distribution as a tool for promoting social and economic justice” (*IMC Mission Statement*, in Shumway, 2003). Autonomy, anonymity and interactivity were central to achieving these goals and thus needed to be translated into technical terms. Due to the global nature of the IMC network, language translation and internationalization were social realities reflected as technical priorities. Finally, because its insurrectionary posture caused Indymedia to be “systematically targeted by repressive forces,” a decentralized and redundant network served as the technical foundation (Bashaw, 2004).

Drawing on seven years experience with Indymedia as a technical project and radical media experiment, IMC techs also composed a wish list of front-end functions to account for new and evolving user needs. This list included network-wide login (nick registration) to prevent abuse by impostors; access control to differentiate among users and administrators; user moderation (e.g. voting); open editing and wiki-style version control; and Web 2.0 functionality (e.g. profiles, podcasting/vodcasting, tagging). The integration of emergent values and evolving user needs into the technical infrastructure demonstrates the social construction of Indymedia as a sociotechnical system. It must be noted that the desire for a new CMS is not shared by all IMC techs, though none would dispute the reasons behind its proposal (chronic resource shortage, technical inferiority and/or complexity of custom IMC software, tech burnout). The autonomous nature of

the Indymedia network allows for such an initiative, however, on the understanding that it can not be universally imposed—only freely chosen by interested nodes.

In 2008, the IMC-CMS Group released a white paper that summarized the findings of the CMS survey, and proposed a hybrid solution. “We've reviewed almost every open source content management system and come to the conclusion that many (if not all) of them aren't really appropriate to the specific needs of Indymedia” (Ryan, 2008). The group nevertheless remained firm in its resolve not to “start from scratch” but leverage the numbers and vibrance of an existing FOSS project. Although motivated by a desire to recapture Indymedia's role as an IT innovator, the move to an out-of-the-box CMS was also pragmatic, addressing limited human resources and burnout that are typical of most activist groups. Duda sums it up this way:

For a lot of people, Indymedia is also a means to an end. There's a lot of other stuff they'd like to do and a lot of other projects they'd like to work on. I think it's no longer the case that Indymedia really needs to be in the business of designing and building CMS's from scratch for most of the needs they have. It's pretty unsustainable, especially when there are these other communities that are focusing on building a very nice, very extensible, totally free CMS. It's kind of silly not to take advantage of that (interview, 2008).

The hybrid solution was presented in a proof-of-concept called Malandro. Its approach

is a distributed and highly redundant three-tiered software design that leverages a number of open source projects with large development communities. The design's three tiers are: 1. web server tier; 2. middleware tier; and 3. database tier...The goal is to create lightweight servers on each tier that can intersect with each other in any number of ways via the middleware tier. In doing so there is no single server which can be a single point of failure. If a server is seized, it is merely taken out of the rotation and the system continues to function as normal (Ryan, 2008).

Although Malandro is a technology solution tailored to IMC's needs, it is not a custom-built web application; rather it is a system built on three major FOSS projects: CakePHP

(web application framework), ICE (Integrated Collaborative Environment) and MySQL (relational database management system). Thus it relieves pressure on the tech collective to develop and maintain a unique codebase with limited human and financial resources. Malandro addresses Indymedia's various concerns (security, redundancy, resource limitations etc.) while providing the technical foundation upon which its social project (radical media making, world changing) can operate. It is a good example of how “social and cultural pressures result in physical arrangements of technologies that in turn accommodate social and cultural values” (Flanagin et al., 2000, 411). Malandro is still at the proof-of-concept stage, so it remains to be seen how widely, if at all, it will be adopted by the IMC network. Nevertheless, it demonstrates the ongoing engagement of tech activists with the development of the internet as a space and tool for radical social change.

Beyond Indymedia: Radical tech collectives

Values designed into the early internet account for its configuration as an open, decentralized, non-hierarchical network composed of autonomous, self-determining nodes and oriented toward communication rather than mere information transmission. But progressive forces continue shape cyberspace, argue Kahn and Kellner (2004a), who link the creative appropriation of the internet by the global justice movement to the democratic rationalization of internet technology. While internet activism “is an increasingly important domain of current political struggles,” they write, “the internet itself has undergone significant transformations during this time toward becoming a more participatory and democratic medium” (5). Radical tech collectives have contributed to this transformation in their efforts to create an alternative online communication system for activists. Indymedia is the earliest and best-known

manifestation of tech activism; its tech collective, IMC Geeks, gathers the world's top hackers and radical techies under its broad auspices. But the IMC model is neither the first nor the last incarnation of tech activism as it occurs under the broad umbrella of the GJM. Indymedia is part of the radical movement for social justice launched by the Zapatistas in 1994, when they declared war against the Mexican government. “These freedom fighters...were among the first to advocate the creation of a global network of alternative communication to resist the crippling effects of corporate capitalism” (Milberry, 2003). Subcommandante Marcos' (1996) call to “make a network of communication among all our struggles and resistances. An intercontinental network of alternative communication against neoliberalism...[and] for humanity” would inspire media activists around the world. This call marked the beginning of a “new electronic fabric of struggle” of which radical tech collectives would be a crucial part (Clever, 1998).

TAO

The global anarchist community came to a similar conclusion about the importance of networking struggle and progressive communication, leading to the founding of A-Infos in 1990. A terrestrial network in the pre-internet era, A-Infos' mission was to build “contacts and co-operation internationally and help improve the flow of information between the different anarchist movements” (A-Infos, 1995). It went online in 1995, and continues today as an “autonomous anarchist press agency” in nine languages (A-Infos, n.d.). Toronto-based TAO Communications was the tech collective that helped transition A-Infos to the internet, and hosted its Canadian domain, A-Infos.ca. Originating as The Anarchives Online in 1994, TAO began providing online support and space to radical projects, beginning with A-Infos the following year. TAO

hosted list servs and websites and provided email as part of a strategy to develop networks of activists both in the virtual and terrestrial realms. In keeping with its anarchist ideals, TAO was organized as a regional federation of local autonomous collectives and individuals that cohered philosophically around the Black Panther Party's 10 Point Program for social justice. The creation of TAO was spurred by a sense of urgency emanating from the increasing commercialization of cyberspace. According to one long-time collective member “it was important before the window closed and the networks were completely carved up into proprietary corporate fiefdoms to secure any and all worker-owned and operated access” (Lilley, in Shantz, 2003, 216).

One of the first tech service providers for activists, TAO's “primary contribution to radical movements...is the provision of network facilities for communications and organizing.” To this end, the collective developed a fine-grained analysis of knowledge creation, information distribution, and communication under capitalism:

We create knowledge through independent public interest research, and distribute it freely through participatory education...Under the belief that information should be free, we operate against capital or market-regulated forms of political, economic and cultural organization, and towards socially just, ecologically sound, international liberation. We advocate democratic exercise of the means of production to help achieve these beliefs (TAO, *Basis of Unity*).

At the height of its activity TAO maintained hardware and workspaces in Toronto and Vancouver, as well as fledgling locals in Montreal, Edmonton, Ottawa, Olympia, Boston, and New York City (TAO, 2001). Collective members emphasized the social aspects of technology, maintaining a balance between online and offline networking. Megan Adam, a former member of TAO Vancouver, recalls: “we decided we were going to facilitate technology in the community, so we had a computer lab for activists and people in the Downtown Eastside and we ran an activist space. We were part of activist networks in

that way” (interview, 2008). Indeed, the technical dimension of the project was always secondary to its social objectives. Comments co-founder Jesse Hirsh, “While people always regarded the original tao.ca as a tech project, for those of us involved it was more about political intelligence and philosophy, with the internet as the broader context.”²⁹ TAO's decentralized, federated approach to organization would provide the basis for Indymedia's “franchise model”³⁰ four years later. Eventually, TAO would morph into the OAT (Organize. Autonomize. Triumph.) tech collective, which continues to provide web services to the radical and non-profit communities on a smaller scale.

Protest

Protest.net is another early expression of tech activism before the Battle in Seattle, where years of social justice organizing would erupt into a movement. Founded by Evan Henshaw-Plath in 1998, Protest.net is a global events calendar that aggregates demonstrations, protests and actions in what *The New York Times* called a “protest portal.” Closely aligned with anarchism, the project embodies classic anarchist values such as self-organization, autonomy and mutual aid. It was built by radical techs on early open publishing software, allowing users to upload their events to the unmoderated global calendar. Protest.net fuses media and tech activism with the global justice movement's intuitive analysis of capitalism, corporate media and the struggle for social justice: “Activists around the world are fighting for a better world. We can't rely on the media establishment to cover our movements. We will rise up and seize the means of communication!” (Protest, n.d.). Practically, it enabled activists with limited resources of

²⁹ Personal communication, August 25, 2009.

³⁰ This refers to the means by which Indymedia self-replicated across an emerging global network. Activists in cities preparing for international trade summits would establish their own IMC local, using the website layout and logo of Indymedia and plugging into the IMC network by inserting the name of their city or region in the URL; for example www.bostonindymedia.org.

time and money to promote their events across geographical boundaries, free from censorship or gate-keeping. As with Indymedia, the explosion of commercial social media and Web 2.0 has caused Protest.net to fall into disuse, with the activist community dispersing across cyberspace—to blogs and wikis as well as social networking websites. However, Henshaw-Plath has received funding to rewrite and update the software. “The internet's changed in the last decade. So some of it is technical,” which accounts for changing the programming language from Perl to Ruby on Rails, he explains.³¹ “But a lot of it is trying to look at who are core users—the people in activist communities who act as 'event collectors'—and solve their needs.” Once this has been done, Henshaw-Plath says he will look at how the software can facilitate event promotion as well as news coverage of events. This will help realize what is perhaps the most important goal of the new Protest.net: to be “a tool to connect people up for ongoing offline organizing” (ibid). Once again, the social and technical objectives of radical tech projects becomes evident.

Resist!

As activists became more experienced and savvy internet users, it became increasingly clear that existing (proprietary) software and online communication systems were inadequate. “To me the mission for tech activism has been to create an alternate means of communication which social movements control,” affirms Henshaw-Plath.³² Tech activists took that mission seriously in the wave of organizing and activism that followed the Battle in Seattle, particularly as Indymedia unexpectedly became a model for radical media organizing, and nodes began appearing in local communities and joining the growing IMC network. The Resist! collective emerged out of this wave of

³¹ Personal communication, August 19, 2009.

³² Personal communication, August 19, 2009.

tech activism, arising phoenix-like out of the ashes of TAO Vancouver, driven by activists' need for security, privacy and autonomy in their online communications. According to founding member Megan Adam, activists required a radical provider that would protect their information against state snooping and corporate data mining as well as defend their free speech rights online. Activist “sites with servers that were autonomously owned meant that the state couldn't come in and shut them down when people most needed communications” (interview, 2008). Thus, where TAO focused more on community outreach, education and tech training, Resist! was conceived as a radical server project.

The first Resist! server went online in the summer of 2000 and began offering email and list services to the international activist community two years later. Serving under the motto “appropriate technology,” the collective is founded on anarchist principles, operates on consensus and has a clear social justice mission in line with the goals of the global justice movement:

Our purpose is to aid in the creation of a free society, a world with freedom of expression and freedom from want, a world without oppression or hierarchy, where power is shared equally. We do this by providing communication and computer resources to allies engaged in struggles against capitalism and other forms of oppression (Resist!, *Mission Statement*).

In order to become a member and receive services, users should adhere to the spirit of this mission. Thus they must agree to the Basis of Unity—a combination of principles and political demands. In addition, applicants are asked to disclose their political affiliations in order for their application to be considered seriously. Following the anarchist principle of mutual aid, services are provided on a “pay-what-you-can” sliding scale, starting at \$2 a month for email accounts. Donations of money and labour (technical or non-technical) are also accepted; most members, however, pay nothing.

Entirely built with free software, Resist! today has more than 2500 users and hosts hundreds of email lists for diverse groups such as the Bus Riders' Union, No One is Illegal and Food Not Bombs.

In Resist!'s efforts to build a communications infrastructure exclusively for activists, it has followed in the footsteps of Indymedia. But where Indymedia strove to create an alternative media system for activists based on free software, Resist! used free software to provide activists with the technical services required for their online communications. Despite their shared affiliation with the global justice and free software movements, however, Resist! and Indymedia differ in their respective approaches to technology. For Indymedia, technology is mainly the domain of IMC Geeks; although absolutely essential, the technology is secondary to the broader project of radical media making. In other words, technology is a tool rather than a focal point for activism. In contrast, technology is at the heart of Resist!'s mission, and structures its activism: "Resist!ca is not an internet service provider per se, but rather a political project whereby we create and support infrastructure for activists around the world" (Resist!, *Introduction*). Technology is clearly political for Indymedia techs but Resist! explicitly politicizes technology for its users. "We empower organizations and individuals to use technology in struggles for liberation. We work to support each other in overcoming the systemic oppression embedded in the use and development of technology" (Resist!, *Mission Statement*) So, while Resist! provides the activist community with a set of technical services, it regards its function as political, not merely utilitarian.

As a radical tech collective, Resist! subscribes to the community model of the internet, and adapts internet technology to its social goal of community building online. Instead of choosing open publishing for its newswire, for example, Resist! techs hacked

up Scoop, an open source CMS in order to facilitate editorial control. “We don’t subscribe to the open publishing model. Our model is more centred on our community versus the general community...We don’t get Nazis posting to our website like you do with Indymedia” (Ron Collins, interview, 2005). Like other radical tech collectives, Resist! serves the progressive activist community by providing accessible, non-commercial, relatively secure online communication. Resist! creates a conscious community by requiring new users to agree to its Basis of Unity, thus ensuring self-selection on the basis of shared politics and values. This evokes Dewey’s (1927) idea that community is based in communication, or the sharing of meanings, and the related notion that community life is the foundation of democracy. “The clear consciousness of a communal life...constitutes the idea of democracy,” writes Dewey. “Only when we start from a community as a fact...can we reach an idea of democracy which is not utopian” (149). In agreeing to the Basis of Unity, users pledge their support to the collective’s overarching goal “to aid in the creation of a free society” (Resist!, *Mission Statement*); it also signals their participation in a virtual communal project that engages in the democratic rationalization of the internet. In supporting activists in their social justice struggles, Resist! contests the definition of the internet as a commercial space in thrall to global capitalism, projecting a democratic understanding of community onto the still-ambivalent technology of the internet.

