Contestational Design:
**Innovation for Political Activism**

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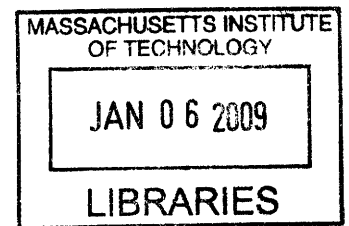
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Abstract

This thesis presents contestational design, a unique form of design activity whose aim is promote particular agendas in contested political arenas. I propose a framework for analyzing contestational design processes, which I then apply to two initiatives that developed communications infrastructure for activist groups.

The first case study is TXTmob, an SMS-broadcast system that I developed with an ad-hoc coalition of activists to support mass mobilizations during the 2004 Democratic and Republican National Conventions. It has been used by thousands of people and has inspired new projects in both the nonprofit and commercial sectors.

The second case study is Dialup Radio, a telephone-based independent media system that I developed with a civil society organization in Zimbabwe. It was intended to disseminate activist information, particularly to Zimbabwe's rural poor. Despite limited infrastructure and government restrictions, several prototypes were produced and tested in Zimbabwe.

After describing each case study individually, I turn to a comparison of their respective processes and the artifacts that each produced. Examining the cases side by side, I identify a set of common issues with which contestational designers contend at various points in the design process. Finally, I describe a set of organizing principles that distinguish contestational design from other kinds of design activity.

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Introduction

When I first came to the Media Lab, I was interested in the ways that design innovation could be brought to bear on activism. Although I had experience with both technology design and political activism, these had for the most part remained separate activities. Aside from some graphic design and web development projects for various groups, I had found very few opportunities to do serious technology and activism work.

In my first years at the Lab, I collaborated with peace activists, community development organizations, and environmental rights groups. The work was interesting, challenging, and rewarding. However, I increasingly became aware of a gap between the design practice I had learned in school and exercised professionally, and the activist practice in which I was increasingly engaged. On the one hand, the design processes that I had learned where the designer begins with a more or less well defined problem statement, conducts some kind of research, creates an iterative series of sketches and prototypes that are subject to rigorous discussion and critique in a studio environment, and finally produces a refined design that can then be taken forward through a production process were wholly inappropriate for the fast-paced and highly indeterminate activist contexts in which I suddenly found myself. At the same time, working with activists brought to light a set of considerations that I did not have to contend with as either a student or a professional designer. These included working with extremely limited resources, deep consideration of the ideological implications of various design decisions, and mitigating the possibility of arrest.

As I began to talk about my work with other designers and engineers, I discovered that I was not alone in recognizing disconnects between traditional activism and design practice. When I presented my projects at academic conferences, I invariably found myself in discussions with designers and engineers who wanted to engage with activist projects but frankly didn't know where to begin. At the same time, I was also hearing from my activist colleagues about the difficulties they had had working with engineers and designers. As a member of a Navajo environmental group with which I worked put it, many well-intentioned designers simply "don't get" activists.

In taking up my dissertation work, I have chosen to focus on the design process itself. My goal has been to understand what makes working with activists different from other design activities, and to articulate a set of practices and principles that describe what it means to work

in this unique space. I am calling this practice "contestational design."

By contestational design, I refer to design activities that engage in advocacy work in collaboration with and/or on behalf particular players in adversarial political processes. Contestational design is distinct from design activities that merely seek to raise awareness of or provide opportunities for discussion about political issues; it is an openly partisan activity that advances a particular set of interests, often at the expense of another.

Contestational design projects vary in scope, and often operate at several levels simultaneously. At the tactical level, design focuses on the intervention; on particular, often short-lived action. Examples include protest props like the oversized puppets, DIY body armor, and teddy-bear flinging catapults that are used in mass mobilizations. It also includes political posters, radical newspapers, and activist websites, as well as culture-jamming and interventionist media activism by groups like AdBusters and The Yes Men.

Contestational designers also work strategically. The "color revolutions" that swept Georgia and the Ukraine in 2003 and 2004 relied on carefully-crafted images and symbols, while the innovative uses of mobile phone text messaging in the Philippines during the 2002 People Power II mobilizations were very much the product of careful design activity.

Contestational designers also build infrastructure; projects that are primarily oriented towards creating new capacities for collective action that can be leveraged for multiple interventions and campaigns. Indymedia, an Internet publishing

Examples of contestational design: Tute Bianche (1994-2001), Ukraine's Orange Revolution (2004), Edinborough IMC (2005)
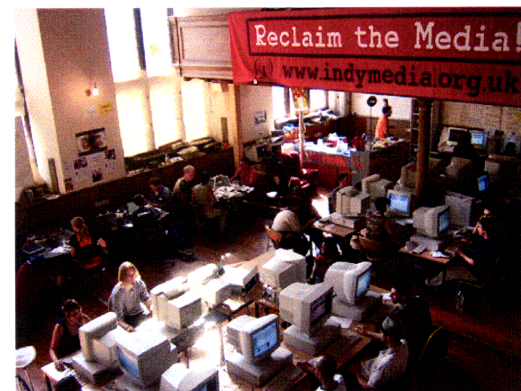
platform originally developed to support 1999 anti-WTO protests in Seattle has grown into an international network of independent and activist journalists. Protest.net offers a calendar of activist events taking place around the world. Technical collectives like Resist! and Riseup provides email and web-hosting services for activists around the world.

In this thesis, I propose a framework for analyzing contestational design processes, which I then apply to two initiatives that developed communications infrastructure for activist groups.

The first case study is TXTmob, an SMS-broadcast system developed for activists protesting at the 2004 Democratic and Republican National Conventions in Boston and New York. This system was designed in collaboration with several local and national activist groups, and was intended to support a new model of radically-decentralized protest. It was used by approximately 250 people during the Democratic National Convention, and by nearly 6000 people during the Republican National Convention. Since 2004, it has been used in a variety of mobilizations in the US and abroad, including the Orange Revolution in the Ukraine and the 2006 Mayday mobilization by US immigrants.

The second case study is Dialup Radio, a telephone-based independent media system for human rights and civil society activists in Zimbabwe. The basic concept behind Dialup Radio was to provide an easy-to-use means for activists to produce brief (approximately 3 minute) radio-style programs, which are then uploaded to a server and accessed by mobile phone. The system was developed for a context in which there is both limited communications infrastructure and strong government control over media, which offered a unique set of design challenges. The project was further complicated by relationships between activists, NGOs, and international civil society and funding networks.

After describing each case study individually, I turn to a comparison of their respective processes and the artifacts that each produced. Examining the cases side by side, I identify a set of common issues that each design had to contend with at various points in the design process. Finally, I describe a set of organizing principles that shape contestational design practice and distinguish it from other kinds of design activity.

I have several goals in taking up contestational design as a subject of academic inquiry. By engaging in critical reflection about several of my own projects, I hope to inform my own practice to become a better designer and a better collaborator. I also wish to inspire the design research community by identifying a compelling and overlooked area of design practice, and offering conceptual frameworks and some initial findings to guide further research in this area. Most

importantly, I aim to encourage other designers and engineers to work in this area and to provide at the least a starting point to help them find their way.

A few notes before proceeding. First, I am using the term "design" very broadly. While there are of course differences between the various design disciplines (architecture, graphic/industrial/ interaction design, etc), it is common among design theorists to blur interdisciplinary boundaries in favor of a more generalized description of design practice. For example, Donald Schön describes design as "all occupations engaged in converting actual to preferred situations" [1]. Taking an inclusive approach to design is reflective of real-world practice in which disciplinary lines are increasingly fuzzy; it also provides a useful analytic frame.

Second, I will focus on activist projects that are explicitly adversarial; i.e. projects in which notions of antagonism and partisanship are central to the activity. Such projects represent a subset of activist work; for many activists direct conflict with opposition plays a less central role than such activities as community organizing and economic development. This is not to say that contestational design has nothing to offer less confrontation-oriented activism; rather, it is my belief that placing conflict at the center of design activity allows us to identify issues, themes and principles that are at play to some degree in all activist design projects.

Along these lines, it might be suggested that contestation is present in other, perhaps even all, design activities. Architects and urban planners, for example, often find themselves engaged in bitter disputes between zoning regulators, business interests, and community groups. While a thorough consideration of contestation in all forms of design activity is outside the scope of this dissertation, it is hoped that the insights gained through my research are generalizeable to a wide range of design practices.

Chapter Organization
This document is organized as follows:

Chapter 1: Introduction describes the motivation and structure of this thesis.

Chapter 2: Background reviews literature on design and social change, and provides a theoretical grounding for contestational design.

Chapter 3: Methodology discusses the research methods employed in this thesis and proposes a conceptual framework for analyzing contestational design projects.

Chapter 4: TXTmob presents the TXTmob project. This chapter describes contestational design

in the context of a contemporary American protest that appropriates ideas, tactics, and resources from the anti-globalization movement. Several key themes are identified to be taken up in the analytical discussion.

Chapter 5: Dialup Radio presents the Dialup Radio project. Contestational design is considered in a southern African, developing world context where the primary actors are NGOs and international funding agencies. By tracking the project's evolution from activist project to social enterprise, this chapter begins to differentiate contestational design from other socially-engaged design activities.

Chapter 6: Discussion compares the two case studies. Design issues confronting both projects are identified and a set of shaping principles is described.

Chapter 7: Conclusion reviews this thesis and maps out areas for future contestational design research and practice.

Background

As has been widely recognized in both the academic and mainstream press, mobile communications technology – particularly cell phones – are transforming the nature of dissent and public protest around the world [2, 3]. From the Philippines to Madrid to New York to Los Angeles, mobile phones have come to play a central role in both the organization and coordination of mass mobilizations around the world [4]. The ubiquity of mobile communications technology makes it easier to publicize protest events, and also facilitates new forms of fluid, responsive collective action [5, 6]. Cell phones also provide new venues in which to express political dissent, for example, through the creation and sharing of political ring tones, wallpapers, and the like [7]. Not surprisingly, access to mobile phone networks by civil society organizations has itself become a contentious issue particularly in the developing world [8].

Often overlooked in both academic and popular accounts of cell phone use in political protest is the role that intentional, directed human labor plays in conceiving these new forms of "mobile activism" and in developing the underlying technologies that enable them. To take a well-known example, the People Power II movement in the Philippines was widely reported in the popular press and echoed in subsequent academic accounts as a spontaneous uprising that was initiated and sustained by widespread text messaging [9]. Subsequent research revealed that in fact, PPII was neither spontaneous nor particularly "mobile." Rather, it was a carefully orchestrated mobilization planned by a number of experienced activist organizations, and publicized via television and radio as well as through text messaging [10].
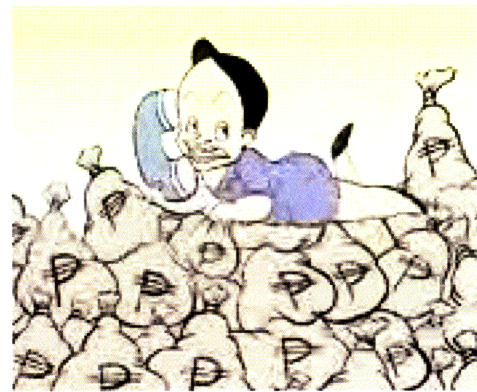
Mobile activism in the Philippines: The 2001 People Power II mobilzation employed mobile phones (left); still image from a mobile video protesting the 2005 Hello Garci scandal.
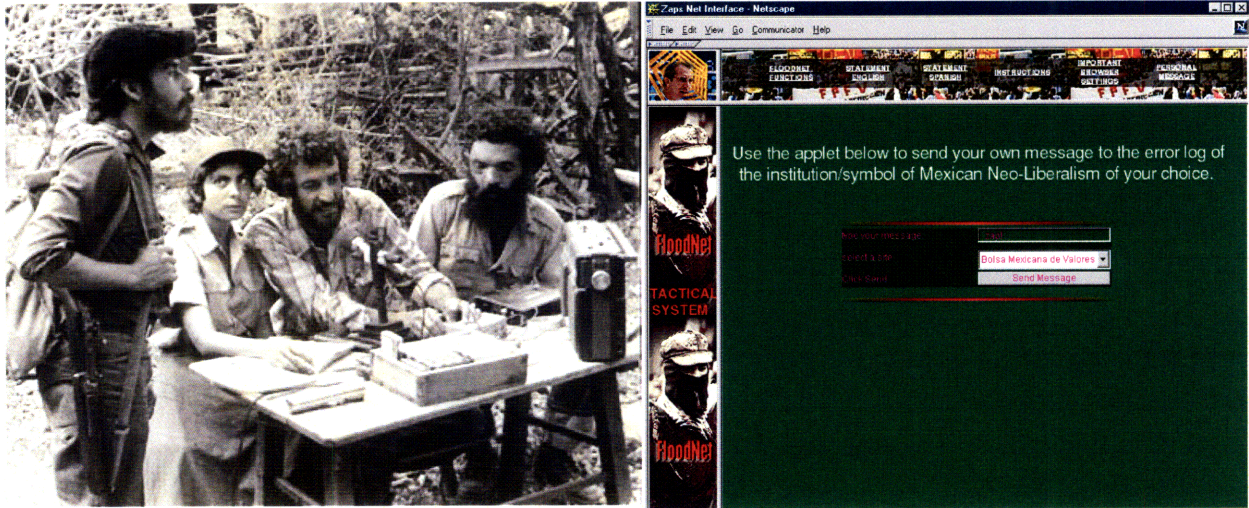
In the 1980s, the FMLN's Radio Venceremos broadcast partisan information during El Salvador's revolution (left); Electronic Disturbance Theater's FloodNet (1999) software carried out distributed denial of service attcks on behalf of Chiapas' Zapatistas.

As this example indicates, the effective use of mobile technology in activist campaigns is usually the result of careful planning and disciplined execution. It occurs within the broader context of activist adoption of communications technology.

Technology and Activism

Activists have long been early-adopters of communications technology. For example, activists in the 1980's used PeaceNet, an email and filesharing system established specifically to support social justice movements [11]. Throughout the 1990s, the emergence of Internet technologies transformed protest movements [12, 13]. Activists from all over the world now routinely collaborate in order to plan, publicize, and marshal resources in support of mass mobilizations, giving rise to transnational activist networks [14, 15]. This capacity, pioneered by the Zapatistas in Mexico [16], led to a series of large-scale protests at meetings of the WTO and G8 – most notably the June 18 1999 uprising in London [17], and the "Battle in Seattle" later that year. The first mobile-phone enabled activist actions also took place during this period, beginning with the 1992 anti-military mobilizations in Thailand [18]. Activists have also made extensive use of other communications technology including FM radio [19-21], public-access television networks [22, 23], and walkie-talkies [24] to coordinate protest.

Activist adoption of technology is enabled by the growing ease with which communications systems can be designed, prototyped, and implemented. The falling cost of computer equipment

and bandwidth, combined with the development of user-friendly programming and scripting languages have made is substantially easier to prototype and deploy communications systems and applications. At the same time, a growing technical literacy has both reduced barriers to software development and also provided a growing labor force of developers often with non-traditional educational and professional experience. The recent growth of "hacktivist" [25] and "advocacy developer" communities – loose networks of designers and software engineers who work primarily with social justice organizations -- provides the needed technical expertise to not simply appropriate existing technologies for activism, but to actually create new technical forms that meet the unique requirements of advocacy campaigns [26]. Perhaps the best-known example of such a system is Indymedia, a web-based "open publishing" service that was initially developed to support independent journalists covering the 1999 anti-WTO protests in Seattle [27, 28] and has since grown to be a global phenomenon [29].

I am attempting to make two points here. First, at the time mobile phones became widely adopted, activists were used to including communications technology in the planning and execution of advocacy campaigns. Second, there was an established network of practitioners with the requisite expertise to adopt, modify, and create mobile communications services to meet the needs of activist campaigns. In short, the stage was set for activist adoption of mobile technology before the actual devices came into widespread use.

However, this stage-setting does not in and of itself guarantee innovative, effective campaigns. Integration of communications technology with advocacy efforts requires careful design of both the technology and of the campaigns in which they operate. This co-design of technologies and tactics is not confined to a particular set of technologies. It is, rather, an approach to design that privileges antagonistic political processes as a mechanism for social change.
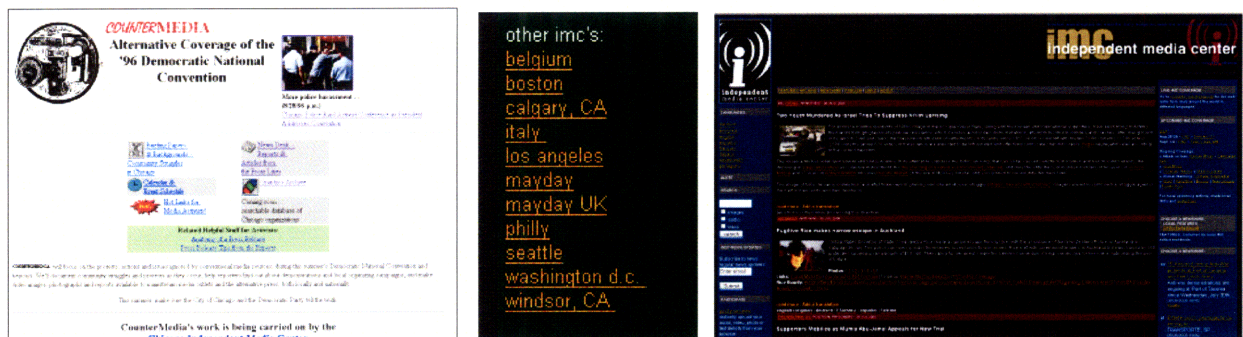
Growth of a movement: CounterMedia, an Indymedia precursor in 1996 (left); detail of Indybay's front page circa 2000 (center; the list of IMC's now numbers in the hundreds); Indymedia today (right)

Perspective	Ethos	Discourses	Examples
Materialist	Product as Catalyst	Technology Transfer Technology Appropriation	FreePlay Radio OLPC Nigerian piracy
Ethical	Designer as Catalyst	Responsible design Social enterprise	Habitat for Humanity Grameen Bank
Political	Process as Catalyst	Participatory Design	Scandavian trade union projects R/UDAT

Perspectives on design and social change

Design and Social Change

At core, this dissertation is concerned with relationships between design and social change. This topic has long interested designers and scholars, dating back to the utopian aspirations of John Ruskin and William Morris. However, contemporary literature that addressing design and social change directly is both limited and fragmented across several disciplines [30].

In approaching the literature, I am interested in underlying models of social change – in theories about how and why change is achieved, and what role designers and products play in bringing it about. In this chapter I bring several discourses into a common framework organized by theoretical orientation. It should be noted that the approaches identified here are not the only ways that social change can be theorized; they are simply the most dominant themes in the design literature. Nor are they mutually exclusive. These are not competing theories of social change; they are merely perspectives that indicate various orientations and areas of interest.

Materialist Perspectives: Product as Catalyst

Materialist perspectives emphasize the capacity of products to catalyze social change. Classic studies of the printing press [31] and writing technologies [32], for instance, describe dramatic cultural shifts arising from the introduction of new technologies. Radio, television, and the Internet have all been accompanied by a host of prognostication predicting seismic social shifts

resulting from their introduction [33-35].

This approach is mirrored in much of the early thinking about technology and development. Technology transfer proponents, for instance, celebrate the ability of technical innovation to transform the developing world. These engineering-centric narratives tend to emphasize products that "solve" social problems. Oft-cited examples include wind-up radios, water filtration systems and more recently, low-cost laptop computers [36]. Critics note that products in and of their own right are probably inadequate to address the most pressing and complex social issues. As described by systems theorists [37] and environmentalists alike [38], social and environmental problems arise from the complex interactions of multiple, often contradictory forces. Design outcomes can be very difficult, indeed impossible to predict. More significantly, there is often no clear agreement on what a desirable outcome would be – for example, is homelessness "solved" by an adequate supply of public shelters for the indigent, or does it require that home ownership is within the grasp of every citizen?

Such problems defy the easy modeling required by classical systems design and engineering [37]. They require methods that recognize indeterminacy and solutions that work with rather than dominate complex situations [38]. They also require that designers recognize and challenge their own implicit beliefs and assumptions, and how these may influence the products they create and the social relations they reinforce [39].

Critics argue that engineering-centric accounts are overly deterministic, that they allow far too much agency to technologies and ignore the role that social relations play in determining how products are designed and adopted [40, 41]. Among new media and science studies

Technology Transfer:
One Laptop Per Child's XO computer
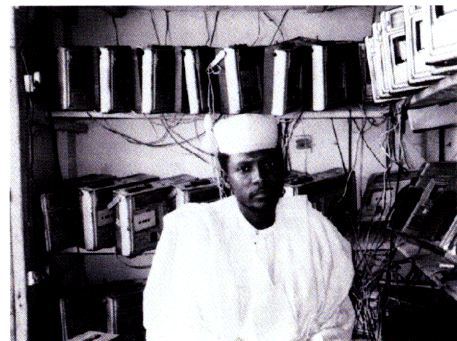
Appropriateion: a Nigerian media piracy with audio dubbing machines.

scholars, substantial literature exists describing various ways that technologies are adopted by social movements. Sreberny-Mohammadi and Mohammdi describe the role played by such "small media" as leaflets and audio cassettes played in the 1979 Iranian Revolution [42]. Calhoun discusses the use of fax machines during the 1989 Tienanmen Square protests [43]. Rafael considers text messaging by Philippino demonstrators in 2002 [44]. Jenkins reports on the emergence of online gaming environments as sites of large-scale virtual protest [45].