Riseup/Crabgrass

Riseup is another radical tech collective started by activists organizing for the Seattle protests against the WTO in 1999. “We saw ourselves as part of the global justice movement first,” explains founding member Sparrow (interview, 2008). “But then we were like, wow, we also have all these geek skills and we saw a great lack of adequate

services. We realized we could provide [tech] services too.” Like other radical tech collectives, including TAO and Resist!, Riseup's beginnings were humble; says Sparrow, “there were three of us who put a server in someone's basement. Basically, it was like a \$200 computer that someone found at a garage sale and then...we started hosting stuff.” Today, by Riseup's estimation, it is the largest non-profit email list hosting service, with over 2.5 million list subscribers, 20,000 email users, 13,000 lists and 50 hosted servers (Riseup, *All About Crabgrass*). In addition to email, web hosting and list hosting, Riseup provides affordable and secure server co-location for social movement organizations around the world. Its other work includes free software development (several members are active contributors to the Debian GNU/Linux distribution) and the Tech Collective Incubation Project, which helps new technology collectives get started by providing free servers, bandwidth, and technical support.

Riseup is one of the larger tech collectives, with about 10 core members, and one of the more stable, though it is always short of volunteers and money. Its stated goal to create an alternative communications infrastructure for communities of resistance.

We promote social ownership and democratic control over information, ideas, technology, and the means of communication. We empower organizations and individuals to use technology in struggles for liberation. We work to support each other in overcoming the systemic oppression embedded in the use and development of technology.

These interrelated objectives are enframed by a critical constructivist analysis and nest within the larger goal of building a better world. Riseup shares the scathing critique of the corporate communications industry that characterizes radical tech collectives, as well as the broader global justice movement. This critique drives Riseup's mission to provide a secure, non-commercial online communication infrastructure for social justice activists.

Like other radical tech collectives, Riseup has a social contract, which states its purpose and political principles, briefly summed up as support for direct democracy, anti-sexism, anti-racism, anti-capitalism, self determination, local autonomy and communal economics. While Riseup expresses solidarity with a broad spectrum of progressive politics and campaigns, it asks users to refrain from using its services to advocate support for capitalism, domination, or hierarchy; a vanguard strategy for revolution; population control; or the superiority of certain types of oppression. These particular points provide the foundation for the development of an activist community online; therefore they are non-negotiable: “If you disagree with this, then riseup.net is not for you” (Riseup, *Riseup social contract*). The user agreement goes further in articulating what type of community (and world) Riseup is building in its proscription of certain social behaviours, which include commercial exploitation of Riseup services, user harassment, and collecting personal data for users without consent. It also requires agreement from users regarding other behaviours, like maintaining the confidentiality of their accounts and passwords and reporting security breaches (Riseup, *Usage agreement*).

In considering how to address the special needs of activists online, Riseup collective members conceived Crabgrass, a FOSS “web application designed for group and network organizing, and tailored to the needs of the global justice movement” (Riseup, *Welcome...*). The long term goal of Crabgrass is to “provide the technical tools to facilitate active, confederal, and directly democratic social change networks” (ibid). Sometimes described as social networking for activists, Crabgrass operates on virtual terrain made familiar by MySpace and Facebook. “The social networking phenomenon holds much promise,” acknowledges one planning document. “But it is clear that the revolution will not be hosted by MySpace” (*Introduction to Crabgrass*, 2006). In

Crabgrass, users create networks by adding friends and joining or creating groups; they can upload pictures and PDFs (though there is no video support as yet); they can chat or message, as well as update their status.

It would be misleading to describe Crabgrass as “Facebook for activists,” however. Where Facebook is a walled garden built on top of proprietary software, featuring dubious privacy policies³³, uncertain copyright regulations³⁴ and a fairly limited and inflexible set of user functions, Crabgrass is free software, written in Ruby on Rails (a FOSS programming language) and licensed under the AGPL.³⁵ Crabgrass is hosted on Riseup's secure server, and is configured to only allow HTTPS connections.³⁶ Crabgrass has a strict privacy policy focused on user rights, featuring encrypted data storage and a pledge to “actively fight any attempt to subpoena or otherwise acquire any user information or logs” (Riseup, *Riseup Networks Privacy*). Crabgrass offers a suite of group collaboration tools that allow for flexibility as well as security in online organizing, including wikis, discussion forums, task lists, file repositories, and decision making tools.

³³ In July 2009, Privacy Commissioner of Canada Jennifer Stoddart reported findings of an investigation into Facebook's privacy policies and practices. Prompted by a complaint from the Canadian Internet Policy and Public Interest Clinic, the investigation found “serious privacy gaps in the way the site operates,” including outright violations of Canada's privacy laws http://www.priv.gc.ca/media/nr-c/2009/nr-c_090716_e.cfm.

³⁴ The main point of contention in an August 2009 lawsuit filed against Facebook by five users in California was the question of whether the website owns users' self-generated content—the personal information, notes, photographs and video posted to their profiles <http://www.cnn.com/id/32458206>.

³⁵ Affero General Public License is a “free, copyleft license for software and other kinds of works, specifically designed to ensure co-operation with the community in the case of network server software” <http://www.gnu.org/licenses/agpl.html>.

³⁶ HTTPS is a combination of the Hypertext Transfer Protocol and a cryptographic protocol, designed to create a secure channel over an insecure network. It ensures reasonable protection from eavesdroppers and man-in-the-middle attacks by encrypting an HTTP message before transmission and decrypting it upon arrival http://en.wikipedia.org/wiki/Man-in-the-middle_attack.

Unlike social networking services, which are designed to facilitate networking amongst individuals, Crabgrass's central objective is to engender group collaboration and network organizing:

By group collaboration, we mean the ability of small groups to get things done, such as share files, track tasks and projects, make decisions and build repositories of shared knowledge. By network organizing, we mean the ability of multiple groups to work together on projects in a democratic manner (*All about Crabgrass*).

These various elements are implemented from a social networking perspective; in other words, the ability for users to connect online and build relationships and trust with other users is essential for social justice organizing. For the designers of Crabgrass, however, social networking software has a more important function. According to tech activist

Daniel Kahn Gillmor:

Successful social networking tools have the opportunity to codify community behaviour. A widely-used framework can define not only what's acceptable or not, but what's *possible* or not. Many commercial social networking frameworks don't seem to encourage community participation outside of "typical" interactions—joining a group, "friending" someone, blogging or commenting on a blog, etc.³⁷

The knowledge that technical frameworks constrain or enable certain social behaviours is common among tech activists, and tends to inform and influence their coding. One of the main goals of Crabgrass is community building, and the encouragement of collaborative work and communal decision-making. As such, its technical focus is on encoding these social values into the software. "The developers of Crabgrass are making a strong effort to re-imagine the social structures inherent in our technical infrastructure, and are actively creating tools that support other models of community interaction," adds Gillmor. Tools like the proposed "straw poll," "which encourages consensus decision making through accountability and conversation, are key to building

³⁷ Personal communication, September 10, 2009.

a democratic network. The Crabgrass development community itself is not only open to but actively investigating different models of online interaction.”

This is in stark contrast to proprietary social networking sites like Facebook, where the formation of community extends to creating and joining groups, and where user participation is restricted to posting comments, adding links and uploading photos or videos (where enabled). While Facebook users have used the social networking site to promote events and actions, the range of functions associated with groups, pages and and events is limited and inflexible. In addition, because Facebook was not intended as a participatory platform, user interactivity is fairly basic, restricted to simple responses (“Like” or “Attending”) and commenting (where enabled). In contrast, Crabgrass is a participatory environment by design, supported by tools that enable user creativity and interaction. The wiki tool, for example, allows users to create an editable document that can be shared with other users, groups and networks while controlling what information remains private and what is made public: “You need to be able to add in support for that level of fine-grained access permissions in such a way that facilitates private communication among groups” (Sparrow, interview, 2008). Usability for members with minimal technical skill is a key concern for Crabgrass developers. In a proposal to develop instant messaging, one tech stresses simplicity: “You should be able to send a personal message with as few clicks as possible; perhaps with one!” (Crabgrass Dev Network, n.d.). In a discussion about improving the wiki function by adding HTML support, another programmer writes: “Keep the HTML support semantic for accessibility reasons!” (Riseup, *New features*).

Crabgrass represents an entirely different user experience than commercial social networking, outwardly focused on community, rather than inwardly directed toward the

individual. “We're trying to build tools that reflect more closely our real world experience with how people democratically organize,” explains Sparrow (interview, 2008), “instead of relying on social networks or on online collaboration tools that are really kind of crude and blunt or actually encode logics that are contrary to the democratic impulse we're trying to foster.” Though still in beta version, Crabgrass's emphasis on collaboration, democratic decision-making, community building and secure communication encode at the technical level both the requirements and social values of activists in the global justice movement. Like Active and Samizdat before it, Crabgrass is an activist technology, informed and built with the intention of reproducing the ideals and practices that fan the flames of hope that another world is possible.

Democratic politics of technology: The code to freedom?

This chapter discusses tech activism in its various facets, from its origins in the hacker movement through its most recent manifestation in the global justice movement. In building the technical infrastructure of that movement, and in seeking to provide online communication services and support, today's tech activists are consciously crafting an internet in the image of the just society. They view technology as highly political, and demonstrate an awareness of the social consequences of technical choices. Through their FOSS development, tech activists participate in the social construction of technology. This confirms their knowledge of internet as a “contested terrain” where relevant social groups compete for hegemony in cyberspace (Kahn & Kellner, 2004b). This contest exists at the logical and application layers of the internet, and between commercial and community models of the internet; between user-citizens and the corporate-state nexus, and between proprietary and free and open source software. As a technology whose code will never ossify, the internet remains unfinished, its technical

design controversial and open to technical and social interpretation. Tech activists' awareness of the internet's interpretive flexibility translates into user agency at the level of its design, particularly in regard to FOSS and activist-oriented online communication infrastructure. User agency is key to the ongoing process of “inventing” the internet and the possibility of molding it after a more democratic, community-oriented model. The emergent technical code of the internet reflects values that contradict those that cohere in the capitalist technical sphere, suggesting that the internet is ripe for democratic rationalization. “As a technology is stabilized, its design tends to dictate users’ behaviour more successfully and agency recedes into the background;” thus the time to intervene in this process is now (Feenberg & Bakardjieva, 2004, 14).

The socio-political implications of tech activism are clear: by creating and appropriating the internet for their social justice work, tech activists project their vision of community on to the ambivalent technology of the internet. In doing so, they actualize potentialities inherent in the structural design of the network, potentialities that are threatened by the ever expanding reach of capital. Tech activists and the radical tech collectives and activist software projects discussed in this chapter comprise a new “democratic politics of technology,” unified by the very communication networks they contest and reinvent. “In their tactical resistances to established designs,” writes Feenberg (1999), they “can impose new values on technical institutions and create a new type of modern society” (128). This is lofty stuff, the stuff of dreams. Yet the values of freedom, autonomy, equality, community, co-operation, mutual aid and collaboration that concretize in activist deployments and appropriations of internet technology, and in turn make those values manifest in democratic communication online, belie the fantasy. These values are contrary to those that embed the technical sphere of the dominant social order; they present a way forward, a vision of the new society enacted in the here

and now, as well as into the future. Tech activists and radical tech collectives develop the internet along the community model by carving out and defending space for democratic communities online. As one Resist! tech put it: “We don’t pretend to be *the* community. We hope to build networks and introduce activists to different projects hosted on the server, to make people aware of actions happening around the country and around the world, and to help people to not feel so isolated in their struggle” (Ron Collins, interview, 2005).

Chapter 6: Talking to tech activists

Despite the wane of “anti-globalization” demonstrations, and the proliferation in cyberspace of progressive media projects, blogs and social networking websites, Independent Media Centres around the world continue to report on social justice issues as they are manifest in local struggles for equality, democracy and liberation. Although considered irrelevant or passé by some, Indymedia has been a focal point for tech activism in the decade since Seattle, and remains a key source of information about radical struggles in developing nations, particularly those where formal democracy has no or little footing. Ten years after the birth of Indymedia, tech activism remains closely linked to its roots. Many of the tech activists involved in building the first IMCs continue to work on the project, both in their local collectives and on the global website. Others have used their experience with Indymedia to build complimentary projects that support activism online, such as Resist!, Riseup and TAO, as discussed in Chapter 5. Still others focus on free and open source software (FOSS) projects, particularly those oriented toward activist needs in cyberspace, such as Crabgrass, the social networking site “tailored to the needs of the global justice movement” (Riseup, *Welcome to we.riseup.net*) and Samizdat, a content management system explicitly designed to “promote values of freedom, openness, equality, and co-operation” (Samizdat, *Mission statement*, n.d.). In order to better understand the phenomenon of tech activism—its objectives and its role in the global justice movement—I interviewed 22 tech activists from around the world. This chapter attempts to give voice to their analysis as well as their vision, relying upon their words wherever possible.

Portrait of the activist as a radical techie

The tech activist community is small and highly interconnected, despite its globally distributed nature. The techs I interviewed live in different countries around the world, including Belarus, Germany, Spain, England, the United States and Canada, reflecting the distributed nature of the global justice movement. They are by and large well educated: at least 14 had university degrees. Of those, six had or were pursuing graduate degrees. Another four were university drop outs, having found activism and programming more compelling endeavours. Areas of formal study fell into four main categories: computer science, math, science and philosophy. One tech activist noted two types of student in computer science: those interested in making money and those interested in solving problems. The former only wanted to learn Microsoft; the latter “tended to be interested in free software. If they're there for personal interest and creativity, they want to see software used in a way that helps other people...” (Peter Lypkie, 2008, interview).

More than half of those interviewed are programmers working on free and open source software projects. The technical contributions of the others include server maintenance, system administration and website maintenance, as well as “softer skills” such as member intake and help desk. They tend primarily to have paid labour in the IT sector, with the others spread amongst the non-profit and advocacy sectors. During intense movement activity, it is not unusual for tech activists to spend upwards of 60 hours a week on their activism, though the average time spent ranges from 2-10 hours a week. It is not uncommon for those with well paying jobs to contribute labour and money to social justice causes.