These narratives tend to emphasize the work done by social actors to appropriate existing technical forms into local, activist contexts. One may think of Georgian students adopting popular cartoon characters during the Rose Revolution [46], or the emergence of Javanese puppet theater as a site where politics could be represented and ridiculed under Soharto's regime [47]. Appropriation describes a process by which existing technical and cultural forms are "captured and localized," [48] repurposed to reflect particular times and places [49].

Appropriating technologies enables activists to develop new practices and innovative organizational forms. For example, McLagan [50] describes the emergence of a "human rights media" privileging publicity, celebrity, and a sort of activist-journalism that relies on innovative uses of print, photography, Internet, CD-ROMs and handheld video cameras. Alongside the technology adoption are new organizations that train activists in the use of media technologies and distribute human rights media through film festivals, websites, and the popular press.

Technology appropriation can involve some degree of technical innovation. For example, Larkin describes the ways that Nigerian media pirates modify audio cassette recorders for use in mass dubbing [51]. However appropriation literatures tend to emphasize novel technology use rather than the creation of new technical forms. Technology is often taken as given; technical innovation is usually understood to occur through separate processes and by other actors than those involved in an appropriation. Even when scholars consider technical forms that are created specifically by and for activists, analysis tends to focus on how technologies are used rather than on how they are created. For example, one may look to the many articles that have been written about the use and impact of the World Wide Web during the 1999 anti-WTO demonstrations in Seattle and the subsequent growth of Indymedia into a global network of grassroots activists and journalists. The majority of these accounts focus on organizational strategies employed by Indymedia activists [52-54] and pay little attention to the work done by Indymedia designers and technicians. The notable exception is Halleck's brief account which remains one of the few detailed descriptions of Indymedia's technical and social development [55].

Ethical Perspectives: Designer as Catalyst
There is a dominant strain in the literature that appeals to designers' moral sense of social

responsibility and emphasizes designers' capacity to act as agents of social change. In essence, the argument for "socially responsible design" suggests that designers have an obligation to take the long-term social interests into account when making design decisions because the artifacts they produce have significant social and environmental impact.

Socially responsible design is often presented as a normative moral argument implying an obligation. As with other such arguments, it can struggle to define the authority from which this obligation stems. David Stairs suggests altruism as a basis for doing good works, and tries to locate the altruistic urge deep within human psyche [56]. Buchanan argues that design is necessarily founded on "first principles" of human dignity and human rights [57], although he acknowledges that this is difficult to reconcile with the historical uses of design by fascist states.

Bonsiepe embraces the idealism of socially responsible design in calling for a "design humanism" that posits a role for design "to interpret the needs of social groups, and to develop viable emancipative proposals in the form of material and semiotic artifacts" [58]. Bonsiepe's agenda is openly aspirational and unapologetically utopian, shedding all normative claims on designers.

Whatever the source, claiming a social responsibility for designers poses a direct challenge to commercial design practice. Traditionally, design presents itself as a service industry whose primary responsibility is to its paying clients [59, 60]. Insisting that designers are also beholden to society at large raises questions about designer agency. Simply put, if a social responsibility also exists, to what extent are designers capable of acting on it – especially when the social obligation is at odds with the client's interests?

There are several responses to this challenge. One is to stake out a version of socially responsible practice that doesn't conflict with business interests. This is the approach favored by some members of the "green design" movement who see the advent of a softer, gentler corporatism driven by consumer desire for sustainability [61]. This take on green design is basically compatible with market forces and is a comfortable position for designers, the majority of whom see their roles as "complimentary to business strategies" [62]. It is nonetheless a problematic stance as it ultimately relies on corporate integrity to verify product sustainability, a strategy that has been shown to lead to "greenwashing" rather than substantive environmentalism [63].

A second response is for designers to use what authority they have within business contexts to make socially responsible decisions and advocate for change. Indeed Papanek [64], Whiteley [65], and Margolin [66] all suggest that designers have considerably more agency than is generally assumed, even within industrial and corporate contexts. Their status as experts allows designers

Design NGOs: Habitat for Humanity (top), Designers Without Borders (bottom)

Academia: Rural Studio

a great deal of leverage in shaping deliberations and making recommendations. Designers can use this authority to advocate on behalf of users, recommend sustainable materials, and suggest socially responsible alternatives. Design firms also exercise considerable latitude in selecting their clients, enabling them to refuse work deemed not to be in the public interest.

Many social design advocates view socially responsibility as fundamentally incompatible with the demands of business [64-66], which necessarily proceeds according to "industrial logics" [62] that promote consumption and deem social issues as "extraneous" or "inappropriate" to the work of design [67]. They recommend that designers withdraw from commercial practice as much as possible.

In recent years, several models of practice have emerged that explicitly empower the designer. Margolin and Margolin encourage socially responsible designers to find clients and collaborators among such socially-oriented professions as healthcare, education, social work, and crime prevention [66]. Steven Heller promotes an idea of "design authorship" in which designers utilize internet technologies to publish their own books and sell their own products [68]. Victor Margolin similarly exhorts designers to embrace entrepreneurship as a means of liberating themselves from the limitations of "mainstream manufacturing" [69].

Stairs and Tatum [56, 70] describe the emergence of "design NGOs" like Habitat for Humanity and Design for Social Impact as a compelling model

for situating design outside of market constraints. Both, however, are largely uncritical of the constraints faced by NGOs, such as the influence of funding agencies in shaping activity. Stairs, for example, admits that his African-based Designers Without Borders NGO has worked closely with the US State Department but argues that his stance of being 'ideologically neutral' is an effective tactic to mitigate any political complications.

The design NGO model is closely aligned with notions of social enterprise one finds in business and nonprofit management literatures. Social enterprise and social entrepreneurship emerged in the 1990s in large part as a set of strategies for nonprofit management in an age of diminished public funding [71]. Although a precise definition of social entrepreneurship remains elusive [72], it is generally understood to involve bringing business and entrepreneurial techniques to bear on nonprofit management [73], and is generally concerned with creating organizations that meet "the double bottom line" of providing social value and maintaining economic self-sufficiency [74].

One should also acknowledge the role of volunteerism in enabling socially-responsible design. Many socially-engaged design activities are undertaken on an after-hours pro-bono basis [60]. There have been attempts to institutionalize volunteerism including corporate support for pro-bono work and organizations like the Taproot Foundation and Geekcorps that connect designers and engineers with nonprofits. Projects like Auburn University's Rural Studio and MIT's Ideas Competition also demonstrate the power of educational institutions to engage students in real-world socially responsible work.

Political Perspectives: Process as Catalyst

Political perspectives see the design process itself as a vehicle for empowering end-users to exercise greater control over their environment. The dominant formulation among design scholars is "participatory design," an approach that emphasizes participation by multiple stakeholders in collaborative design projects. Rooted in the participatory design movement that emerged from 1970s Scandinavian labor movements as a means of empowering workers and mitigating workplace alienation [75], it has subsequently been adopted in a variety of design contexts including urban planning, industrial design, and human-computer interaction design.

Participatory design projects may be structured in a variety of ways. A key differentiator is the relative degree of power afforded to each participant. In industrial contexts projects often draw distinctions between 'experts' with technical and managerial skills, and 'laypeople' with informal or contextual knowledge. In most cases, designers' status as experts confers relatively greater authority in decision-making than laypersons [66]. Commonly, product development teams adopt user-centered design methodologies in order to enhance designers' effectiveness and ensure usability. These projects tend to limit layperson participation to "passive roles," including filling
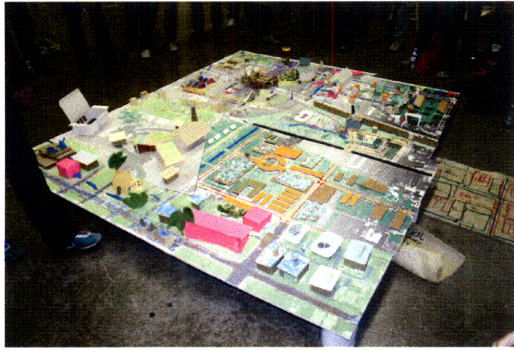
Participatory Design: Art and Sustainability Laboratory, Smart Museum (Chicago, 2005)

out surveys and joining focus groups [76].

At their most ambitious, participatory design projects aim to democratize design processes and empower individuals to exercise control over their environment. Drawing on Kleinman [77] and Barber [78], Howard describes these projects as "deep democracy" [76]. These projects blur distinctions between technical and nontechnical considerations, and emphasize deliberation and consensus-based decision making [79]. Relationships within collaborative teams aim at leveling hierarchies and granting significant authority to laypersons.

Philosophically, participatory design is often aligned with Habermasean notions of deliberative democracy. The design space is advanced as a sort of "public sphere" – a non-hierarchical discursive space in which participants rationally debate issues of mutual concern [80]. There are several key characteristics of public spheres. First, a distinction is made between "public" and "private" spheres, reflecting a commitment to individual autonomy over areas of individual concern. Second, the legitimacy of democratic process is predicted on public spheres being inclusive. Participation in deliberation is open to all citizens, and all are considered to be free and equal. Finally, public discourse is taken to be rational. Decision making is based on argument and persuasion, and is ideally consensus-based as a guarantor of inclusion and full legitimacy.

Critics of Habermasean democracy point to the role that the structure of public discourses plays in shaping its content. Limits are often placed on the scope and tenor of deliberation, determining which topics are eligible for consideration and establishing

Radical graphics: The Beehive Design Collective designs activist posters, banners, and logos.

ground rules that exclude "irrational" or "inappropriate" modes of discourse [81]. These discursive boundaries, coupled with rules governing who is eligible for participation, often serve to marginalize or exclude minority viewpoints [82].

The first design imperative of deliberative democracy is to facilitate rational decision-making by diverse participants around areas of mutual concern. Designers' expertise in these contexts is often founded on managerial rather than technical knowledge, as they are called upon to act as facilitators who build consensus among various stakeholders. Designers are encouraged to develop inclusive models of participation that allow full expression by stakeholders, casting participants "citizens" rather than mere "users" [83, 84].