The majority of respondents self-identified as tech activists, with the others categorizing themselves primarily as activists, media activists, geeks or citizens. Many had been computer geeks from childhood or teenage years. A few came to tech work through activism (usually media activism); a few others became involved in activism through their free software development. Some had parents who were politically involved while others were drawn to activism as young adults in high school and university. Generally, respondents tended to engage in other forms of offline activism, working on such campaigns as anti-oppression, media democracy, food security, and environmental sustainability prior to their tech activist work.

Those not directly involved in the global justice movement today continue to work on various social justice projects. Whether they were raised with a social justice conscience or came to activism as young adults, respondents shared a strikingly similar, yet simple, goal: to be of use, to help out with the skills they had. “I’ve never been a real theorist,” says programmer Mike Cantelon, a Resist! co-founder. “It was more, how can I make myself more useful to something I consider valuable?” (interview, 2008). Says IMC Geek John Duda, “for me, tech activism was a way of having a deeper personal involvement with activist work that I felt I could make a more useful contribution.” Blue Footed Bobby, a Riseup programmer, describes his tech work as “a natural progression of where I could be useful in activism” (interview, 2008).

Half of my respondents identified as anarchists, while several made references to a marxist analysis. The influence of anarchism in the global justice movement has been well noted, particularly its decentralized, affinity-based mode of organizing (CSIS, 2000; Downing, 2001b; Epstein, 2001; Starr, 2001). Indymedia programmer Dmitry Borodaenko saw “Indymedia principles as inherently compatible with my anarchist

principles.” He decided to get involved “to help people—not only anarchists but any people involved in social activism, to provide them with informational resources, with the means to communicate, to co-ordinate, to help each other and to organize” (interview, 2008). For Borodaenko, Indymedia represented an actualization of anarchist principles, especially self-organization, and he hoped it would show users of the website that anarchism works “in the real world.” Associated with the analysis of unequal power relations engendered by the world-dominant economic system was a commonly held assessment of current environmental practices as devastating and unsustainable. Several took for granted that a global ecological crisis or disaster was imminent, causing their activism to take on urgency. “I feel like this is unstable, unsustainable. Our society cannot keep going in this way,” comments Blue Footed Bobby (interview, 2008). “This is not charity for me; this is about saving myself and the people I love. I feel like we have to try. I've got to try.”

Race, class and gender: Acknowledging privilege

Tech activists are typically male—only five of the 22 people I interviewed were women, and of those only one was a software programmer. The problem of gender imbalance has long been acknowledged by the tech activist community. In 2003, IMC co-founder Sherri Herndon characterized the Indymedia tech collective as mostly white, middle class and male. “There are women who do some things, but it's all guys running the network...A lot of women feel that techies don't share their power, they don't share their knowledge,” she comments. “There is a kind of centralizing power because the techies...run the website; they're the ones who have the code” (interview, 2003). Michelle Poirier, a former member of TAO, considers the lack of gender parity among tech activists from an anti-oppression perspective: “looking at the faces of who is active in

tech activism—predominantly it was white, young to middle aged, able bodied men. Those were the faces and I wasn't quite comfortable with that, especially if this was supposed to be the revolutionary space..." (interview, 2008). Sparrow, a Riseup programmer, acknowledges that gender inequity can contribute to traditional power imbalances, even where stated goals are to eradicate dominative social relations: "Ultimately, if we [male techs] don't like something, we can just go home and change the code" (interview, 2008).

The women I interviewed shared similar experiences of being the only woman in the group, of struggling with the technology, or of lacking confidence in their technical role. "I'm somewhat hesitant to call myself a tech person, but I have a full-time programming job," says Tufted Puffin, of Riseup. "It took me a while to feel comfortable calling myself a geek or tech person. I think gender definitely comes into play with that sort of identification" (interview, 2008). Poirier notes the contradiction between the liberatory impulse of free and open source software and unequal social relations in which FOSS is embedded:

I would show up at meetings for tech activists and I literally would be the only woman in the room and everyone else in the room would be white. I mean, I'm living in Toronto, a very multi-ethnic city, so I guess it's problematic, right? I mean problematic in the sense that it's not representative of everyone. [Free]/open source software purports itself as a revolutionary tool against mega corporations. There's this free/libre rhetoric...that would suggest that *that* liberation or *that* revolution was for everyone when in actual fact, that *everyone* was a particular *someone* (interview, 2008).

Identity-based critiques and charges of elitism against the GJM are not new (Starr, 2004). Observed one media activist, "For radical techies and white-majority 'global justice' activists, there is a growing awareness of being even further behind on on some

the most urgent and undeveloped questions and challenges, those around race and class” (Dichter, 2002).

In addition to power imbalances along race, class and gender lines, this creates further division within collectives between tech and non-techs. “Geeks suddenly have an exaggerated, disproportionate influence on the decision-making process within an organization because of the obscurity created by technical questions” (Bickell, interview, 2008). Mark Burdett discusses the reorganization of the IndyBay IMC due to the social division created by technical hierarchy.

We’d had a lot of problems where there was kind of a divorce between editorial and tech and it didn’t really make much sense. Basically, editorial people were supposed to come up with ideas and decisions for how the site would work, and tech people were supposed to implement them, but that wasn’t really happening. It was kind of dysfunctional and the tech people tended to have too much control over things. So we just had a web collective that would meet and decide everything as a group (interview, 2008).

Several of the male techs interviewed acknowledged their privileged position within the movement, and their consciousness of it informed their activism. “For me it’s trying to connect with what other people experience and how my experience is different, as a white male North American, with a better lifestyle and more privilege,” says programmer Peter Lypkie, a volunteer with Free Geek, a computer recycling and community centre.

Adds Blue Footed Bobby, from Riseup:

I come from this upper middle class white background. I grew up in the suburbs. My parents are professionals. I went to a fancy college; I went to graduate school. I just have been given a lot of opportunities and I have the ability to do a lot of things that not everyone can do because of where I grew up and the chances I had (interview, 2008).

He sees Riseup as an ally in anti-oppression organizing by providing technical services to minority groups. He takes a nuanced view of the root causes of injustice, however: “there

are intersecting systems of oppression and if you pick one and exclude the others you'll fail the way so many things in the past have failed.”

Shared motivation: World changing and a critique of capitalism

“I have a t-shirt that says if you're not pissed off, you're not paying attention.” That's how UK Indymedia tech Kester Edmonds (interview, 2008) summed up the motivation for his activism. Tech activists are concerned with the economic, environmental and military havoc wrought by the totalizing economic system of neoliberal capitalism. Generally, they share the anti-capitalist critique articulated by the global justice movement, a response to the “apparently relentless widening of global inequality that has occurred in the heyday of the Washington Consensus” (Callinicos, 2003, 22). Early on, the movement “named the enemy” (Starr, 2001): “It was capitalism itself and the logic that governs it—a logic of exploitation and competitive accumulation—that was the problem” (Callinicos, 26). The global justice movement issues a challenge to neoliberalism portrayed as a one-size-fits-all economic model, and not globalization per se, as the mainstream media and politicians have often reported (Klein, 2002). In contesting the internationalization of capitalism, global justice activists reject the economic template that promotes privatization, deregulation and trade liberalization, on the grounds that it is economically and environmentally unsustainable, and therefore socially unjust.

Starr (2004) summarizes the long-term goal of the GJM as “structural change, described variously as 'revolution' and 'democratization,’” a goal shared by tech activists, and codified in the policy documents of the various tech collectives. For example, Riseup explicitly states its commitment to radical social transformation in its statement of

purpose: “We work to create revolution and a free society in the here and now by building alternative communication infrastructure designed to oppose and replace the dominant system.” Similarly, Resist! calls for structural change in social organization in its Basis of Unity statement: “the means of production should be placed in the hands of the people, empowering communities to organize meaningful employment, and provide a responsible and sustainable standard of living which tries to meet the needs of all people.”

Tech activists share a well-developed analysis of capitalism. States IMC Belarus tech Boradaenko: “One of the primary obstacles...is capitalist society, is a money system which allows some people to gain power over other people. At the same time, it educates people [to] consider taking advantage of people a norm rather than something only sick people would do” (interview, 2008). Alster, from IMC Germany, identifies capitalism as the greatest impediment to achieving progressive social change:

Much could be improved if there were not the dictation to make profit. Financial interests and some selfish and egocentric people get in the way. But it's not so much these people who pose a problem, it's mostly the system which ultimately requires those taking part in it to be profitable and not care about those who are not (interview, 2008).

Tech activists in no way consider technology to be a panacea for the dehumanizing and reifying effects of capitalism; in fact they are critical of positivist interpretations of technology. However, they are guided by the idea that technology can be built and used to make human connections and develop individuals' sense of humanity and community in a way that creates lines of flight from capitalism and toward alternate, as yet unrealized, modes of existence.

Shared vision: A just world for all

The tech activists I interviewed have a strikingly similar vision of the world they want to help build. It is a vision in keeping with the overarching goal of the global justice movement, as defined by della Porta (2007): to advance “the cause of justice (economic, social, political and environmental) among and between peoples across the globe” (6).

John Duda, a programmer with Baltimore Indymedia, offers a comprehensive explanation of this vision, as a

a world where people have substantial control over their own lives, where they are not manufactured as consumers, where they are not indoctrinated into being citizens in support of war but where people really have a fabric of a local community that ties them to a larger world in which they have the ability to participate in decisions. A world in which there is a substantial redistribution of wealth and power away from the very hierarchical, pyramid-shaped forms we now have to something a lot more diffuse and a lot more egalitarian (interview, 2008).

Notions of equality that account for distribution of wealth and power, feature prominently in the future world envisioned by tech activists. The current social order is found sorely lacking, and stands in stark contrast with the ideal sought. “I believe in talking about utopian visions in terms of an important imaginary domain to be able to think about,” comments Sparrow (interview, 2008). “My vision of a just society is a world in which there is both freedom of expression and freedom from want...your standard anarchist vision of a...society in which there are power flows from the bottom up.”

A strong sense of fairness is a common thread interweaving this vision: “I want to live in a world where people are actually equal and have the opportunity to be happy that's not at the expense of others,” asserts coder Blaine Cooke (interview, 2008). Tufted Puffin shares this sentiment: “Some people shouldn't exist at the expense of others or have lifestyles that are oppressing others. Broadly, I want to live in a society where

people are empowered to live in the way they want so long as it isn't oppressing others” (interview, 2008). Tech activists consider education to be an important factor in this. “I want to see a world where people are all educated, in that they're aware of how the society works, [where] people care about each other and the social good, the common good and the health of society” explains Boradaenko (interview, 2008). Cantelon puts it the most bluntly: “Education is about the only thing that's going to be effective in the long term” (interview, 2008).

Interviewing the elusive tech activist

The main criterion for inviting techs to participate in this dissertation was current or former participation in or around the global justice movement. Generally speaking, global justice activists are a cagey bunch. They are relatively easy to find on the web, if you know where to look: in real time on Internet Relay Chat (IRC) channels, or archived in IRC logs, meeting minutes, wikis and other digital records. But making contact and securing interviews is quite another thing. It took me six years of working in this area to build credibility in the tech activist community and earn the trust of 22 geeks. It was a long process of getting to know these people, joining their list servs and collectives, learning and adopting their method of knowledge production, meeting them in person at hacker conferences and tech unconferences, and building peripheral relationships that helped me gain entrance into this subset of the activist world. While the majority of respondents chose to be identified by their real name, four opted to use their “nom du net,” the handle by which they are known online. This was due to general security concerns surrounding state surveillance of social movement activity, something that can have serious consequences for activists. For this reason, some respondents

chose to go off the record when speaking about certain aspects of their activism or encounters with the state.

State repression of social justice movements after 9/11

There is good reason for their reticence. In post-9/11 North America, where the “negation of civil liberties, heightened surveillance, and legalized racial profiling are insurance against the possibility of significant political resistance,” activists associated with the global justice movement have faced increasing repression and violence and at the hands of state enforcers (Lipman, 2006). Excessive use by police of tear gas, pepper spray, water cannons and rubber bullets against demonstrators at street protests has become standard procedure (Klein, 2002). Other commonplace security techniques include “pre-emptive arrests of protest organizers, random beatings of activists, raids on activist 'convergence centres' and the seizure of harmless protest materials such as placards and puppets” (139). Police violence reached a crescendo at the Group of Eight summit in Genoa in 2001, when the Italian military shot Carlo Giuliani at point blank range and then ran him over in a Land Rover.³⁸

The focus of global justice organizing began to shift away from street demonstrations even before the catastrophic events of 9/11. According to Megan Adam (interview, 2008) this was because the mass public gatherings became “more and more frightening and the stakes got higher and higher. And when they killed Carlo Giuliani in Genoa, Italy, that's scary shit. And that's really what was starting to happen—more and more violence...” Activists in the movement generally agree that “the events of September 11 and their consequences have been a tremendous blow” that has created a

³⁸ For more on the violence at the G8 Summit see <http://www.guardian.co.uk/world/2001/jul/21/globalisation1>

false link between global justice activism and terrorism, giving governments the world over an excuse “to close public spaces and to repress dissent from whatever source” (Caffentzis, 2005). This made it difficult for activists associated with the GJM to organize or mobilize en masse: “Before Seattle and the lead up to APEC³⁹ it seemed there was a vibrant and engaged activist community,” notes tech activist Blaine Cook (interview, 2008). “If you wanted to start a group or help people organize things, it was really easy. After 9/11 it became really difficult.” Adam agrees: “it became so hard to organize under conditions of 'you're with us or against us.' It's almost like we got really disoriented after September 2001...And the state used that period, that open space, to fill it with security guards and cops and military and wars.”

Have you been served? Attacks on tech activist projects

National security experts have closely scrutinized the global justice movement, particularly its relation to and use of the internet. A Rand Corporation publication defines anti-globalization organizing as *netwar*, “an information-age model of social struggle” (Arquilla & Ronfeldt, 2001). The Canadian Security Intelligence Service identified the internet as key to the success of the GJM and “a major source of protest motivation and planning [that] will require careful monitoring” (CSIS, 2000). As early as 2000, CSIS was recommending “monitoring the communications of protesters” (ibid). Server seizure, subpoenas for server log files and threats to shut down websites as a result of state surveillance are not uncommon experiences for tech activist projects (Juris, 2008). The following are just some examples of this:

³⁹ The Asia Pacific Economic Co-operation summit held in Vancouver, BC in 1997 was the first manifestation of the emergent global justice movement in North America. Globally, “ritual celebrations of economic globalization” such as the APEC summit were already targets for protest around the world (Laffey & Weldes, 2005, 74).