The second design imperative is to provide material support for the construction of inclusive discursive spaces; i.e. "safe" places where diverse groups can gather to engage in discourse and deliberation. Traditionally, these have been physical locations, including community centers, cafes, bookstores and barbershops [85, 86]. The Internet has been proposed as a contemporary site for deliberative democracy [87].

Contestational Design

Contestational design is offered as a holistic approach that cuts across the perspectives described above. Our treatment of contestational design will consider how designers, artifacts, and processes can all act as catalysts for social change. Contestational design's specificity arises not from the

GraffitiWriter
"Our shit works." Since 1998.

www.appliedautonomy.com/gw.html

Art interventions: Homeless Vehicle (top; 1988-89, Kryzsztof Wodiczko), GraffitiWriter (middle; Institute for Applied Autonomy, 2000), SurvivaBall (bottom; The Yes Men, 2006)

site of its analysis, but from its grounding proposition that social change emerges through opposition. This suggestion is contrasted with deliberative democracy's proposal that conflicts between interested parties can be reconciled through consensus-based process and rational discussion. Following Chantal Mouffe's notion of agonistic democracy [88], contestational design views conflict as a central fact of democratic process. Design is seen as an openly partisan affair, less concerned with building consensus than with winning over opponents.

There is an established tradition of partisan graphic design. McQuisten has examined the historical use of graphic design by women's movements [89]. Glaser and Ilic examine poster design in contemporary social movements [90].

Partisanship is less established among other design discourses. Design projects with openly political agendas are often presented as art practice and receive scant attention within the design community. Krzysztof Wodiczko's "interrogative design" projects provide an illustrative example. His works give voice to marginalized peoples (homeless, immigrants, youth) through fanciful design interventions [91]. Anthony Dunne sees Wodiczko's work as examples of "critical design" -- artifacts that embody critiques or commentaries on culture, although he notes that "to hold a design view where electronic objects function as criticism, one must move closer to the world of fine art because the design profession finds it difficult to accommodate such research" [92].

As Dunne's comment suggests, there exists an established tradition of politically engaged art practice and criticism. In recent years, much of the discourse

has centered around "new genre public art [93]," "interventionist art [94]" and "tactical media [95, 96]." Although distinct, these strains all focus on art practices that feature direct engagement with activism and social issues.

Within design scholarship, however, contestation has not been deeply theorized and generally remains on the margins of design discourse. It is this oversight that the present work hopes to address. We begin by returning to Mouffe, and recognizing that her thesis poses two significant propositions to designers who engage in democratic processes.

First, the suggestion that democracy is fundamentally conflict-driven offers a philosophical imperative for design as a politically engaged, partisan practice. The implication is for designers to stake out positions not as facilitators or even as guardians of the public good, but rather as willing combatants who take sides in contentious social issues.

Mouffe's second proposition arises from the contention that antagonists in social contests don't persuade their opponents with reasoned arguments, but convert them away from previously held positions. Framing political choice as conversion highlights the many non-rational factors, including emotional resonances and notions of collective identity that underpin deeply held political beliefs. The implication is that democratic design is not limited to "providing information" or "fostering discussion" (two common tropes of socially engaged design practice) but creates emotionally charged symbols that simultaneously appeal to opponents and cement the loyalties of believers.

Methodology

In his book *The Reflective Practitioner* [97], Donald Schön argues that the knowledge required and produced by designers is qualitatively different than the knowledge produced in laboratories and other controlled environments. Schön casts design as a "reflective conversation with the situation," suggesting that real-world design contends with multiple, competing variables in dynamic, unique circumstances. Because these circumstances cannot be adequately modeled in a controlled environment, he proposes that design research properly resides in real-world practice itself and is centered around "reflective practitioners" – engaged, self-aware agents who simultaneously act and reflect on their actions through a process of participant observation. While Schon refers explicitly to Leston Havens' description of participant observation in psychiatric research [98], the term is more generally employed to describe social anthropology's methodology for gaining close familiarity with a group of individuals through ongoing, intensive interaction. Rooted in the work of Malinowski and the Chicago School of urban sociology, participant observation is accepted qualitative research methodology [99] and has spawned several variants. Particularly relevant for this thesis is "participatory action research" [100], which combines elements of participant observation with Kurt Lewin's emphasis on studying the "conditions and effects of social action" [101]. Participatory action research often emphasizes self-reflection as a research methodology [102].

Inspired by Schön's insights into design research and by participatory action research methodologies more generally, this dissertation investigates the means through which real-world activist technologies are designed and used. This is an exploratory research project addressing a descriptive, multi-variate question. Accordingly, I take a case-study approach to the research emphasizing qualitative, in-depth analysis of a small number of examples to offer "thick descriptions"[103] of events and draw out complex relationships between actors. Case-study methodologies are particularly well-suited to develop descriptive inferences [104] and identify causal mechanisms [105], to conduct exploratory rather than confirmatory research [106], and generally to form inquiries that are based "in the field" rather than in the lab [107]. Case-study research emphasizes depth over breadth, examining relationships between many variables [108]. Case studies are particularly well suited for designers whose work necessarily links theory and practice [109].

This dissertation focuses on two case studies, which are described in the next section. Each will be considered according to a common analytic framework intended to probe the design process,

identifying how the participants in each case contented with major design issues. From here, I comparatively analyze the cases to identify common themes and underlying principles in both the design process and the products that were created.

Case Studies

My analysis focuses on two case studies in which activist groups created innovative mobile communications systems to facilitate new forms of advocacy and mass mobilization. These case studies have been selected for several reasons. As a principal player in the development of both systems, I have unique access to the participants and process through which these artifacts were designed, implemented, and used. This perspective provides a first-hand account of the design process, as well as access to primary source material including interviews with other participants, transcripts of online discussions, meeting notes, sketches, server logs and databases.

In each case, I worked closely with activist organizations to design and implement a new mobile-phone based service and a corresponding set of tactics and practices. However, the examples occurred in dramatically different contexts. One was designed to support a series of highly-anticipated demonstrations in major American cities. The other is a clandestine communications system for use in an undemocratic society in the developing world. The needs, opportunities, and constraints in each situation lead to very different design decisions regarding both the technology and the advocacy campaign it was intended to support.

Examining these two projects alongside each other highlights the complex interplay between technology and context, and demonstrates how deep consideration of "situation" impacts contestational design. They also provide a robust challenge to our framework and design principles, helping to ensure that any conclusions we draw can be generalized across a variety of contexts.

Case Study 1: TXTmob

The first case is TXTmob, an SMS-broadcast system developed for activists protesting at the 2004 Democratic and Republican National Conventions in Boston and New York. This system was designed in collaboration with several local and national activist groups, and was intended to support a new model of radically-decentralized protest. It was used by approximately 250 people during the Democratic National Convention, and by nearly 6000 people during the Republican National Convention. Since 2004, it has been used in a variety of mobilizations in the US and abroad, including the Orange Revolution in the Ukraine and the 2006 Mayday mobilization by US immigrants.

The TXTmob study is based on participant observation, and is also informed by close examination of activist blogs and websites that appeared during the 2004 Democratic and National Conventions in which activist strategies in general, and TXTmob in particular are discussed. Journalist accounts from this period are also considered. In addition, a recently released dossier of New York Police Department surveillance documents from the Republican National Convention provides unprecedented insight into both activist and police tactics [110]. System use is determined by analyzing server logs and database entries, and by through informal interviews and "report-back" emails from users.

Case Study 2: Dialup Radio

The second case study is Dialup Radio, a telephone-based independent media system for human rights and civil society activists in Zimbabwe. Two prototypes have been created and tested in Zimbabwe. The basic concept behind Dialup Radio is to provide an easy-to-use means for activists to produce brief (approximately 3 minute) radio-style programs, which are then uploaded to a server and accessed by mobile phone. The system was developed for a context in which there is strong government control over media, which offers a unique set of design challenges.

The Dialup Radio study is largely dependent on participant observation. I worked with the project team for several years and traveled to Zimbabwe twice. Most design discussions occurred via IRC and email, leaving an archive of transcripts that have been analyzed. Interviews with project participants provided background information on the Zimbabwe context, corroborated by international press accounts and several recent books [111-113]. System performance was evaluated via server logs and database entries, and through user observation and interviews.

Analytical Framework

A key challenge for employing reflective practice as a research methodology is developing conceptual frameworks and analytic tools that enable careful, nuanced analysis of the experience under consideration. In this thesis, I employ an analytical framework inspired by Margolin and Margolin's "social design" model [66]. This framework is intended to lay out chaotic design narratives in an orderly manner, and to capture the design process with sufficient granularity and from a relatively broad perspective.

Margolin and Margolin equate design with social work, and present a six-step problem-solving process employed by human service workers :
1. Engagement: the social worker listens to the client to get a sense of the problem.
2. Assessment: the social worker looks holistically at the client's environment
3. Planning: the social worker and client collaborate to prioritize needs and brainstorm

solutions.

4. <u>Implementation</u>: an intervention occurs, guided by goals and objectives that have already been agreed upon.

The evaluation and termination phases are not described; presumably they are thought to be self-explanatory.

I appreciate the holistic view implied by this approach and by the sense of collaboration between the client and social worker. However, the underlying metaphor of care-giver and patient may not adequately capture the solidarity relationships involved in contestational design projects. It also dictates activities and relationships (e.g. the client speaks while the social worker listens, the social worker inspects the clients environment, etc) that for the moment I would prefer to leave unprescribed.

Using the social design model as a starting off point, I offer a framework for contestational design that focuses on activities but leaves roles and responsibilities undefined. I also flesh out the model by including several specific questions to be addressed at each phase of the analysis.

Here then, is a description of each phase and a listing of key questions that arise.

Engagement: key participants come together around a set of shared interests or loosely defined "problem" to be addressed through a design intervention.
<u>Key Questions</u>
- Who were the key participants in the project?
- What were their areas of expertise?
- How did they come to be involved?
- What were their motivations and expectations?

Assessment: participants examine the problem space in some depth, identifying needs, objectives and constraints.
<u>Key Questions</u>
- What specific geographic, historical, and/or social issues framed the design activity?
- What were the objectives for the design?
- What were the significant requirements and constraints?
- How were these identified, understood, and addressed by the participants?

Planning: needs and objectives are prioritized, potential solutions are identified and evaluated, roles are defined, and resources are marshaled.

<u>Key Questions</u>
- How was the design process structured and managed on a day-to-day basis?
- How were decisions made?
- What decisions were made, and why?
- What alternatives were considered?

Implementation: an artifact is produced and/or an intervention is executed.
<u>Key Questions</u>
- What was actually produced?
- How did it address design objectives and constraints?
- What were the artifacts capabilities and limitations?
- What technologies were involved?
- How did it related to existing infrastructure and technologies?
- What was the artifact's cost?
- Where did the materials, resources, and expertise come from?

Evaluation: the effectiveness and impact of the artifact or intervention is judged, strengths and weaknesses are identified, and directions set for further work.
<u>Key Questions</u>
- What sort of evaluation was conducted?
- How was success measured?
- How was the artifact used?
- What kind of activities did it enable?
- To what extent did it meet the designers' expectations?
- How was the artifact perceived by the social movements in which it participated, and by the broader culture?

Termination: the project is brought to an end.
<u>Key Questions</u>
- What is the "end state" for the project?
- Where does the project reside?
- What arrangements, if any, are made for it's long-term sustainability?
- How has the project been documented, and have its results been disseminated?
- Are the participants continuing to work together?

It is important to acknowledge that design is often a nonlinear process in which various design and analysis activities occur in parallel, rather than in series [62]. While this may be a useful

framework for laying out a narrative, it is understood that in practice the distinctions between each phase may often be blurred.

TXTmob

This chapter describes the design and deployment of TXTmob, a text-messaging broadcast system developed for protests at the 2004 Democratic and Republican National Conventions in Boston and New York.

Engagement

There were two main phases of activity to this project, each with a different group of participants and collaborators. TXTmob was first developed to support protesters at the 2004 Democratic National Convention in Boston. A second version was produced for protests at the Republican National Convention in New York later that year. In Boston, my main collaborators were members of an activist group called the Bl(A)ck Tea Society. In New York I worked with several organizations, the most important of which were the A31 Coalition and the New York Comms Collective.

The Bl(A)ck Tea Society (BTS) Comms Group

Protests during the 2004 Democratic National Convention were coordinated by the Bl(A)ck Tea Society (BTS), an ad-hoc coalition of Boston-based activists, organizers, and students that came together specifically for the DNC. The BTS was established as a non-hierarchical collective without a leadership hierarchy in which decisions were reached by consensus.

The BTS was formed to support a radically decentralized model of protest in which actions would be planned and carried out by loosely affiliated, autonomous "affinity groups". Rather than organizing specific actions, the BTS saw its role as "host," providing information and infrastructure for activists many of whom were expected to arrive from out of town. BTS members were involved in negotiating with city officials, arranging 'convergence centers' and housing for out-of-town activists, providing logistical information, hosting 'spokes' meetings, and organizing events.

Within the BTS, several committees were established to address such specific needs as publicity and housing out-of-town activists. I worked closely with the "comms committee" tasked with developing communications infrastructure for DNC organizers. The comms committee consisted of four core members. Several other individuals attended comms meetings, including a blond-haired man with a thick Boston accent who was widely believed to be an undercover police officer. This individual offered on several occasions to provide two-way radios and other

communications equipment that he claimed to borrow "from work." The equipment never materialized, and the group began distancing itself from him by changing meeting locations and times.

The A31 Coalition (A31) Comms Group

Unlike the BTS, no single organization fully embraced the "host" role in New York. This was due in part to the relative scales of the events -- the DNC protests only involved a few hundred people as opposed to the hundreds of thousands who participated in demonstrations at the RNC. It also probably had some basis in the political cultures of Boston and New York. Boston is a relatively small city with a correspondingly small activist community, much of which is comprised of students and young people new to organizing. New York's progressive community is larger, more complex, and more entrenched. It is also deeply factionalized, which can make collaboration difficult. Cooperation among organizers was further complicated during the RNC by the involvement of several national and international activist organizations that orchestrated specific events. For example, United For Peace and Justice (UFPJ) organized an "impassioned, peaceful, and legal" march on Sunday, August 29 (the day before the RNC opened). This was the largest single demonstration of the week, attended by an estimated 500,000 people. UFPJ is a national anti-war organization with an operating budget of approximately $1 million, representing a coalition of over 1300 national and local groups [114]. UFPJ focused exclusively on the August 29 march, and had little to no involvement with other events or organizations. Indeed, the UFPJ's emphasis on legal action and electoral politics may preclude coordination with more radical groups and limit its participation in the broader anti-globalization movement [115].

While many groups focused on their own actions during the RNC, a handful of organizations were oriented towards collaboration and supporting the broader network of activists. The No RNC Clearinghouse held several "spokescouncils" where affinity groups could meet and plan actions, the Bay Area Radical Health Collective offered first aid assistance to protesters, the National Lawyers' Guild recruited over 250 volunteer legal observers who monitored arrests and police conduct on behalf of demonstrators [116], and the New York chapter of Indymedia set up an independent media center (IMC) that provided computers and working space for hundreds of journalists. The A31 Coaltion, with whom I worked most closely, was focused on coordinating direct action protests on August 31.

The A31 coalition was similar in composition to the BTS in that it was an ad-hoc group of activists and organizers that had come together specifically for RNC. Unlike the BTS, the A31 wasn't organized to provide support and services throughout the RNC. Instead, it focused on promoting wide-scale direct action campaigns on August 31. Like the BTS, the A31 coalition was comprised of seasoned and new activists representing a variety of organizations and interests.

Most if not all of the A31 committee were also members of other affinity groups. A31was arranged into several smaller committees, including a "comms" group. The comms group was comprised of approximately a half dozen members (attendance at meetings tended to fluctuate), and included academics, "street medics," legal observers, and activists. As with the BTS, there was a mix of organizers interested in broadcasting information and activists who wanted to receive timely information in order to coordinate their own activities.

The New York Comms Collective (NYCC)

The New York Comms Collective (NYCC) was a group of self-described "radical techies" who offer communications support for mass mobilizations. During the RNC, the NYCC deployed several of its members to monitor protest activities in the street and maintain communications contact with the group's "command center" -- a space with computers, internet, telephones, and police band radios the group had established in a cooperative building on the Lower East Side. The command center consolidated information from various sources, which was then distributed via internet and mobile phone.

While the NYCC appears to have ceased operations, many of its members continue to be active in New York's activist scene.

Participant expertise

BTS members varied in protest experience, technical expertise, and expected roles during the protests. Two members were seasoned activists and organizers who saw their role as providing infrastructure and facilitating actions by various affinity groups. Another was a college freshman with limited activist experience who planned to act as a 'street medic' during the demonstrations.

A31 organizers were generally a more seasoned group of activists including academics, street medics, and legal observers. Most were from the New York area; one individual was from San Francisco and was also a member of the Bay Area Radical Health affinity group.

Few of the BTS or A31 comms group members had significant technical expertise. One member of the BTS worked as a system administrator in the financial services industry, and one member of the A31 comms group was a software developer in the mobile communications industry. This individual was also a member of the NYCC, and had helped to develop a website called counterconvention.org, which provided information and offered social networking opportunities to RNC protesters. Most A31 and BTS members were technically literate, regular email and internet users. Most had mobile phones, although several had not used text messaging features prior to the protests.

In contrast the NYCC group were avowed "techies:" experienced programmers, system administrators, and technical writers. They also were seasoned activists, having previously provided comms systems for protests in the New York area and elsewhere.

Motivations and Expectations

Both the BTS and A31 were ad-hoc coalitions formed specifically to organize protests during the 2004 conventions. Many members were experienced activists with deep roots in their local communities. Others – particularly in Boston – were first time organizers, but were socially connected within the activist scene. Some members of were recruited through early organizational meetings held in the months leading up to the convention; at least one of these individuals was widely suspected of being an undercover policeman.

My own involvement was largely brokered through existing social relationships. I was introduced to the BTS by a colleague at MIT who had become involved organizing the DNC protests. I then became involved with activists in New York through introductions made by mutual colleagues. At least one NYCC member later told me that he had made several inquiries among established New York activists (some of whom I've known for over a decade) about my reputation before deciding to work with me.

Several perspectives were represented in the comms groups. Organizers were seeking ways to broadcast information to activists during the protests, while street medics and legal observers were more focused on coordinating their own, more specialized activities. "Techies" (and here I include myself) were interested in creating the needed communications infrastructure to support the protests.

It is worth noting that idea of using mobile phones at all – let alone developing a new SMS messaging service – came about relatively late in the process. From its inception, the BTS comms group intended to use 2-way radios and low-power FM to manage protest communication. Text messaging was only considered when the group was unable to secure the necessary equipment, and as the limitations of radio broadcasts became more apparent.

After the DNC, organizers in New York were interested in text messaging and were familiar with the TXTmob project. My conversations with A31 and NYCC focused on how the system might be adopted for the RNC protests.

Assessment

The 2004 Republican National Convention was one of the most widely-anticipated mass mobilizations in recent American history. Growing dissatisfaction with the Bush administration
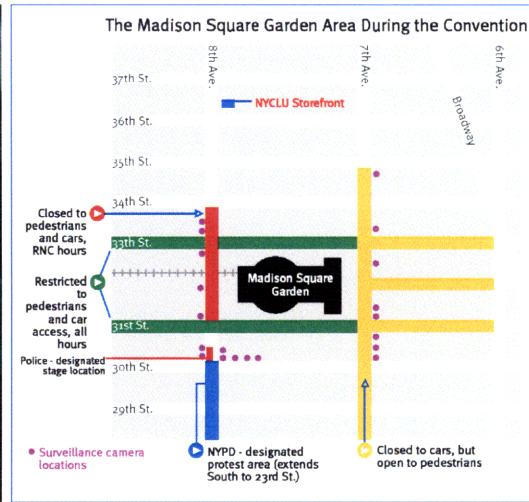
Policing protest: Police in Boston established a "free speech zone" during the DNC (left); in New York much of the area surrounding Madison Square Garden was closed off to the public.

in general and the war in Iraq in particular had fueled a reawakening of protest movements in the United States and around the world. The February 15, 2003 antiwar demonstrations were arguably the largest in history [117], with protests in nearly 800 cities around the world by an estimated 8 – 30 million people. In the United States, demonstrations were held in approximately 150 cities [118], the largest occurring in New York and San Francisco by an estimated 200,000 and 150,000 [119] respectively.

The 2004 national conventions of the dominant American political parties were anticipated as a sort of coming out party for the burgeoning progressive and antiwar movements. Particular emphasis was placed on the Republican National Convention (RNC), held in New York City in August; for many, the earlier Democratic National Convention (DNC) in Boston was thought of as a 'dry run' for the RNC.