***April 2001** The FBI unsuccessfully tried to subpoena the server logs of Seattle Indymedia when global justice activists in Quebec City stole a memo on protest policing tactics from the back of a squad car and posted it to the newswire. IMC Seattle refused to give police the logs, and eventually had the subpoena and an accompanying gag order overturned in court. (Costanza-Chock, 2004).

***July 2001** A violent raid on an activist and media convergence centre at the Group of Eight Summit in Genoa resulted in the injury of 92 demonstrators, and the destruction of computers as well as camera film and videotape evidence. One officer described it as a "bloodbath" and said police were "beating youths like wild beasts" (Summers, 2005).

***August 2004** The US Secret Service issued a subpoena to an Indymedia web host demanding contact information as part of its investigation into an anonymous posting of publicly available information. The web host contacted four tech activists, who agreed to the release of their names. The American Civil Liberties Union acted as legal defence for the techs and the web host, calling it an act of intimidation against political speech and dissent.⁴⁰

***October 2004** The FBI requested the log files of two servers located in the UK and serving 20 IMCs in Europe. The American web host responded by taking the servers offline for a week. The Electronic Frontier Foundation, which represented Indymedia, questioned the US government's complicity in the matter, raising the possibility that it

⁴⁰ *ACLU criticizes secret service investigation of news website that posted RNC delegates' names*, <http://www.aclu.org/free-speech/aclu-criticizes-secret-service-investigation-news-website-posted-rnc-delegates-names>.

deliberately misled “the web host into thinking it had to hand over complete copies of the Indymedia servers.”⁴¹

***June 2005** British Transport Police seized the server and computer equipment of Bristol Indymedia in response to a posting about rail vandalism.⁴²

***March 2008** Montreal anarchist web host Koumbit was served with a search warrant authorizing police to seize all computers in its office and granting access to its server log files after the anonymous publication of articles on CMAQ⁴³. “Given the risk of seizure of workers' hardware, Koumbit was forced to provide three lines of logs to the inspectors,” read a press release “to avoid the possibility of seizure of all Koumbit's servers and therefore the deactivation of hundreds of sites belonging to users that are in no way related to the CMAQ, even less so to the authors of the...articles.”⁴⁴

***January 2009** Police in Manchester, UK seized an Indymedia server without showing a warrant, due to an anonymous posting that had already been removed in accordance with Indymedia's privacy policy. The server hosted Indymedia London, the global Indymedia wiki (containing the documentation written by all 165 IMCs worldwide), a mirror site of Indymedia UK, and a development site for Indymedia UK. IMC UK server admins estimated around one million pieces of content were affected.⁴⁵

***January 2009** The FBI issued a subpoena to US Indymedia asking “for the IP address of every one of indymedia.us's thousands of visitors on that date—the IP address

⁴¹ *Secret documents about Indymedia server disappearance unsealed*, <http://www.eff.org/press/archives/2005/08/02>.

⁴² *Indymedia server seized in raid*, http://news.bbc.co.uk/2/hi/uk_news/england/bristol/somerset/4629399.stm.

⁴³ Centre des médias alternatifs du Québec, the French name of the Quebec IMC.

⁴⁴ *Press release: search warrant at Koumbit's offices*, Retrieved May 5, 2009 from <http://koumbit.org/en/node/10796>.

⁴⁵ *Police seize UK Indymedia server (again)*. Retrieved May 22, 2009 from <http://www.indymedia.org.uk/en/2009/01/419838.html>.

of every person who read any news story on the entire site” (EFF, 2009). The Electronic Frontier Foundation (2009), which represented IMC US, called the subpoena bogus in that it violated restrictions on what types of data the government can obtain under the *Stored Communications Act*, and it contained an unenforceable gag order.

The security risks faced by activists online have broader implications for free speech rights and democracy in general. This points directly to the need for radical tech collectives and the democratic communications infrastructure they are building cyberspace. This is why Megan Adam helped co-found Resist! in 1995:

With the web you have this issue of keeping things online; particular sites get attacked or taken down. You want radical providers who are going to defend free speech in that sphere. For things like email and communication, the security issues are much bigger because you're talking about what people consider their private information, which isn't very private on the internet. Resist! wanted to make that more secure for people who are planning things or talking about things or simply don't want the state to know all about their identities and their personal lives.

If you look at any FBI investigation of the ELF [Earth Liberation Front] and the number of court cases, Resist! is *always* mentioned because we hosted the website for so long. And it was like, who is this shadowy group of people in Canada that's willing to host this illegal material? I think it's really important to have people who will say, yeah, we'll host this shit. We're going to host instructions on how to burn buildings down and that's okay because we have the right to do it. And be willing to take that legal risk (2008, interview).

While some server hosts will take the legal risk, or will at least contact activists before handing over information or servers, many comply immediately with police requests, with or without a warrant. A host that will defend its clients' cyber-rights is crucial for radical online projects, explains IMC tech John Duda:

We've had some servers where we've had tight personal connections, where people have been very willing to stand up to the government. When the government comes knocking and asking for logs or to confiscate servers, they say, “actually, no, I'm going to call my lawyer. Why don't you

get back to me?” Other places where servers were hosted were more than willing to just give servers away (interview, 2008).

The increasing prevalence of server seizures and requests or warrants for log files is the main reason some online tech projects do not keep IP addresses in the server logs⁴⁶ or any server logs at all. Indymedia's no-logging policy has been in effect for several years (Seltzer, 2004). “We don't keep log files for any of our traffic,” says Adam of Resist!s approach (interview, 2008). “When the RCMP comes and asks for the log files we legitimately can say we don't have them.” She recounts her early tech activist work with TAO Vancouver: “Back in the day, TAO refused to hand over files. What was interesting, though, was that the RCMP never did come with subpoenas. They made requests and then didn't follow them up with any legal action.”

Antoine Beaupré, founder of the anarchist web host Koumbit, recounts a similar story of police intimidation:

The first time, the police sent a lawyer's letter, all official, to scare the hell out of us. The second time they figured they had us scared so they just called me...The director of communication told us they wouldn't go through all the trouble of pursuing a lawyer's letter, if we would just remove this article. I said I needed to speak with CMAQ about it and get back to him, but I never called him back (interview, 2008).

This type of police intimidation does not appear to be atypical. However, as another activist comments: “I think the question of whether or not the cops had a warrant is a bit of a red herring. They could easily get one if they wanted, and if not, or it became a problem, they would get the law changed to not require them.”⁴⁷ Such a statement cannot be considered far fetched or paranoid given the revelations of US National Security

⁴⁶ *ACLU: Statement of Brian Szymanski Regarding Secret Service Investigation of Indymedia.* Retrieved May 20 2009 from <http://www.aclu.org/freespeech/protest/11476prs20040830.html>.

⁴⁷ *Comments: Responses to some of the technical points.* Retrieved 22 May 2009 from <http://www.indymedia.org.uk/en/2009/01/419838.html?c=on>.

Agency's domestic surveillance project, which conducts warrantless wiretapping on a massive scale. This project largely rests on the complicity of major telecommunications providers like AT&T, which has a room at its downtown San Francisco switching centre designed to monitor internet and telephone traffic. According to the Electronic Frontier Foundation (2007), which sued AT&T for violating its customers' privacy by participating in the illegal wiretapping, former US President Bush “reauthorized this warrantless surveillance more than thirty times, including after the Department of Justice found the program to violate criminal laws.”

State surveillance has created an untenable situation for activists, comments Sparrow, “where the future capacity of our social movements to even be able to function is what's at stake...The communications structure that is being built now is deeply problematic in terms of our continued existence.” The situation is poised to worsen, with governments seeking to extend the reach of existing laws. For example, in 2009 Canada introduced a legislative package called the *Investigative Powers for the 21st Century (IP21C) Act* that would require Internet Service Providers to install surveillance mechanisms, force ISPs to preserve data as well as disclose subscriber information, and grant the police broad new powers to obtain transmission data. According to cyberlaw expert Michael Geist (2009), such legislation “will embed broad new surveillance capabilities in the Canadian internet.”

Dataveillance: Facebook is watching you

In addition to very real security concerns resulting from state surveillance, activists in the global justice movement are also troubled by corporate surveillance. The majority of internet users are subject to various forms of data mining and corporate monitoring in their online travels. This is largely due to the fact that the only successful

business model in cyberspace has been one that simultaneously commodifies user attention while sorting and packaging users for sale to advertisers (Milberry & Anderson, 2009). Surveillance and data collection schemes unleashed by web giants Google and Facebook are the norm with the emergent online media corporations, sorting users not into particular demographic categories, but into the category of “You.” This new level of commercial incursion into personal communication commodifies users and converts user-generated content into fodder for marketers and advertisers, illustrating how control online rests ultimately with corporate entities rather than computer users.

Online commercial tools and spaces are problematic for social justice work, according to Yossarian (2008), a long-time Indymedia programmer:

Activists who would never consider eating meat or crossing a picket line think nothing of putting their entire communications infrastructure into the hands of Google, Yahoo, Microsoft, and Rupert Murdoch. There are enormous practical problems with respect to communications security, data ownership, privacy, censorship of content, and data mining by both corporations and law enforcement agencies...

The state's objective in digital surveillance and data mining is to gather information about suspects and “persons of interest,” particularly where social network analysis enables authorities to establish communication and other social patterns. For corporations, when it comes to surveillance, the bottom line is—as always—profit.

Observes Indymedia tech John Duda:

If you look at corporate software and especially corporate web software, the entire business model is built around tracking. Most of these very useful services like Blogger or Gmail or Flickr or YouTube...are built around an elaborate, almost insanely Orwellian level of personal surveillance that's then used to do their target advertisements, to sell to marketers. Online ads are one aspect of the business model but there is this whole industry of tracking you online and developing you as an online user, as a potential site of exploitation... (interview, 2008).

There are additional consequences for activists, including reduced privacy and compromised autonomy, as Adam points out. “I don't necessarily want a corporation owning my data and if you upload your photos to Flickr, Yahoo owns them. If you do stuff on Gmail, Google owns that and may or may not decide to make that public in the future,” she comments, noting the importance of understanding what rights are forfeited in the signing of user agreements in exchange for a “free” online service. Blaine Cook, a former tech for Resist! underscores the point:

Sure you could get free web hosting or email hosting at Hotmail but at some level you're always tied to these companies and if they decide to turn over your information, they're going to turn over your information...Google's been really good at not turning over [users'] information, so we've been relatively lucky (interview, 2008).

Activists and other dissenting citizens cannot afford to rely on luck or the benevolence of corporations, which in the best case scenario is unreliable, or the protection of the state, which has looked favourably upon curtailing civil rights, at least in post-9/11 North America (Kellner, 2008). “There's no way you could do a lot of the stuff that Resist! and Riseup do on the Facebook platform because at some level, Facebook sees all of your data” (Cook, interview). Indeed, a recently proposed British law that will require internet and phone companies to store information on their customers' internet communications for a year means that Facebook messages, texts and internet gaming activity will be logged. Such a law would enable complex social networking analysis and potentially blur the line between communication (who is talking to whom) and content (what they are talking about) (Casciani. 2009). It would also more firmly entrench a culture of surveillance, where the state assumes as a matter of course the right to spy on its own people beyond the exigencies of counter terrorism and crime fighting.

There is a place for Facebook in activist work, says Adam, but the key is to be aware of what technology one is using, and how.

We need to talk to other people. Facebook networks you with people from your work, your school, whatever. If I want to talk about union activism to an audience that's not just my five friends, then that's a good place to do it. If I want to talk about burning down buildings, I'm probably not going to do that on Facebook because it can have security implications for me elsewhere. I think people have to have that discussion and understand the dynamics... (interview, 2008).

This ambivalent potential of Facebook brings into relief the contradiction between the hype surrounding the internet as an inherently liberatory technology, delivering freedom and democracy to all who log on, and the dystopic view of the internet as a web of surveillance amid an enclosure of consumption. Web 2.0 has been hailed as the great equalizer, a participatory medium that challenges status quo power relations, “valued for its capacity to empower users socially and politically” (Jarrett, 2008). In fact, Web 2.0 is a smart corporate rebranding of the internet, less a social revolution online than “a business revolution in the computer industry” (O'Reilly, 2006). The market ideology of Web 2.0 is at odds with its claims to autonomy, social justice, democratic governance and the development of a critical culture (Scholz, 2008).

There is little to criticize in the shift from web-as-information to web-as-participation, and Web 2.0 feels more user-friendly, enabling more mobility and functionality online. But it is clear that commercial social software and networking websites come at a price despite being “free.” Explains Sparrow:

Web 2.0 is empowering in all the ways that YouTube allows anyone to post videos or Blogger allows anyone to start a blog. It can't be downplayed, the power of communication that Twitter provides etc. At the same time, it's becoming increasingly clear that the business model of the internet is surveillance and that those systems are only going to make money through surveillance...All of the ad companies that manage ads on websites are now doing very finely tuned behavioural tracking where they

build not just a demographic of “you're in this category of metrosexual” but you're in the category of “You.” They have your behaviour down pat, and even better, who you know (interview, 2008).

One example might be Facebook, where the product—the facebook—is surveillance, in that it's really fun to surveil your friend and it's really empowering for you to have your friends be able to surveil you. The product is also surveillance in a sense that Facebook is watching you constantly and your behaviour is its only hope for making money from the advertisers. That's not just true of Facebook but...of the internet as a whole. Every time you go to a website, data is collected on you. There are strong profit incentives to aggregate that and use that data better and figure out more about you because that is seen currently as the only way they can make money (Sparrow, interview, 2008).

The dilemma of being unable to make money from the internet's only product—information—was discovered early on by businesses migrating online. The solution, of which Facebook is the master purveyor, was simple, as it turns out. Rather than privatizing information, corporations commodify participants, turning their free labour as content producers—of videos, photographs, music and all the other hallmarks of personal pages on social networking websites—into a valuable good for sale to the highest bidder.

Information wants to be free, says Sparrow (interview, 2008), invoking the hacker ethic and reaffirming the historical legacy of the internet's architecture and commons-based culture.. But corporations accustomed to the capitalist rule of supply and demand seek to make information exclusive in order to imbue it with exchange value. “The resolution to that contradiction is to give the information away for free but then watch people doing it and you make money off of observing people's behaviour, which is a neat little fix,” explains Sparrow. “Neat in that it solves the profit problem but not neat in the sense of a fundamental and historical change in the balance of power between social movements and people on the one hand, and the corporations on the other hand.”

Technical responses: Defensive tactics and strategies

Tech activists identify special security needs for those doing their activism on and through the internet. These needs have generated a variety of technical responses, including encryption, anonymization and mirroring.

Email encryption is important for activists to be certain their private communications are not being read by agents of the state or other hostile parties. One example is the cryptographic software, GNUPrivacyGuard (GPG), a free implementation of the OpenPGP (Pretty Good Privacy) standard, considered to be a military-grade security system (Lucas, 2006). Server encryption is also essential for online projects, particularly if it ensures plausible deniability. One activist called it “a basic first-step for any organisation, let alone an activists group that has been targeted in the past”⁴⁸

Anonymization is another key component in the defence against surveillance online. Anonymous proxies attempt to make activity on the internet untraceable by hiding the source computer's identifying information, thus enabling anonymous communication and web browsing and defending against traffic analysis. Examples include networks like Invisible Internet Project (I2P) and Tor.

Web proxies help users securely bypass content-filtering systems in countries that censor the internet. One example is Psiphon, developed by the Citizen Lab at University of Toronto, which allows “citizens in uncensored countries to provide unfettered access to the Net through their home computers to friends and family members who live behind firewalls of states that censor.”⁴⁹ Psiphon is a proxy server tool that uses the encrypted HTTPS protocol to transfer data, enabling users to send

⁴⁸ *Additions: Plausible deniability*. Retrieved May 20, 2009 from <http://www.indymedia.org.uk/en/2009/01/419838.html?c=on>.

⁴⁹ For more about Psiphon and to download, see <http://civisec.org/software/psiphon>.

encrypted requests for information to a trusted computer located in another country and receive encrypted information in return.

Mirroring complements a no-logging policy as a defensive tactic that safeguards activists against attacks on their technical infrastructure. In the case of Indymedia, server seizures are disruptive to the network, but likely to be ineffective in finding information about anonymous contributors to the newswire. One tech describes Indymedia's mirrors as “

an international network of computers donated by supporters which exist to distribute the Indymedia content around the world. Any machine plucked at random would typically contain content which originated elsewhere. It would be impossible to determine who or where that content originally came from by looking at the content because that information is not stored.⁵⁰

Mirroring has a “serious role to play in a radical movement,” says Adam, of Resist! “We did a lot of mirroring, especially around the early Indymedia stuff, so we had our servers over here but if they go down we have servers over here. So they can shut down this connection by hey, if Finland's also hosting a server, fuck you. I think that's pretty important...” (interview, 2008).

Security culture as sociotechnical ensemble?

Despite their immersion in the world of internet technology, the tech activists conceive of digital security as more than a technical issue. While they are preoccupied with keeping their networks and communications secure, and with preserving the anonymity of users, they are sensitized to the social context in which security is maintained or breached. Tech activists thus consider the technology used to create secure communication online in light of a broader security culture. This imbrication of

⁵⁰ *Some notes for police officers wishing to investigate IndyMedia content*. Retrieved May 21 2009 from <http://blog.stodge.org/421>.

the social and the technical recalls Bijker's (1995) notion of the sociotechnical ensemble. This is the idea that discussions of technical artefacts immediately imply an understanding of the social character of the thing, and vice versa: that analyses of social institutions necessarily refer to the technical relations at play. The conception of security culture as a sociotechnical ensemble suggests that tech activists understand, implicitly but also explicitly, the socially constructed nature of technology, and more specifically, the dialectical relationship between the internet and the global justice movement. “It may be the case that it's impossible to disentangle the two and that it's not very useful to try. They're co-produced or entangled to such a degree that it's an artefact of our thinking that we think about them separately” (Sparrow, interview, 2008).

The development of a security culture became a high priority in the wake of the Battle in Seattle, where police response to public protest shifted from negotiating the management of protest with organizers (Hadden & Tarrow, 2007) to an increasingly repressive and violent response, coupled with “predictive policing” (Costanza-Chock, 2004)⁵¹. As a result, one radical tech collective advised: “Security culture must no longer be thought of as merely the domain of those who might break unjust laws—but as something that is part of the organizing toolbox as a mechanism for community self-defence” (TAO, 2003). Government harassment continued to escalate after the terrorist attacks of 9/11, as the numerous online security “toolkits” and handbooks produced by and for activists make clear.

From the histories of AIM [American Indian Movement] and the Black Panthers under COINTELPRO to the current right-wing attacks on immigrants and refugees...From the APEC, WTO , FTAA and other anti-globalization protests—it is apparent over the history of progressive movements that the security state has a high degree of interest in not only

⁵¹ Predictive policing includes the common tactic of pre-emptive arrests of known activists prior to a major demonstration, as well as “monitoring of the internet, cell phones and similar devices...as a means of pre-empting protest and demonstration” (Lyon, 2007, 97).

surveilling, but also disrupting and destroying efforts at social change (TAO, 2003).

Due to this history, and often personal experience, activists tend to assume that their activities are surveilled, their groups infiltrated, and their communications monitored, both online and off. “It is inconceivable that Indymedia has not been infiltrated, not just by freelance, self-serving opportunists and amoral, social climbing careerists, but by paid agents of a variety of various governments' intelligence services...”⁵² *Security News: A Bulletin for Autonomous Resistance Movements* describes violations of security culture as behaviour that “intensifies government harassment, jeopardizes the freedom of other activists, and destroys the trust within the movement” (TAO, 2003).

Activists recognize that infiltration of the social infrastructure is as damaging as breaches of the technical infrastructure. “At the end of the day the security stuff is so much less about the technology and so much more about the social. It's social behaviours and how people relate to the technology,” comments Adam (interview, 2008). Another activist notes,

You can have uncrackable communication encryption and if you have a techie IMCista who is malicious then you have zero security. The security protocols needed by [Indymedia] are the same protocols needed by every activist group and they relate to Human Intelligence rather than Signals Intelligence. That's the weak point and that is where they go for, which is why Tor should be used for any posts that incriminate yourself or others.⁵³

A combination of best security practices and technology is thus required if activists are to protect themselves from prying eyes and ears. Activists must defend against a range of intelligence gathering activity, including Human Intelligence (HUMINT), gathered by interviewing, interrogating or infiltration by agents or informers, and Signals

⁵² *Quicksilver Times: a study in the infiltration and manipulation of alternative media*. Retrieved 21 May 2009 from <http://la.indymedia.org/news/2007/05/198569.php>.

⁵³ *Comments: Shut your eyes and trust in me*. Retrieved 20 May from <http://www.indymedia.org.uk/en/2009/01/419838.html?c=on>.

Intelligence (SIGINT), gathered by analyzing signals emitted by the target. Although SIGINT is perhaps growing more important in our technologically advanced society, manifesting in such incidences as server seizures and warrantless wiretapping as well as practices like social network analysis, HUMINT has been more devastating for progressive social movements, as has been well documented in North America since the 1960s (Davis, 1992). “This is why all the next generation of encryption and anonymity tools are decentralised so that the compromising of a few people in the network won't matter: Tor, Freenet, I2P all fall into this category—no central servers or admins to trust or to be compromised.”⁵⁴ Tech activists consider education as critical to improving digital security and reducing non-technical vulnerabilities. This is why TAO Vancouver and Resist! originally focused on tech skills training, giving free workshops on PGP encryption and generally promoting a security culture among activists. “With electronic surveillance, it's a huge social vulnerability,” says Mike Cantelon, Resist! co-founder. What becomes critical is “teaching people good habits, using encryption and just generally being secure in communications” (interview, 2008).

While fostering a security culture can help protect activists from state interference and disruption, it can also breed mistrust, which is detrimental to movement building and organizing. Scott Nelson, one of the founders of Indymedia Vancouver, links the development of an insular security culture among Vancouver activists to radical environmental activism in the late 1990s. “There was an immediate closing down of a lot of things that had been more open. I think in retrospect it was not good. It serves paranoia, and we don't need more paranoia in our lives. It's counter to all our open values...” The tension between promoting a security culture and practising

⁵⁴ *Comments: Response to some of the technical points.* Retrieved May 21, 2009 from <http://www.indymedia.org.uk/en/2009/01/419838.html?c=on>.

openness in movement organizing and transparency in process is as constant as it is incongruous. Security zines, toolkits and bulletins for activists educate those in the movement about how to protect themselves, contributing to a climate of fear and mistrust in the process. “In some ways it’s contradictory to some of the best tools that we have available—openness, democracy,” muses Blue Footed Bobby. On the other hand, he notes, “by publishing so much information about our organizing, we’re really just making it easier, giving [the state] a whole new set of intelligence to base their tricks on.”

New communication technologies centred around the internet have proven something of a double-edged sword (Kreimer, 2001). On the one hand they facilitate a distributed mode of communication, organization and mobilization at a reach and speed unparalleled in the history of modern social movements, while reducing costs associated with these and increasing the flexibility, diversity, and scale of global justice activism (Bennett, 2004). On the other hand, new communication technologies have made social movements vulnerable to increased surveillance by a wide array of state and other actors, giving new meaning to the slogan of the 1960s countercultural revolution: “the whole world is watching” (Costanza-Chock, 2004).

The right to privacy?

“Struggles over surveillance frequently refer to the idea of privacy,” asserts Lyon (2007). According to the Canadian Internet Project, privacy is a recent and growing concern in Canadian society (Zamaria & Fletcher, 2007). Tech activists recognize privacy as another line of defence against state and corporate incursion into their personal lives and social justice activities. Privacy, as Bennett (2008) explains, is foundational to a healthy democracy. It promotes

...freedom of association; it shields scholarship and science from unnecessary interference by government; it permits and protects the use of a secret ballot; it restrains improper police conduct...and it serves also to shield those institutions, such as the press, that operate to keep government accountable (5).

In the virtual as in the material sphere, privacy protects free speech and public participation (Bennett, 2008). According to Jerry Berman (2006), founder of the Center for Democracy and Technology, the internet could be a revolutionary force “for the democratic values of free expression, creativity and civic participation;” this potential is gravely threatened, however, by “security vulnerabilities, spyware...and lack of trust in the privacy of personal information disclosed online...”

Privacy is defined along a spectrum, ranging from the classic definition of the right to be left alone, to a more modern concern for control over one's personal information and communication. With the rapid advance of ICTs, even in the last decade, “informational privacy” has garnered a higher profile. Lessig (2006) identifies two main threats to privacy generated by the internet. The first is digital surveillance—the growing capacity of government to spy on citizens; and the second is data mining by corporations to facilitate commerce. While both are insidious, the important distinction here is between privacy that has been breached and that which has been surrendered in the course of various online transactions, which Clarke (1988) describes as “dataveillance.”

The need for informational privacy arises out of a paradox: “new technologies are radically advancing our freedoms, but they are also enabling unparalleled invasions of privacy” (EFF, n.d.). This statement is more compelling when placed in the social context of a post-9/11 world, where we have seen, most strikingly in the United States, a political

trade off: civic values such as freedom of speech and privacy in exchange for security in the form of a surveillance state. Writes Smith (2002) in a report to the US Congress:

In the wake of the September 11 terrorist attacks, debate over the issue of law enforcement monitoring has intensified, with some advocating increased tools for law enforcement to track down terrorists, and others cautioning that fundamental tenets of democracy, such as privacy, not be endangered in that pursuit (2).

This is nowhere clearer than in reactionary legislation such as the *USA Patriot Act*, which makes it easier for law enforcement to monitor internet activities, and the *Homeland Security Act*, which reduces restrictions surrounding the release of client information by internet service providers (ISPs). According to Walker (2003) the spectre of terrorism appeared “heaven-sent” to those seeking to close down the internet, providing sufficient reason “to pass any legislation, however intrusive upon the privacy of all people.”

Privacy advocates insist that internet privacy regulation is the only way to protect people's personal information in cyberspace and defend against corporate, state and employer surveillance (Smith, 2002). The US has yet to pass an internet privacy regulation (Lessig, 2002) but in Canada, the *Personal Information Protection and Electronic Documents Act* (PIPEDA) regulates the private sector online. PIPEDA was a response to the blurring of lines between public and private sectors; the recognition that the private sector presented real and substantial threats to privacy; and the realization that self-regulation would be unlikely to provide adequate protection (Tousaw, 2006). While PIPEDA is based on the presumption that individuals have the right to control their personal information, it has been criticized by privacy advocates as lacking teeth. Bennett (2008) points out a more fundamental shortcoming about such privacy legislation: it “may produce a fairer and more efficient use and management of personal

data, but [it] cannot control the voracious...appetite of modern organizations for more and more increasingly refined personal information” (10).

Privacy on the web is closely linked to anonymous travel online. Anonymity in this case means non-traceability, which Lessig (2006) says is essential for certain kinds of communication: “so long as political repression remains a central feature of too many world governments, free governments should recognize a protected legal right to these technologies” (225). Political dissent and whistleblowing are two examples of communication that rely on anonymity to varying degrees. Indeed, the scarcity of free speech and a free press worldwide, and the real dangers associated with political communication inspired Indymedia's general policy of ensuring the anonymity of its users. As Bennett (2008) notes, privacy is one value that can be used to reign in “the worst effects of power” (22).

Regarding weak privacy controls on the internet, IMC tech John Duda says: “It takes a lot of effort to show people that actually there are serious consequences. MySpace will not protect you. Just because your profile is set to private does not mean that the FBI can't see it if they want to” (interview, 2008). Despite the potential for state monitoring and “dataveillance,” commercial internet services like email, social networking and blogging, have their uses. “I use those services fully knowing that. But it's also good to have services where nobody owns it but you” says Resist's Megan Adam. The answer for tech activists is clear: “We need to provide self-managed alternatives” (Yossarian, 2008).