Police Preparations

Police in New York and Boston anticipated large-scale demonstrations. Newspaper accounts prior to both the DNC and RNC quoted police and FBI officials who characterized demonstrators as violent terrorists, warning of plans to "lob Molotov cocktails at news crews," [120] and "puncturing the tires of [delegate] shuttle buses" [121]. Police officials in both cities were particularly concerned about "career protesters" and other outside agitators. These perceptions appear to have been stoked by the sensationalist reporting by some of the local newspapers, including a *New York Daily News* article [122] that quoted anonymous "Internet postings" encouraging protesters to provoke bomb-sniffing dogs by saturating clothing with gunpowder and to "throw marbles under the hooves of police horses." Additional articles in the

Daily News [60] and New York Post [121] warned that "fifty of the country's leading anarchists" were heading to New York , including one who had previously been arrested for wielding a catapult during a 2001 Summit of the Americas protest in Quebec City. The catapult in question was in fact a piece of protest art that lobbed teddy bears and confetti [123].

Crowd control and protest policing strategies were also conflated with anti-terrorism concerns, resulting in an extreme security environment. During the RNC, security was coordinated by more than 60 federal, state, and city agencies and was primarily concerned with protecting the convention venue. As one reporter described New York in the days leading up to the RNC:

> "The security force is extensive. Bell police helicopters patrol the sky, and snipers watch the streets from the rooftops of skyscrapers. Heavily armed Coast Guard vessels look for suspicious watercraft in the East and Hudson rivers. Concrete barricades, fortified metal fences and barbed wire seal off stretches of streets that surround the convention center. Police officers in full riot gear cut through crowds of shoppers on Eighth Avenue, cradling M-16 machine guns in their arms, in a show of force some New Yorkers find disturbing... Police have removed all garbage cans around the convention center and welded shut all manholes in the vicinity of GOP central to limit the amount of spots terrorists could use to place remote-controlled bombs, and law enforcement agents will use cameras and mirrors to check the undercarriages of delegates' buses for explosives. More than 10,000 officers will be working overtime in midtown Manhattan, and 27,000 more will be on standby, ready to pitch in at any moment" [124].

Preparations for the DNC were similarly intense. In addition to expanding police presence with overtime pay and coordination with state and federal agencies, Boston police erected a "demonstration zone" beneath a railroad bridge across the street from the convention center. The "protest pen," as its detractors called it, was constructed from chain-link fence, concrete barriers, barbed wire, and netting and was patrolled by military police armed with assault rifles. According to a federal judge, the protest zone was reminiscent of "an internment camp." [125]. It is perhaps unsurprising that most protesters chose not to enter the pen, preferring instead to take their chances in the street.

Activist Tactics

Activist planning for the 2004 RNC and DNC extended the 1990's era anti-globalization movement's tactic of coordinated actions by decentralized, autonomous groups. This approach entered the public consciousness in 1999, first with the June 18 (J18) demonstrations that

occurred in cities around the world and paralyzed central London, and with the Seattle protests that shut down a WTO meeting later that year. In both of the demonstrations, several "feeder" marches converged on a central location, where both the sheer size and the unexpected nature of the demonstration overwhelmed police.

Military theorists at the RAND corporation have come to describe this tactic as "swarming" -- the dispersion of command among many small, autonomous units that are able to collectively "attack an enemy from all directions" [126]. However, it should be recognized that swarming served both tactical and strategic objectives in 1999. Not only did it prove to an effective means of overwhelming police forces and blockading conventions sites, swarming also allowed cooperation by diverse organizations with very different ideologies and protest methods.

Late 90s American and European street activism embodied by groups like Reclaim the Streets and Critical Mass emphasized inclusiveness and non-hierarchical organization. Swarming emerged out of this culture as a way to coordinate marches, street theater, direct action, and other tactics towards a shared objective or target, without close coordination or requiring participants to collect under a single issue or ideological banner. Swarming was also closely informed by rave culture. Indeed, the very notion of gathering together in smaller groups at designated staging areas before converging on a protest site was borrowed directly from rave culture, as was the emphasis on electronic dance music, sound systems, and "global street parties."

Despite the successes of J18 and the "Battle in Seattle," swarming was a relatively short-lived phenomenon. Subsequent actions in Washington DC (2000), Quebec (2001), Cancun (2002) and Miami (2003) had limited impact on their targets, and were largely controlled by law enforcement. After the J18 and Seattle protests, law enforcement adopted a more aggressive approach to crowd control during large-scale demonstrations. Independent observers have come to call the current strategy "The Miami Model", named for its use during protests against the 2003 Free Trade Areas of the Americas (FTAA) summit. The Miami Model has been described as "the criminalization of dissent," [127] and is characterized by restricting public access to large parts of the city, pre-emptive arrests of activist "leaders," widespread use of non-lethal weapons including tear gas, pepper spray, and rubber bullets [128], and the use of mass arrests or "sweeps" that often includes the detention of law-abiding citizens who are later released without charge [129].

Organizers of the 2004 demonstrations responded to experiences in Washington, Quebec, Cancun, and Miami by proposing a new kind of demonstration. At planning meetings held several months before the DNC, BTS members and other organizers stated that the Seattle

"Miami Model" policing: surveillance, mass arrests, and nonlethal weapons

tactics were no longer effective and described a more decentralized approach for the D/RNC. Anticipating the consolidation of law enforcement resources around the convention venue, organizers eschewed large-scale centrally-coordinated blockades in favor of smaller, simultaneous actions across the city [130]. This approach was mirrored by the A31 coalition, which aimed to distribute the sites of dissent throughout the city in order to "transform the streets… into stages of resistance and forums for debate"[131].[1]

The decision to decentralize was motivated by two considerations. As stated, swarm tactics were no longer considered viable and it was believed that the new approach would confound law enforcement. The decision was also driven by a recognition that there would likely be little agreement among participants about either issues or acceptable protest tactics. Rather than attempt to hammer out some sort of consensus among protesters as an earlier generation of activists might have done, contemporary organizers tend to adopt an intentionally inclusive strategy that "allows for a full spectrum of tactics and messages" [132, 133].

Instead of attempting to blockade of the convention site, organizers envisioned a series of simultaneous actions carried out throughout the city by loosely-coordinated affinity groups. Each affinity group would be organize its own actions, and would decide for itself if and how it wished to coordinate with other groups. According to the affinity group model, decision-making is distributed across a network of autonomous actors. Affinity groups are formed around regional identity (e.g. groups of activists from the same city), around shared skills (e.g. "street medic" affinity groups that care for injured activists), and around ideologies (e.g. "pagan cluster"). Groups

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1   While organizers, particularly in Boston, claimed this tactic as a new innovation that came in response to changes in police tactics, there seems a striking similarity to the No Business as Usual (NBAU) and Stop the City campaigns of the 1980s. While a full history of urban protest tactics is outside the scope of this essay, one might raise questions about organizational learning by the radical left.

2004 RNC Protesters Map: Activists distributed maps that identified delegate hotel, RNC event locations, and government and corporate office buildings as potential protest sites.

seeking collaboration or broader collaboration issued "proposals" at spokes meetings and on activist websites, which other affinity groups could choose to endorse.

BTS and A31 did not directly organize marches or specific actions. Instead, they issued calls for "days of action" and suggested various "protest locations" including delegate hotels, government and corporate office buildings, and RNC event locations. In New York, several groups distributed maps of protest locations and other useful information for activists. They also saw communications technology as central to their organizing efforts.

The ability of autonomous groups to coordinate actions is directly related to their ability to share information. Decentralized protest thus depends on communications infrastructure [126]. While the affinity group model dates back to the antiwar movements of the 1960s and 70s, it finds its fullest expression in contemporary protest movements. On the one hand, modern information and communication technologies enable coordinated action and information sharing at a speed and scale previously unimaginable. At the same time, the affinity group model is facilitated by the advent of "comms groups" – specialized affinity groups who provide communications support for mass mobilizations. Comms groups provide technical infrastructure and the human capacity to gather and share information during demonstrations. In the days leading up to a protest, for example, comms groups might find a safe location from which to operate, set up computers and internet access, and secure 2-way radios. During the event, members will be out on the street observing police and protest

movements, reporting back to other group members who in turn publish information on the internet and maintain telephone communications with protest organizers.

Design Objectives

The groups with which I worked focused on providing communications infrastructure to support direct action campaigns by loosely coordinated networks of affinity groups.

Initially, there were two objectives for the comms system. The first was to facilitate information sharing among a relatively small group of organizers, all of whom were known and trusted by each other. For example, the BTS expected to maintain ongoing communications with legal observers and street medics. The second was to disseminate information to a wider audience of activists and journalists. These broadcasts would report affinity group actions and relay information about police and delegate movements.

A third objective emerged through the design process. Once the decision was made to develop an SMS system, it became clear that the system could also support communications between individuals and affinity groups without direct involvement by the BTS, A31 or other organizers. As this possibility emerged, it became a driving goal of the design to provide communications infrastructure to the entire activist community.

Requirements and constraints

Enable broad, structured participation

Communication and coordination challenges are compounded as protest becomes decentralized. During the Seattle '99 demonstrations, for example, organizers developed a communications network of street activists dispersed throughout the crowd that maintained contact with each other and with convergence center workers via walkie-talkies and mobile phones. Street activists would also convey information within their immediate environment via word of mouth and bullhorns [15].

The radically decentralized protest proposed by DNC and RNC necessitated coordinating hundreds of affinity groups operating across the city. This posed challenges to the comms model developed in Seattle and subsequent demonstrations, promising more actions in more disparate locations than could be covered by a single comms affinity group.

To accommodate the number and distribution of events, it was determined that the ideal comms system would facilitate participation by a broad range of people, spanning multiple affinity groups. Initially, this meant finding a mechanism for organizers to broadcast messages to large

numbers of protesters and journalists. Unlike the viral messaging that figured prominently in earlier protests (including People Power II), the D/RNC organizers needed high-volume messaging between parties who did not necessarily already know each other. This required broadcast, subscription, and user management mechanisms, none of which were needed in the earlier cases.

As the process moved forward and it became clear that the system need not be limited to messaging by the BTS, it became desirable to meet the broadcast and inter-group communications needs of the broader affinity group network. It also became clear that many people would want to join message groups "on the fly," as they learned about the service via word-of-mouth during demonstrations. This was more dynamic than the initial usage model in which activists would set up and join groups in advance of protests, and pointed to the need for handset-initiated messaging and subscription management.

Mitigate service interruptions

Organizers were concerned about attempted interference by police and/or opposition groups. Several activist websites experienced distributed denial of service (DDoS) attacks by right-wing groups in the days leading up to the RNC. Law enforcement agencies also have a history of disrupting activist communications networks. In Seattle, for example, police jammed radio broadcasts [134]. Several BTS members also cited the 2002 WTO demonstrations in Cancun, where it is widely believed among activists that law enforcement jammed protestor's radio signals.