(Re)constructing the internet: Designing social values into technology

Tech activists are cognizant of their role in reconstructing the internet as a more egalitarian, democratic communication technology. “It's important to understand that

the internet is not fixed. It's a constantly changing, constantly evolving field of contention between a lot of different interests. As social justice activists, we can't take the internet for granted," says Duda. That is to say, the relatively open nature of the internet, with its historically egalitarian architecture and commons-based culture, is increasingly threatened by corporate encroachment on the one hand, and state enclosure on the other. "There are no technical barriers to a totalitarian future," warns Riseup's Sparrow. "There's only the self-restraint of the corporations or the self-restraint of the state that keep the communication system viable." Neither option offers any assurances. As Duda points out,

it's very exceptional to find people who will stand up for the rights of users and protect them and protect their freedom of speech, their freedom to speak anonymously. These are increasingly under threat. It's really important from that perspective for people to be developing alternative infrastructure both on the software level and on the hardware and connectivity levels (interview, 2008).

There is a common awareness among tech activists of the need to construct their own technical infrastructure online. Within the context of the global justice movement, this is done by establishing radical tech collectives and projects that provide secure internet services for the activist community, including email, mailing lists and web space for individuals and groups consciously working for social justice. Activists need to be able to communicate and do their work "through means that can't be shut down by a corporation or government," says Tufted Puffin, of Riseup. "The current system is not sustainable. We want to be prepared for that; we want to know how to do things without corporations taking care of us" (interview, 2008). Adds Sparrow, another Riseup programmer:

It's necessary for the longevity of social movements for them to be able to own their own means of communication and not to be wholly reliant on the state or capitalism...[We] are building a particular type of

infrastructure that encodes a level of security and autonomy that's not possible under traditional systems (interview, 2008).

As discussed in Chapter 5, by carving out non-commercial space inspired by their vision of the just society, radical tech collectives help develop the internet as a virtual public sphere, reviving the commons-based, community oriented model on which the internet was built. In the process, they defend against the corporate colonization of cyberspace.

In addition to creating tech collectives to preserve the internet as a space and tool for democratic communication and practice, tech activists develop their own software to support their social justice goals and facilitate their activism toward these goals. They share an analysis of the problems with proprietary software and the insufficiency of the commercial model of the internet for their social justice work. “Commercial and consumerist products don’t represent all realities so the design that goes into products might not necessarily reflect the needs of activists who are trying to get the work done,” says Michelle Poirier (interview, 2008). Mike Cantelon, Resist! co-founder, agrees: “the special needs of activists are not going to be represented by a commodity, by off the shelf software” (interview, 2008).

By designing software that meets their practical needs and social justice goals, tech activists democratize technology itself. As discussed in Chapter 3 free and open source software enshrines user freedoms in the code; the “four essential freedoms” include the freedom to run, share, modify, and redistribute a modified program. This enables users to (re)design software to meet their own needs, rather than the profit objective of corporations. Feenberg (1999) calls this the democratic rationalization of technology, a concept that hinges on the claim that technology is ambivalent, with no particular correlation between technological progress and the division of social power. Democratic rationalization thus highlights the political implications of user agency for

technical design, illustrating how “new technology can also be used to undermine the existing social hierarchy or to force it to meet needs it has ignored...” (76).

This broaches the possibility of rationalizing society in ways that enhance democracy rather than efficiency and control. Feenberg's concept builds upon and responds to Marcuse's (1982) notion of technological rationality, which defines technology as a social process—both a mode of production and a mode of organizing—maintaining or changing power relations. Marcuse describes a new rationality that has emerged in the technological process, one that equates to efficiency as the standard and norm by which all things will be evaluated. Humans must re-orient their desires to the needs of technology until eventually, human rationality becomes machinic: “Everything co-operates to turn human instincts, desires and thoughts into channels that feed the apparatus” (144). In the vice grip of this “technological attitude,” “individual protest and liberation appear not only as hopeless but as utterly irrational” (145).

But as Marcuse (1982) pointedly suggests, technological rationality *can* be re-tooled to promote liberation rather than totalitarianism, the abolition of toil and want, rather than its extension. Free software is one compelling example of this, as discussed in Chapter 3. Tech activists involved in free software development recognize their role in subverting the technical code of software; they are further cognizant of the socio-political implications of both the process and product of free software development. They purposefully design values into the technology, embracing Winner's (1986) assertion that technical artefacts have politics. “I think technology is political,” comments Antoine Beaupré, former CMAQ tech. “You create the technology you want...Mere creation and use of the internet and creating software for communication over the internet has political impact” (interview, 2008).

In redefining the values that comprise the technical code of free software, tech activists have a sense of effecting transformation in the social relations that extend from technology. They seem to understand, either explicitly or innately, that “the hegemony of capital does not rest on a particular technique of social control but more fundamentally on the technical reconstruction of social relations within which it operates,” (Feenberg, 2002, 183). However, tech activists' understanding of their work extends beyond an affirmation of the presence of social values materially embodied in technology. Rather, in keeping with Flanagin et al.'s (2008) analysis, they assume the possibility of embodying values in technology by deliberate design. “We very much have a hidden agenda around what makes good democratic organizing,” says Sparrow. Of the free software development done by the Riseup collective, he says:

We're trying to build tools that reflect more closely our real world experience with how people democratically organize instead of relying on social networks or on online collaboration tools that are really kind of crude and blunt or actually encode logics that are contrary to the democratic impulse we're trying to foster (interview, 2008).

Says a founding IMC tech, “I see my task as building technological systems where people can exert power through egalitarian systems that will reproduce horizontal co-operative social relations and institutions,” (Henshaw-Plath, in Juris, 2005, 202). Juris (2005) calls this “informational utopics,” a process by which “broader values related to horizontal collaboration, open access, and direct democracy are physically inscribed into [the] network architecture” (202).

From this discussion, we can see how free software is both a means and an end. It's not just a tool for manipulating and navigating the internet, although its growing popularity does act as a counterbalance to the corporate encroachment of cyberspace. Free software is a vision of the future enacted now. By democratizing software

technology, tech activists create a working example of an alternative mode of social organization.

Free software as prefigurative technology?

Using Microsoft to make your flyers is like using McDonald's to cater your demo (Michelle Poirier, TAO).

Free software, insofar as it is used to create an alternative technical infrastructure online, is an example of prefigurative technology. Downing (2001a) defines “prefigurative politics” as “the attempt to practice socialist principles in the present, not merely to imagine them for the future” (71). This draws upon anarchist philosophy, and the foundational idea that means and methods employed for achieving a goal must be consistent with the goal itself. One example of prefigurative politics is the spokescouncil, adapted from anarcho-syndicalist organizing to great effect in the global justice movement's mass mobilizations (Pickard, 2006). The spokescouncil consists of temporary representatives from small affinity groups who converge to make larger organizing decisions based on a participatory-democratic, consensus based model. A new way of imagining social relations, the spokescouncil facilitates “a horizontal relationship based on the desire for freedom and not power-over or hierarchy” (Morse & Sitrin, 2004). The spokescouncil characterized the decision-making and organizing process of the GJM, which itself became “a model of what the movement is trying to create, [an] environmentally friendly and socially just group of people that eliminates discrimination and uses consensus-based decision making in a non-hierarchical, anti-consumerist, and anti-capitalist organization” (Crawford, 2005). The Zapatistas are another, perhaps more dramatic, example of prefigurative politics in their engagement of a participatory process for social change “that is concerned as much with social equality,

freedom and participation in decision-making as it is with economic opportunity, women's rights, and reduction of poverty in indigenous communities" (Garrido & Halavais, 2003, 169). In this way, the Zapatistas embody the revolutionary democratic political theory that they demand for all of society.

Extending this idea of prefigurative politics to technology, we can consider the radical potential for social change in the technical code of free software. Free software both prefigures and embodies an alternative to the present mode of social organization. "Are we enabling of movement work or are we itself movement work?" asks Tufted Puffin. "I do think we are in some ways acting in the way we want organizations to be structured at the same time as building infrastructure" (interview, 2008). Free software is prefigurative in that it fosters democratic practice and actualizes many of the goals and values global justice activists strive for, including participatory democracy, autonomy, self-organization, decentralization, collaboration, and mutual aid, all of which contribute to the greater objective of freedom. "I want to use means that are what I want in the end," continues Tufted Puffin.

I really like the analogy of building the new within the shell of the old. There is some value to working to dismantle current power structures but there's also a huge value in working on new ones. The US empire is going to fall and so working on building up alternatives or [new] foundations is really valuable work (interview, 2008).

This discussion recalls Kelty's (2008) notion of "recursive public," which he defines as a public concerned with the material maintenance and modification of the various means (technical, legal, practical and conceptual) of its own existence, an independent collective capable of challenging power through its production of "actually existing alternatives" that create a "moral and technical order" (3; 301). What distinguishes recursive publics is "their focus on the radical technological modifiability of their own terms of existence"

(301). Kelty cites the free software movement as an exemplar of a recursive public. I would argue that the global justice movement, with its subset of tech activism, is another instance.

“I think the role of free software in social justice organizing has been pretty large,” comments John Duda.

Before you even get into people writing free software for their social justice projects, the fact that you had the ability to run things like Apache and PHP and these open systems allow people to develop a lot of communication infrastructure very quickly and very cheaply....Free software has [also] served as an example for people trying to get a sense that there actually is another way to do things, that given the chance to work collaboratively and creatively on problems that interest them and have relevance for the needs of the community, people will actually do this. Not only will they do it in their spare time and make some interesting things but they do it in a way that builds a global electronic infrastructure for communication.

You look at the whole development of the internet, at the way the basic protocols were defined, at the evolution of the free software movement and how that ethos of sharing was codified and given a legal defence—it's pretty amazing that all this was done in an alternative mode of production. So I think it's been very helpful for a lot of people who are looking at this very capitalist world and looking at very small efforts to share and collaborate, to live in a different way and to see something that actually has had a vast world historical impact (interview, 2008).

As a working model for a future society free and open source software demonstrates more than merely an alternative. It shows “that people love doing this and love creating so much that even though they could get paid for doing it, they're willing to do it another way” (Blue-footed Bobby, interview, 2008). Xavi de Pedro, of the radical tech collective *moviments.net*, agrees that free and open source software “has a key role in throwing light onto the way we can behave...It sets the way to interact, to co-operate, for building tools,” he explains. “It shows that another way of organization is possible” (interview, 2008).

Free software development maps on to global justice organizing in a number of ways. Generally, they are both “radically decentralized, collaborative and non-proprietary, based on sharing resources and outputs among widely distributed, loosely connected individuals who co-operate with each other” in the absence of hierarchical leadership (Benkler, 2006, 60). The following is a breakdown of their shared characteristics.

Anti-capitalist

Free software is anti-capitalist in that it is inherently and fundamentally opposed to the capitalist mode of production. As Benkler (2006) notes, free software is “incompatible with a model of production that relies on property rights and markets...” (64). The global justice movement, despite its hallmark decentralized network structure encompassing multiple organizations and ideologies, was unified in its singular critique of neoliberal capitalism. The objection was not to globalization per se but to the worldwide domination of capitalism. Thus many have advocated “alter-globalization,” “globalization from below,” the globalization of equality, economic justice, environmental sustainability etc. Tech activists in the global justice movement eschew proprietary software because of its technical and moral contradictions to their social justice goals (as well as its bugginess and inefficiency). Feenberg (2002) describes how the social and technical requirements of capitalism are instilled into technology in a way that “brings the construction and interpretation of technical systems into conformity with requirements of a system of domination” (76). On this account, the technical code of proprietary software is capitalist; it is therefore incapable of fulfilling user needs not oriented to profit, exclusivity and rationality.

Sharing/Mutual Aid

In free software development, the cultural practice of sharing is enshrined in Freedom 2, a legal protection accorded by the copyleft licensing scheme: “the freedom to redistribute copies so you can help your neighbour” (GNU, n.d). The ability to share in order to “help your neighbour” marks the ideological distinction between free software and open source, which advocates access to the source code as little more than a sound business practice. Free software is considered a philosophy as well as a method: “To use free software is to make a political and ethical choice asserting the right to learn, and share what we learn with others” (FSF, n.d.). In anarchist theory, the concept of mutual aid seeks to explain the innate phenomenon of co-operation in human beings. Kropotkin (1915) describes this as “the feeling of human solidarity, deeply lodged in men's understanding and heart...nurtured by all our preceding evolution” (293). He explains further: “It is the unconscious recognition of...the close dependency of every one's happiness upon the happiness of all; and of the sense of justice, or equity, which brings the individual to consider the rights of every other individual as equal to his own” (xiv).

Decentralization/self-organization

Hallmarks of both the free software movement and the global justice movement, decentralization and self-organization derive from the hacker ethic, which encourages hackers to “mistrust authority—promote decentralization.” Bureaucracies—whether corporate, government or university, promote the centralization of authority, and are “flawed systems, dangerous...” (41). The antidote is the distribution of power and the free exchange of information via open systems. Both the FSM and the GJM operate in a networked, peer-to-peer fashion, much like the internet that facilitates their work; thus egalitarian communication is a structuring feature. Both have mobilized thousands of

people from around the world and over years to great effect. Where the free software process “makes no meaningful distinction between users and developers” (Weber, 2008, 63), the GJM eschews leaders and follows a grassroots, “bottom up” organizing style that allows for “diversity of tactics” based on self-determined need and interest. This approach embodies the marxian dialectic of “the unity of diverse aspects,” popularized as the idea of unity in diversity.

Collaboration

Neither free software nor the GJM would be possible without collaboration, which is foundational to both projects. Collaboration was an assumption upon which the original hackers based their work and it remains essential to free software development. For activists in the GJM, working collaboratively on common goals was as radical as the changes they envisioned for the future just society; this is the idea of praxis or prefigurative politics, where the means *are* the ends. Collaboration embodies a praxis of social change in that it opposes the individualism encultured and structured by capitalism. Benkler (2006) discusses the role of the internet in facilitating collaboration, or what he calls “commons-based peer production” (63).

Liberation

Several tech activists discussed similarities or connections between free software and the global justice movement. “It clearly makes sense for social movements to be using free software,” observes Indy tech Mark Burdett (interview, 2008). “Building software is one of the few areas of human endeavour where we can actually apply some principals of a property-less world where things are held in common and shared...I think with free software we have a really good chance to subvert capitalism.” Free Geek's Peter

Lypkie, who came to activism through his free software development, also notes a synergy between FOSS and radical social change: “The idea that software shouldn't be property got me to thinking about what else shouldn't be property,” he explains. “Free software is a big intellectual part of thinking about fewer things as property and also a technical part of that, actually facilitating whether or not those things become property in an electronic sense” (interview, 2008). Mike Cantelon, Resist! co-founder, shares a similar sentiment: “I like how [FOSS] encourages people to learn to work together, in community; how community seems to win rather than proprietary stuff” (interview, 2008).

According to Juris (2008), radical or autonomous-oriented activists have been deeply involved in free software development.

It should come as no surprise that so many radical or autonomous activists see their own struggles reflected in the struggle for free software...I would expect that activists would be more likely to use those internet tools that most closely reflect their political values and most effectively enhance their preferred forms of organization (in Lovink, 2008).

For Riseup's Sparrow, the object of designing activist software is twofold: “trying to make technology that more accurately maps on to how social movements organize but then also make technology that also can use that aspect of technology that's normally pretty repressive, that disciplines you when you use it, to foster better organizing practices” (interview, 2008).

From the global to the local: The diffusion of the movement as media spectacle

The *movement as media spectacle* faded from view in the aftermath of 9/11, whose tragic events scuttled plans for major demonstrations and gave rise to the war on

terror accompanied by a culture of fear. In North America, the localization of struggle was a response to the increasing police violence at public demonstrations (Hadden & Tarrow, 2007). It was also a critique of the efficacy and sustainability of “summit hopping” as movement strategy. As activist Chuck Munson (2004) observes,

The 9/11 attacks and the rise in patriotism and jingoism afterwards scared some activists into withdrawing from visible activism. Many core movement organizers were burned out from two and three years of organizing summit protests. There was vocal interest among many movement participants that organizing locally was something that needed more attention.

The shift from globally focused organizing to localized activism led some to question the vitality of the global justice movement. Announcements of its death came from both the mainstream media (Munson, 2004) as well as activists themselves (*Upping the Anti*, 2006) amid a fizzling of movement activity. The majority of respondents, however, regarded the GJM as still very much in existence but having shape-shifted in response to external socio-political factors. “There's still a movement. There are still people who do movement work,” affirms Adam, Resist! co-founder. “But that mass part, the part that brought out 100,000 or 50,000 people—it's not really there” (interview, 2008). Adds Sparrow:

[P]eople are still active—they're just doing stuff that's not as visible. There's a general feeling that summit-hopping has run its course, particularly after 9/11...and that people need to get back and organize more in their communities. You had...rising police repression...where it just became untenable to contemplate holding these big protests, and a rising chorus that people should be organizing more locally. I think people have done that (interview, 2008).

Others took a more historical perspective, noting the cyclical nature of social movements (Tarrow, 1998). In this view, the movement has merely gone fallow, remaining in a regenerative stage until the next political opportunity. “There are still networks,” says a

former tech for CMAQ. “The movement still has its feet. I think there will be another peak... these kinds of things are periodic. There's still a global justice movement but it is more diffuse.”

Antoine Beaupré, a tech activist with CMAQ and founder of web host Koumbit, had a similar view:

“People are going to go back in the street at some point. But that's just one tiny part of a movement. That's what the media pick up on because there were people everywhere all the time and there were really impressive demonstrations...Right now people are getting organized all over the place for all different things” (interview, 2008).

In many ways, this was exactly the point of global justice activism, summed up in the much abused slogan: think globally, act locally. Indy tech John Duda notes the affinities between the organic, nodal growth of Indymedia

and the way people were thinking about how the global justice movement would be organized. That it wouldn't really be a centralized, hierarchical organization; that it would be something very open and open for interpretation at a very local level in a way that would allow other people the space to interpret things their way. There was an assumption that this would create some sort of organic unity that would actually be able to communicate in this very horizontal way but still have potential for action that went beyond the local... (interview, 2008).

While many of those interviewed were philosophical about the demise of the GJM as media spectacle, Sparrow says the importance of those mass street protests is not to be underestimated. For Sparrow's cohort of activists, the Battle of Seattle was a life-altering moment:

That experience—the organizing leading up to it, the organizing afterwards and the week of protests—shaped them permanently. So there's very much an emotional, a collective effervescence. There's an emotional charge to the power of those protests that cannot easily be explained and which has made it so that that's what they do for the rest of their lives. That's certainly true for me, and for almost everybody I know. I don't think you get that level of personal life transformation in some of

the more everyday, local grounded activism where there isn't quite the electricity in the air of “anything's possible” (interview, 2008).

Even as the movement was transitioning from summit-hopping as an exclusive focal point for organizing, major protests remained important for tech activists, according to original IMC founder Sheri Herndon. “They inspire a lot of the techies to keep pushing the envelope in terms of technology and innovation in a way that they might not if [they were just working on] a local IMC” (interview, 2003). Duda offers another perspective on the impact of the GJM: “I think it's been interesting to see how people have worked to make longer term community connections, to build longer term infrastructure, to really dig in for a much longer, much more interesting and much more rewarding struggle for social justice” (interview, 2008).

Killing the Washington Consensus: Movement victory or crisis of identity?

According to one analysis, the global justice movement was a success, and not merely for shutting down international trade meetings or forcing the mainstream international media to address the failings of unelected supranational governing bodies. Activist campaigns centred around “the brand,” like many of those orchestrated under the broad rubric of the GJM, “opened back doors into the arcane world of international trade and finance, to the World Trade Organization, the World Bank and, for some, to a questioning of capitalism itself” (Klein, 2002, 238). In other words, by focusing on the unethical labour and environmental practices of the makers of popular products, activists could convey their critique of capitalism in a direct and compelling fashion.

“A lot of the WTO stuff has been a complete failure, so in that regard the protests were pretty successful,” says Blaine Cook (interview, 2008). Indeed, 1999's anti-WTO

protest in Seattle succeeded in shutting down the opening ceremonies and garnering international attention. It also resulted in a class action suit against the City of Seattle, which was found liable for the illegal arrest of almost 200 demonstrators (Bowermaster, 2007). “Basically we did win,” agrees Sparrow:

In 1994, the Washington Consensus was so unassailable and was so accepted worldwide, even by the policy makers in poor countries. Now, we have a situation where globally, everyone thinks that's a joke. A little crack opened in '99 [in Seattle] in terms of what people thought was possible. Now it's a totally different world. It's clearly the case that the emperor had no clothes (interview, 2008).

Today, people have “moved on to other fights,” he says. The loss of an immediate objective coupled with the diffusion of movement activity and arguably the loss of a global focus for activism has generated something of an identity crisis in the GJM, according to Duda.

Part of the problem of the global justice movement today is that the primary target was this very particular form of neoliberal globalization. When [the movement] worked best was when people were able to articulate a whole range of struggles with reference to one organization that was meeting and having very clear anti-democratic effects across this whole field...In terms of that concrete struggle, the neoliberal consensus is dead. It's no longer the case that you have this vision of an overarching neoliberal order that's going to be in charge of the globe. There's a lot more resistance to it, especially if you look at places like Latin America, [which has been] consolidating gains against this neoliberal consensus, and providing alternatives at a national level (interview, 2008).

This identity crisis has led to some soul searching and a re-evaluation of the global justice movement more generally. Continues Duda, “I think to some extent that people in the US have been doing a reassessment of the time scale of our activism [and realizing] that we're not going to overthrow global capitalism in a weekend.”

“There's nothing unifying a broad-based mass movement right now,” says Resist! co-founder Megan Adam, adding:

There are obviously pockets of radicalism in North America...but in the late '90s there was this unifying, anti-globalization, anti-trade thing that a lot of different sectors of the population were coming together around. I felt there was a unified sense of purpose...I don't feel like there's any particular issue around which people are coalescing right now...

Cantelon sees it as a dormant time for social justice organizing:

The global justice movement is fallow. People will change when they're forced to and I think we'll see that day sooner than later. When it's on the rise again, it's going to be the real thing, a real struggle. It will be environmental. It will be economic. But I think our world is going to change very rapidly (interview, 2008).

And Sparrow predicts a time of rupture and rebuilding in the very near future:

Now, there are new struggles to fight, in terms of the horrors of capitalism, but in many ways what we were fighting for then, we largely won: this is not inevitable. I think climate change, climate chaos and the economic hardships ahead are going to create incredible fertile ground for more organizing. At the time a lot of people felt that what was needed was intense effort to topple the empire. Now there's much more thinking that the empire is collapsing all by itself and what we need is better strategies for how to pick up the pieces (interview, 2008).

Indymedia's dead. Long live Indymedia.

As the first tech activist project, Indymedia broke new technical ground, preparing the way for much radical activism online, including the tech collectives discussed in this dissertation. But in the age of ubiquitous “participatory” social media, a popular critique of Indymedia is that it has outlived its usefulness, that it no longer serves an alternative source of critical information and analysis (Indy MediaWatch, 2007). “They've been telling me that for some time now,” says IMC UK tech Kester Edmonds. Like many of the tech activists I interviewed, Edmonds dreams of rebuilding Indymedia, of renovating its framework and organizational structure to make it more relevant to the current social and technical realities of the internet but with the goal of collaboration remaining central.

There are ongoing efforts to revitalize Indymedia, indicating that it still generates interest among tech and media activists. The IMC Alternatives project is developing a new Indymedia node “that intends to be a 'next generation' IMC site, both in its content and its technical architecture.”⁵⁵ True to the founding ethos of Indymedia (“become the media”), IMC Alternatives embraces a praxis of change, both engaging and reporting “working solutions, such as participatory decision-making processes, equitable economies [and] technologies of co-operation [that] nurture social structures and a more ecologically sustainable way of life.” Another project dedicated to revitalizing Indymedia emerged out of Techmeet, a summit of international developers largely connected through the IMC network. Techmeet seeks to restore Indymedia to its previous status as a tech innovator, as discussed in Chapter 5.

“Indymedia is not dead,” assures Dmitry Borodaenko, developer of Samizdat, one of several custom IMC codebases.

It may have slowed down, especially in the United States where it has been pervasive for many years...But in other countries on the other side of the information divide, Indymedia is just beginning to appear. On the other hand, Indymedia is also a legacy of certain principles which are very useful in online journalism and media activism. All those classic Indymedia principles such as rejection of discrimination...consensus, the Indymedia *Principles of Unity*—all are very important for online journalism.

The legacy of Indymedia is no less than the advent of online journalism. It goes by various names today—participatory journalism, public journalism, citizen journalism—but it is a phenomenon that is the product of open publishing popularized by Indymedia during the Battle of Seattle. The original IMC codebase, Active, enabled the real time publishing of text, video and audio online, empowering citizens to be witnesses, to report

⁵⁵ [*Imc-alternatives*] confirming IRC Chat Monday/Tuesday, retrieved October 5, 2009

from the field and to “become the media.” This was prior to the ubiquity of free hosted blogs, video sharing and webcasting, when such bleeding edge services demanded a certain level of technical skill. “If you look at Blogger and YouTube and all these sites that allow you to upload video and post whatever you want, it's all very easy and you don't have to have any technical knowledge,” explains one tech activist. “It was really interesting to see people with concrete needs for a social justice movement develop all these tools. Now they've been commodified.”

With the participatory, interactive, ubiquitous nature of Web 2.0 and the general sophistication and accessibility of social media, the novelty of Indymedia has faded. “Indymedia to me lost part of its *raison d’etre*, which was open publishing” explains Omar Bickell, of CMAQ. He continues:

That’s because back in the day when we were doing that there was a real dearth of sites that you could just go, show up and start publishing stuff, everything you wanted. Now there’s a competition to get our fingers and eyeballs. Everybody wants us to sign up on *their* site and have the discussion on *their* site. I think that the proliferation of Web 2.0, collaborative, everybody-contribute-over-in-my-little-silo approach is another thing that hurt the movement (interview, 2008)

IMC tech John Duda agrees:

The biggest challenge with Indymedia today is that we don't have the amounts of infrastructure that you need. We have plenty of code but we don't have the server and bandwidth resources. Look at what people expect out of a website today: instantaneous interaction and fast, efficient video transcoding, near infinite personal storage and bandwidth...Building up these long term material institutions that actually have a capacity for resistance is a real challenge for tech activists...Trying to take the [free software] ethos of sharing and collaboration and actually endow it with some really long-term potential for resistance... (interview, 2008).

Despite these technical challenges, Indymedia remains a viable source for eye-witness reports on global moments of injustice. The corporate mainstream media has a poor

record covering such moments and the alternative media is largely a critique of mainstream coverage. Blogging cannot fill in the gap, as Duda points out:

if you're a blogger sitting at home, you don't have a global network of correspondents that you can say to, "What's going on in Brazil today?" The global Indymedia newswire aggregates the features produced by the local nodes. This is tremendously powerful, to see this kind of aggregation going on and to see it at the level of a network that is consciously organized and is very much focused on not repeating their own critiques of global issues or issues that are already in the public consciousness but really bringing to life what's going on locally.

Bickell says Indymedia remains important for engaging and mobilizing a new generation of activists.

[It] is one of the best mobilizing tools for turning people into activists. Young people are sick of everything and then they see other people standing up, saying sometimes intelligent things, at least already different perspectives on topics they've sort of heard of. They're definitely claiming power to the people and when you're a young kid that's what you wanna hear. I think the CMAQ was a trampoline for a number of people become activists and that's still true today.

Epilogue

What became of the 22 tech activists I interviewed? The vast majority were very active during the heyday of the global justice movement from 1999-2001, and about half were still actively involved in their original tech projects when I spoke with them. Like me, three had entered graduate school to pursue their activism through the academy. Three more had started businesses that stemmed directly from their social justice work. "How do I stay involved? I try more to change it into a job," explains one former CMAQ tech who is now a doctoral student. He acknowledges, however, "that's kind of contradictory. As soon as you professionalize the activist work it loses its possibility for change." Two respondents worked for major tech companies—Twitter and Microsoft, though one of these used his hefty pay cheque to fund his activist projects. Some had

full-time employment in the IT sector while others did enough consulting and contract work to support their activism. A couple of techs redirected their focus to the non-profit sector and away from more radical grassroots activism. By and large, however, they all continued doing social justice work of one sort or another, directing their particular technical skills where they were most needed.