Unforeseen during the initial design was the potential for service interruption originating with mobile phone carriers, which occurred during the RNC. On the afternoon of August 31, T-Mobile subscribers suddenly stopped receiving TXTmob messages. Many activists believed that they had been intentionally cut off, citing T-Mobile chairman John Stanton's status as a major Republican donor. A more likely scenario (described by an anonymous online source who claimed to be a T-Mobile network analyst [54]) is that high volume of messaging experienced during the RNC tripped an automated spam filter. The problem was soon rectified by moving TXTmob's messaging functions to a new IP address. This experience ultimately lead to the development of a distributed messaging service.

Protect activists

Another lesson activists learned from Seattle and subsequent protests is that police often arrest comms group members in order to disrupt activist communications networks [134]. BTS and NYCC members expressed concerns about the comms workers' safety and noted the inconspicuousness of mobile phones, with several organizers stating that anyone seen with a two-way radio was likely to be arrested as a 'leader.'

By far, though, the biggest privacy concern was the potential use of TXTmob activity logs to identify protesters and organizers in subsequent police investigations. This concern was in part an acknowledgement of police video surveillance of protest actions. Police videotape protests in order to establish evidentiary records for use in later prosecutions. Indeed, this practice was widespread at the RNC although in several cases police video records directly contradicted police testimony, leading to acquittals and subsequent lawsuits for false arrest and civil liberties violations.

It is worth noting that eavesdropping by police on activist communications was not a significant concern – although this did seem to be a particular fascination of journalists who wrote about TXTmob. This is not to say that activists believed they were immune from eavesdropping. Rather, several activists stated that they simply assume that *all* of their electronic communications are monitored and take appropriate precaution. These activists encrypt their email messages, and usually reserve sensitive communications for face-to-face meetings with trusted comrades. Their concerns are well-founded; recently declassified New York Police Department intelligence documents shows that police monitoring and infiltration of activist groups before and during the RNC was widespread [2].

Information quality

Both the BTS and NYCC intended to use TXTmob as a broadcast medium enabling the organizations to send messages to large numbers of protesters. In addition to issues of reliability and security outlined above, both organizations were concerned with guaranteeing the quality of their information. There were two aspects to this concern. Firstly, the organizers needed to develop policies to ensure that they had access to accurate, timely, and useful information. Secondly, measures needed to be taken to prevent agent provocateurs from using the system to disseminate inaccurate or inflammatory messages.

Limited Resources

Design was further constrained by a lack of resources. Unlike large NGOs such as the aforementioned UFPJ, ad-hoc coalitions like the BTS and A31 generally operate with little or no budget, relying primarily on volunteer labor and small, often in-kind donations. In Boston, several BTS members believed that this fact was exploited by an undercover police officer who sought to infiltrate their group with promises of expensive 2-way radios that he could procure "from work."

Identifying, understanding and addressing requirements and constraints

Design requirements and constraints were identified to support an evolving protest strategy, which in turn was influenced by activist aspirations, anticipation of police tactics, and by ongoing assessment of the situation in the streets.

Activists held regular spokescouncils throughout the demonstrations, during which affinity groups reported on their experiences and suggested tactics for upcoming actions. I also maintained near-constant communication with organizers and activists during the demonstrations, which allowed technical issues to be identified and addressed as they came up.

Assessment of police tactics was highly speculative, informed to some extent by first and secondhand accounts of prior demonstrations. These accounts were shared through face to face encounters in small meetings and at public planning meetings in the months leading up to the conventions, and via email and activist websites. Ongoing press coverage of police preparations for the demonstrations also gave activists insight into the mood of the law enforcement community, as did civil rights attorneys' accounts of ongoing negotiations and legal struggles over permits and "free speech zones".

Planning

In the weeks prior to the DNC and RNC events, the comms groups (BTS, A31 and NYCC) held several meetings during which members reported on their activities, identified outstanding work to be done and raised questions for the group. Meetings were informal, and discussions included both technical issues and tactical objectives. Discussion was free-ranging, and decisions were made by consensus. Group meetings were also an opportunity for brainstorming, experimentation and prototyping.

Between meetings, I worked independently to develop the TXTmob prototype. There was occasional communication within the group between meetings via email and mobile phone, usually related to scheduling or to address simple questions.

I also participated in BTS, A31 and NRC spokescouncils. During these sessions, I promoted the TXTmob service, trained users, and reported on lessons learned. Spokescouncils also provided opportunities to get feedback from the broader activist community and conduct rapid, informal testing of the TXTmob user interface.

Decisions and alternatives

All major decisions were made during meetings with comms groups, and were generally subject a variety of social and technical considerations.

Decision: use SMS

The BTS comms group began with two primary objectives. First was to facilitate communication among BTS members and specific partners, including street medics and the the National

Lawyers Guild. Second was to distribute timely information to the broad network of activists participating in the DNC protests.

Organizers initially planned to procure a number of two-way radios for inter-group communications. However, organizers had little access to devices or the funds necessary to purchase them. Some comms group members also voiced concern that two-way radios were conspicuous devices that would identify their users as protest leaders, making them vulnerable to arrest.

The group also considered radio broadcast, using low-power FM (aka "pirate radio") transmitters. This required a small but not insubstantial financial investment and also raised concerns about police interference, especially after the Cancun demonstrations in which it is widely believed among activists that law enforcement jammed protesters' radio signals. Additionally, comms members pointed out that relatively few people ordinarily carry FM radio recievers.

Mobile phones were an attractive platform for several reasons. By 2004, mobile phones were in widespread use in North America, particularly among urban and suburban youth. Mobile phone ubiquity meant both that the devices were widely available and that their use had become relatively inconspicuous – public cell phone use in an of itself would not be an indicator that an individuals was a member of a protest group. This was a marked change from the year 2000, when possession of a mobile phone was the proximate cause of Ruckus' Society Director John Sellers' arrest and $1 million bail during the Republican National Convention in Philadelphia [135]. Widespread cell phone adoption also meant that the comms network could reach hundreds of activists by simply leveraging existing communications capacity.

Ironically, the fact that mobile phone networks are owned and operated by major corporations and that mobile phones are widely used by the business community was part of their appeal. Mobile phone networks were also seen as less vulnerable to police interference – it seemed unlikely that law enforcement would attempt to disrupt mobile phone communications in a major urban center on a weekday afternoon.

While mobile phones obviously offer a variety of capabilities, SMS was of particular interest as a broadcast medium. Text is generally recognized as an efficient communication medium that, unlike audio or video, can be read "at a glance," making it a good medium for fast-moving high-pressure contexts like street protests. Although in 2004 text messaging was still not widely used in the US (especially as compared with Asian and European countries), it was available on most handsets. Protest organizers were familiar with the use of SMS during mass mobilizations in the

Philippines and Madrid, although it should be stated that several "experienced" comms workers associated with established NGOs dismissed SMS early on, pointing to earlier unsuccesful attempts to use SMS as a comms technology.

<u>Decision: develop a new system</u>
The decision to develop a new, independent SMS messaging service rather than to utilize existing methods and services was initially motivated by pragmatic concerns. It was determined that standard approaches to SMS broadcast (which are described in a later section) would not meet the project requirements.

It would have been possible to piggyback on existing commercial services, as a solution developed by the Ruckus Society during the RNC did. The privacy implications of using commercial services was the subject of some discussion among organizers. Some activists expressed concern about security implications as this approach would have left a record of messages and mobile phone numbers on the provider's servers where it could conceivably be available to law enforcement. Others suggested that mobile service providers had a vested interest in protecting their customers' privacy and might be counted on to resist police requests to provide subscribers' phone records without court orders and the like.

The NYCC also believed that the new service would be useful to a much broader activist and NGO community after the conventions. To this end, members of the NYCC have been instrumental in coordinating an open source release of the TXTmob sourcecode and in integrating TXTmob into Drupal, an open-source content management system popular with nonprofit and activist organizations.

<u>Decision: support the entire affinity group network</u>
The decision was made early on to create communications infrastructure that could support many different organizations and affinity groups during the convention protests. This approach fit with the BTS' ideology of supporting the entire activist network rather than working with a few priviledged nodes. It also differentiated TXTmob's development from most comms efforts and from the models of practice favored by most NGOs. Ordinarily, comms groups create communications systems to support a relatively small number of organizers with whom the comms workers have direct connection. Indeed, in the rare cases where a comms group receives direct funding monies are often tied to supporting a particular group of organizers.

<u>Decision: rely on SMTP gateways</u>
Once the decision was made to use SMS, various mechanisms were considered. At the time, there

were several methods for bulk SMS messaging. The preferred mechanism for sending bulk SMS is to use an "aggregator," a third-party company that has negotiated agreements with mobile phone service providers that allow it to send and receive messages across the providers' networks at discounted rates. The aggregator in turn sells messaging capacity to its customers. This is the method most commonly used by businesses and large organizations. It is an expensive solution by activist standards and also raises previously-discussed privacy and security concerns.

Another option appropriate for sending small numbers of messages is to connect a mobile phone or GSM modem to a computer, and send and receive messages using AT commands or pre-compiled messaging software (at the time, NowSMS was the most popular solution). While relatively easy to implement, this solution was not well-suited to sending large numbers of messages. Service providers at the time placed limits on the number of messages per minute that one could send through a single device. This limitation could be overcome by using multiple modems; however, costs quickly escalate. In addition to the hardware costs, GSM modems require paying end-user rates for SMS messaging, which in 2004 could be as high as 10 or even 25 cents per message. At the time, the only unlimited messaging service packages were available on a subscription basis, at an approximate cost of $600/year (per modem).

As the comms group considered these options, one member mentioned that his service provider allowed friends to send email to his cell phone. Because email is free to send, this was an exciting possibility. Additional research confirmed that in fact all of the major US carriers at the time offered free email-to-sms services, intended to promote the then-nascent US SMS market. These services are known as "SMTP gateways," referring to Simple Mail Transport Protocol, the standard protocol for email messaging.

The decision to utilize service providers' SMTP gateways represented a tradeoff between cost, independence, and reliability. SMTP-originated SMS messages are not guaranteed to be delivered in a timely fashion by the carriers and may experience significant delay (or may not be delivered at all). On the other hand, they are free to use and don't require the services of a third-party aggregator which would invariably create an archive of messages and participants.