Conclusion

“Love is the only sane and satisfactory answer to the problem of human existence” (Fromm, 1956, 112).

The defeated logic of protest

The legacy of oppression haunts human society. Dominative social relations comprise a seemingly persistent condition, despite their changing nature from slavery to feudalism and through the varietal expressions of capitalism. “In the social reality, despite all the change,” observes Marcuse (1964), “the domination of man by man is still the historical continuum that links pre-technological and technological Reason” (144). The ramifications of industrialization—centralization, mechanization, specialization and bureaucratization—contribute to a technological rationality that shifts the nature of oppression from the private sphere to the privatized sphere of the economy. The protestations of Information Society gurus aside, post-industrialism has heralded neither the end of history or a new dawn. Today, workplaces may be geographically dispersed, but control over the labour process is not in the hands of the labourer. Not mechanization but digitization has workers struggling to keep up. Computers and information work have arguably increased the need for specialization, and bureaucratization remains a key characteristic of the corporate-state nexus. Industrialization has taken on new aspects with the increasing informatization of labour and capital, but maintains its original exploitive character in developing nations even as it expands its base to support the new “information industry” (through the manufacture of computer and other information technology etc.).

These conditions, the products of “advanced industrial society,” have produced the one-dimensional thought Marcuse (1964) explored in depth. In the one-dimensional society, the aptitude for critical thought and oppositional practice has atrophied, overcome by technological rationality, which idealizes social values in order to neutralize their effect on “the daily necessities of business and politics” (148). In other words, ideas like justice, truth, beauty, and peace are rejected by scientific reason as matters of preference, thereby stripped of their oppositional power. In this way, “the ideas become mere ideals and their concrete, critical content evaporates into the ethical and metaphysical atmosphere” (ibid). The result of one-dimensional thought is the lack of critical self-reflection. Bookchin (2005) sums this up as the inability to contrast “a more human-scaled world that once was; another world, approximating complete totalitarianization that now is, and finally a third one, human-scaled, ecological, and rational, that should be” (434). The loss of tension that occurs with the advance toward one-dimensional thought results in the loss of motivation to “rear up in resistance against our complete defilement” (ibid). Marcuse variously calls this negative thinking, the “paralysis of critical thought” and the “defeated logic of protest.”

We cannot help but see evidence of the one-dimensional society all around us, like the fetid droppings of some monstrous beast. But hope, and the indefatigable drive for freedom that pervades human existence, prevent us from admitting defeat in the face of the totally administered universe. One of the nagging questions that followed this dissertation from conception to completion was: why? Why do tech activists do what they do? What motivates them to intervene, to risk so much? Some reflection on this, while unable to produce a resolution, seems a fitting conclusion.

Love as revolutionary praxis

Grassroots social justice activists in the newest social movements have taken on the task of confronting capitalist society in all its inglorious—its brute force, its schizophrenia, its callousness, its ugliness. It is a wearying task indeed. But the hopelessness capitalism breeds is countered by activists' dreaming, thinking, desiring and envisioning a new way forward to a better world. This has been the major undertaking of radical and critical theorists in modern political and sociological thought, an undertaking that, while no blueprint for revolution, certainly illuminates potential new directions. The tricky bit has always been to figure out how the theory interacts with practice, how critical thought is or becomes action. Thought lacks the power to bring about another world, a “new polis,” unless it transcends itself into practice, thus “critical philosophic thought is necessarily transcendent and abstract” (McLaren, 2000, 134). But as Foucault (1977) clarifies, theory is practice but only when it is a practical, localized, embodied struggle against power. To this, Deleuze replies: “Precisely. A theory is exactly like a box of tools...It must be useful. It must function. And not for itself. If no one uses it, beginning with the theoretician himself...then the theory is worthless...” (ibid).

When considering the radical social change necessary to bring about a free, just, equitable and sustainable existence for all of humanity, there are two recurrent, interconnected themes: love and revolution. The one belongs to the realm of affect, the other is material, embodied, and as such they are dialectally connected. The kernel of the good society lies in the dialectical relation between love and revolution. The liberatory impulse smoulders in the potent commingling of theory and love: this is the tool box of activists. “In the exigencies of thought and in the madness of love is the destructive refusal of the established ways of life” (Marcuse, 1964, 127). What emerges is love as

revolutionary praxis; the destructive refusal of the old becomes the construction of the new. It is this that guides social justice activists. For critical, radical thinkers—dissidents by another name—love has revolutionary implications. Now I am not referring to the bourgeois idea of love described by Marcuse (2007), which is based not on solidarity but on conflict between individuals, persisting even in the marital union, with its impossible demand for exclusivity.

I am talking about something we see or know or experience little of: revolutionary love. Revolutionary love is a conscious practice. It is not something received but rather something given. It not, therefore, passive, but active and productive. Revolutionary love is a refusal: it says no to human oppression in its myriad forms. But it also says yes—yes to the all that is liberating and life-affirming. In this affirmation of life, revolutionary love produces agitation and action, fissures and lines of flight, tremors and translations. It is inclusive: it does not distinguish between human and non-human life or between friends and enemies; it is radically open. Revolutionary love is selfless, responsive to the needs of others; it is co-produced by shared desires for solidarity, beauty and freedom.

Indeed, love takes on a revolutionary characteristic in its extension beyond the model of the exclusive couple-based marriage rooted in the nuclear family. The romantic ideal of love as personal, exclusive and everlasting is rejected as limited and isolating, the opposite of community in that it

“ignores the social disposition, communication and interaction that allows love to emerge, grow and survive. By assuming that true love is between two individuals who are insulated from the rest of the world, we deny the possibility of love as a force for social inclusion, transformation and justice” (Chabot, 2008, 808).

Revolutionary love resists reduction to mere personal declaration when it is rooted in “narratives of transgression and dissent” that comprise the foundation of hope (McLaren, 2000, 171). In a world mutilated by dehumanizing and reifying effects of global capitalism, practising revolutionary love is itself transformative. It is the beginning of the social transformation.

It is such a beginning because the principle underlying capitalistic society and the principle of love are incompatible. Love is necessarily a “marginal phenomenon,” writes Fromm (1956) “not so much because many occupations would not permit of a loving attitude, but because the spirit of a production-centred, commodity-greedy society is such that only the non-conformist can defend himself successfully against it” (111). For radical philosophers of liberation like Che Guevera and Paulo Freire, love stimulates critical action (McLaren, 2000). According to Freire (1970) this occurs through developing critical consciousness:

To surmount the situation of oppression, people must first critically recognize its causes, so that through transforming action they can create a new situation, one which makes possible the pursuit of a fuller humanity. But the struggle to be more fully human has already begun in the authentic struggle to transform the situation (47).

Critical thought as a revolutionary praxis of love provides an opening for grassroots struggles to move beyond resistance, confrontation, and oppositional tactics toward practices of transformation. These practices help reorient our social relations, democratize our communication and bring change on multiple fronts, including the technical sphere, as this dissertation has attempted to demonstrate. These practices, such as non-hierarchical social organization, participatory democracy and consensus-based decision making, comprise a prefigurative politics that enacts the social change being sought in the broader society. Radical tech collectives are just one example of these

“spaces of hope” being consciously constructed by grassroots social justice activists around the world (Harvey, 2000).

Free as in love

Revolutionary love, rooted in a love for humankind, is an act of freedom: “It must generate other acts of freedom; otherwise, it is not love,” writes Freire (1970, 90).

Revolutionary love is therefore political because it cannot remain disconnected from a liberatory politics; it is rather “always pointed in the direction of commitment and fidelity to a global project of emancipation” (McLaren, 2000, 171). But freedom is risky. It is terrifying. There is a “fear of freedom” that afflicts the oppressed, the world's disenfranchised and downtrodden majority, that leads them to either desire the dominative role of the oppressor or submerge themselves completely in the role of the oppressed (Freire, 46). One result of the relationship between oppressor(s) and oppressed is the creation of dominated consciousness whereby the oppressed orient themselves to the will of the oppressor(s). Freedom requires the non-free to expel the internalized image of the oppressor and assume the position of an autonomous individual-in-community. “Freedom is not an ideal located outside of man,” Freire reminds. “It is rather the indispensable condition for the question for human completion” (47).

Freedom is one of the central concerns and objectives of free software. The theory and practice of open that guides this mode of software development has cascading and far reaching implications for charting lines of flight and designing the future anew. New labour and social relations coalesce within the open source method, which is rooted in a conceptualization of community based on collaboration. The freedoms inherent in free software apply to software use and development, but insist upon their own scalability:

thus they imply the freedom to live in community, to share, to help one another, and to contribute to the broader social good. These freedoms are therefore productive: they permit and promote community building behaviour. According to Kelty (2008), the forms this collaboration takes are “collective social experiments” that result in “an experimental praxis...extended to the social organization of governance in the service of improving the conditions of freedom” (239). Thus free software is a recursive public in that it both proposes and provides alternatives, which scale beyond the realm of software production.

Others have discussed the scalability of open source as an alternative mode of production, suitable for goods other than just software (von Hippel & von Krogh, 2003; O'Mahony, 2003; Benkler, 2006).

The key concepts of the argument—user-driven innovation that takes place in a parallel distributed setting, distinct forms and mechanisms of co-operative behaviour regulated by norms and governance structures, and the economic logic of “antirival” goods that recasts the “problem” of free riding—are generic enough to suggest that software is not the only place where the open source process could flourish (Weber, 2004, 225).

The various elements of the social, political, technological and economic change explored in this dissertation converge in the praxis of open source. Free and open source software is social because it is a product of voluntary collective collaboration, which suggests a different way of organizing society, one that rejects the capitalist labour relations and market dictates in favour of community. It is political because structures and organizations allocate resources and manage conflicts in novel ways that translate to an offline environment. FOSS is technical because the final product is software code that must function; and finally it is economic in terms of how programmers make individual choices about what to do with their limited time and energy, again suggesting alternatives to the capitalist mode of economic organization (Weber).

What *would* motivate people to contribute their limited resources to an unpaid endeavour like FOSS? Altruism? Recognition? Self-satisfaction? Doubtless these all have some impact. But could it be something more fundamental, something more deeply human? “Only within the community has each individual the means of cultivating his gifts in all directions; hence personal freedom becomes possible only within the community” (Marx & Engels, 1970). Soderberg (2008) describes the FOSS scene as a “community-for-itself;” in other words, a purposeful community made up of individuals with interests in common and working toward shared goals. Community, on this account “is merely the ground of a labour of individual self-development” (Shershow, 2005, 212) This brings us back to species-being and “an ontology of production and creativity in which freedom itself could be grasped...” (213). It is in community, therefore, where we become ourselves, and in doing so, become free.

A communication revolution?

The search for the elusive agent of change, the class or group that will unleash our freedom upon us, must cease. We must see tomorrow's change agents today, in ourselves; we must accept our responsibility for the atrocities that besiege this planet as much as the minor injustices that plague our daily lives. We must become ourselves. To do so, we must see the invisible yet very human hand that guides the market and shapes technology. Tech activists have seen very clearly the human side of the work they do:

If we undress the myths surrounding the internet, and examine the true meaning of the word, we see that it is not a story of technological revolution. Rather it is a narrative of popular revolution. It isn't about technology, it's about people. People coming together and expressing themselves freely. That in itself is a revolution. We are the internet. We are the revolution. We drive it, we make it, we use it, we are it (Hirsh, 1996).

The internet is the terrain on which this “communication revolution” is taking place; it is also the object of transformation as users appropriate internet technology to satisfy unmet needs. These ideas of inter-connectedness, agency, democracy and change inhere in the social justice work of activists in the newest social movements: they are ideas that continue to inspire and guide me in all I do.

As an activist scholar, I feel strongly the need for social utility in academic work and the necessity of aligning my radical critique with an ethico-radical practice. I do not want to practice “freedom in quotation marks,” as Guevera (2003) cautioned the revolutionary-intellectual (224). I do not want to reproduce relations of domination by perpetuating the status quo. I thus adopted and adapted the method of the activists I was studying, a method that had openness at its core. This affordance of openness coincided with a culture of sharing, co-operation, collaboration, mutual aid, autonomy and equality in which activists were engaged, consciously preparing the ground for a future better world *now*, in the present moment. I extended this method to my academic practice, embracing the open access movement and joining the effort to liberate publicly funded and generated scholarly knowledge from the privatized domain of academic journal publishing. At the same time, I applied these inherently democratic values to my teaching practice, seeking to bring them into the classroom as a space of participatory co-learning. Unsurprisingly, the writing of this dissertation was personally transformative, as much as it sought broader societal change.

From the lofty heights of the “intellectual stratosphere (as one young student friend put it in all earnestness) to the trenches of tech activism, to speak of a better world is to not only provoke the sleeping fear of change (and thus resistance to it). It is also to invite charges of utopianism. Utopian thinking is essential to the task of building our

world anew, out of the rotting but fertile corpse of the old; it is needed “to stir the imagination into creating radically new alternatives to every aspect of daily life” (Bookchin, 2005, 432). Utopian thinking is only guided by love, and of this activists in the newest social movements are guilty. They are remaking technology in order to help people remake our world. It is a different world, a better one, where human freedom and equality and care is the measure of a just and loving society. It is possible.

Appendix A

Interview Questions

1. What is your online activist project?
2. How did you become involved with it?
3. What tech skills do you contribute? (coding/hacking, website building/maintenance, tech support, trouble shooting, translation?)
4. How much time do you devote to your online activism (hours/week, hours/month)?
5. Do you engage in other types of activism (e.g. offline)?
6. What motivates your activism?
7. What are your social justice goals? E.g. what is your vision for society?
8. What are the obstacles, if any, to achieving these goals?
9. What is the role of free software and copyleft in global justice activism?
10. How can/does the Internet contribute to building a better world?
11. Are you male or female?

12. What is your age?
13. What is your email address?
14. What city/country do you live in?
15. Do you have paid work?
16. Do you get paid (e.g. wages, honorarium, stipend) for your activist work?
17. How many people are involved with your activist project?
18. What are the main difficulties experienced in organizing your project (e.g. financial/human resources, security etc.)
19. Can we contact you for a followup interview?

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