Informal testing in the weeks leading up to the demonstrations showed that in the vast majority of cases, message delivery via SMTP gateway was suitably reliable. During the RNC, it was discovered that at least one service provider did attempt to limit access to its SMTP gateway. When it became clear that the providers' filters were blocking messages based on the IP address of the sending machine they were easily circumvented by distributing message sending across several computers.

Decision: Limit user information and archival

Security concerns lead to rather strict privacy policies. TXTmob users were required only to provide a mobile phone number, a username (which could be fabricated), and a password in order to register with the site. Users who were interested in receiving periodic announcements about the service could optionally enter their email addresses into the database as well. No other information was collected, and no information was to be shared. Control over personal information was left in the hands of the users. Message archiving was independent from personal information. If a user chose to remove his or her phone number from the database, it was immediately deleted. This policy, coupled with the fact that TXTmob was offered by individuals and organizations known within the activist community conferred a higher degree of trust to the service than may be generally attainable by commercial offerings.

It is worth noting that the number of law enforcement requests for subscriber records has dramatically increased under the US Patriot Act [136]. The record of telco compliance is mixed. As has been widely reported, many telcos have in recent years provided government agencies with wiretaps and customer data. On the other hand, at least some communications companies have so far been hesitant to comply [137].

Privacy concerns were brought to a head in 2008, when I received a subpoena from the City of New York to supply records pertaining to TXTmob and the 2004 RNC. Many activists were relieved to learn that much of the requested data no longer existed, and that in any case I chose to resist the subpoena.

Decision: Opt-in service

One of the recurring requests from activists is to develop an interface to TXTmob that allows batch account creation. This feature would enable, for example, an NGO to upload a list of its constituents' phone numbers to a TXTmob list which the organization could then use for bulk SMS messaging.

This feature was not implemented for two reasons. First is a commitment to personal privacy that precludes support for mailing list features. Second is a recognition that such a feature is likely to generate user complaints, which if made in substantial number would likely result in service providers restricting access to the SMTP gateways on which TXTmob depends.

Instead, TXTmob is offered as a strictly opt-in service. Each user must register his or her own phone with the site in order to send or receive messages (even if they anticipate only using the service's web-based broadcast features), and all phone numbers are verified before a user is

allowed to even to view lists of user groups.

<u>Decision: No ideological vetting</u>
TXTmob is offered as a free web-based service. Almost from its inception it has been used by individuals and organizations that do not conform to the ideological commitments of its creators. To date, no attempt has been made to limit TXTmob usage by political orientation (or lack thereof). This is in keeping with the original intent of the systems designers to support a wide range of expression.

While TXTmob is freely available to anyone who wants to use it, my own services are not. As the system's maintainer, I frequently receive requests for technical support, new features, and customization. I exercise a fair amount of discretion over which organizations I work with directly. There is no particular formula for this decision, I generally consider the relative merits of each request on a case by case basis.

Implementation
TXTmob is software application that sends and receives messages between a central server and mobile phone service providers' SMTP to SMS gateways.

The first version, produced for the DNC, consisted of an website that allowed activists to send SMS messages to groups of mobile phones via service providers' SMTP gateways. In order to receive messages, users registered their mobile phone numbers with the project website and subscribed to various message lists.

The initial version was broadcast-only – messages sent via the TXTmob website were delivered to subscribers' phones; however, mobile phones could not be used to respond to or initiate new messages. Design and development focused on user and group management. The project website provided an easy-to-use interface through which users could set up and configure messaging groups. Because TXTmob was intended to support a broad activist community (a departure from the usual model of protest communications, in which techies set up communications systems for use by organizers or particular activist groups), users were allowed fairly wide leeway in how groups could be set up. Affordances were provided for 'public' groups which anyone could join, 'private' groups in which membership was controlled by group administrators, and 'secret' groups that were invitation-only. In addition, groups could be 'moderated' in which case messages could only be sent by privileged members or 'unmoderated,' meaning that any group member could initiate messages.
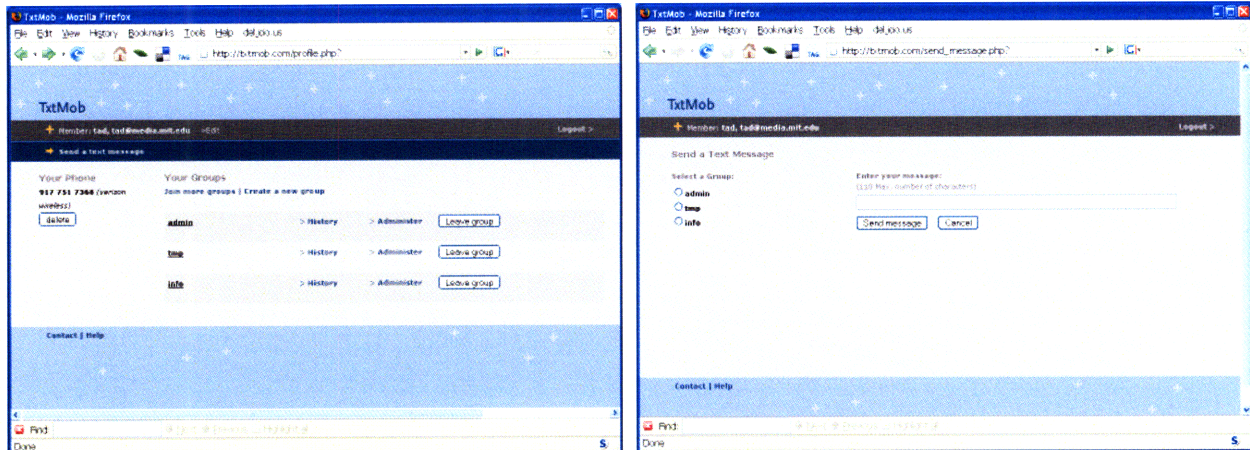
TXTmob web interface

Prior to the RNC support was added for handset-initiated messaging and user management. This allowed users to join groups and send messages directly from their phones without visiting the project website. Handset-initiated messaging and subscription management was achieved via a shell script on the TXTmob server that parsed inbound messages, validated the sender's address, and performed the appropriate action. This enabled users to send messages to their groups by sending text messages to [listname]@txtmob.com. Users could also join or leave groups by sending "#join" and "#leave" messages.

The service's messaging capabilities were refined during and after the RNC, adding additional carriers networks to the system and enhancing overall system reliability. The key improvement was the addition of a distributed sending mechanism in which messages are first distributed across a network of client machines before being delivered to service providers' SMTP gateways. This provides redundancy and improves system performance by allowing messaging functions to occur in parallel (the technique is commonly referred to as "load balancing"). This arrangement also effectively bypasses filters on the providers' gateways that limit the number of messages accepted from a single IP address.

TXTmob messaging is ordinarily performed by two or three computers. On special occasions – in anticipation of a major demonstration, for example, capacity is increased by adding additional machines to the messaging network. On several occasions, activist and other organizations have temporarily donated servers for this purpose.

TXTmob continues to be provided as a free service to political organizers and to the public at large. Its sourcecode was released under open source license in 2005. Efforts are currently underway to deploy an updated version of TXTmob as a drupal module.
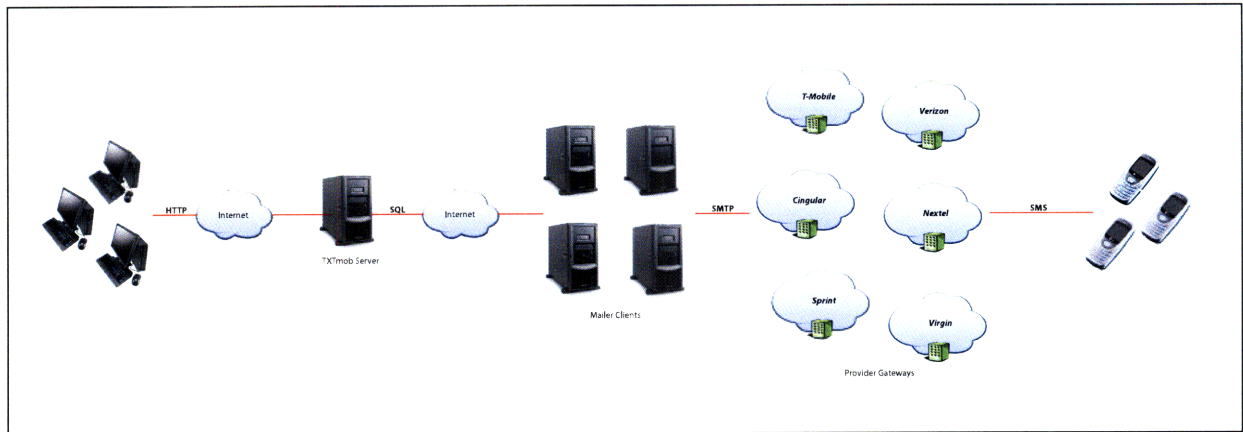
TXTmob system diagram

Capabilities and limitations

TXTmob was designed to address several specific objectives and constraints.

Enable broad, structured participation.

TXTmob allows users to create and configure message groups to support a variety of communications styles. Membership can be open, subject to administrator approval, or by invitation only. Within a group, members' ability to send and receive messages can also be restricted by administrators. By allowing users to determine the structure of the groups they create, TXTmob serves a variety of communications needs including messaging between trusted members of small organizations, broadcast by select individuals to a broad audience, and free-form discourse among many participants. Efforts were made to lower barriers to participation wherever possible. The web interface was designed to be simple and easy to use. Affordances were added that enabled users to join message groups by sending messages directly from their handsets as it became clear that many TXTmob users discovered the service via word of mouth during marches and other actions, when they didn't have easy internet access.

However, TXTmob was not intended to replace personal or viral messaging. Both of these activities were widespread during the 2004 conventions, and it is believed that many TXTmob messages were also circulated in this way among individuals who did not subscribe to the service. TXTmob's primary goal was to support fast, structured communications among groups of people who did not necessarily know each other – a common activist need that is not well served by viral messaging models.

TXTmob was also not intended to support common NGO activities like fundraising, constituent management, or get out the vote efforts. While several NGOs have used TXTmob to support these kinds of programs, they are hampered by an inability to add batches of constituent phone

numbers to TXTmob groups. As previously described, the decision to not offer this feature was an intentional one based on concern for user privacy and to discourage spammers from hijacking the system.

<u>Mitigate against service interruptions</u>
A range of solutions was put in place to mitigate against disruption attempts. An Italian security consultant who read about TXTmob in the international press volunteered to diagnose webserver vulnerabilities. Server configuration advice was provided by members of the NY Comms Collective. Housing TXTmob's servers at the Media Lab, which has good bandwidth and is also outside the jurisdiction of the New York Police Department provided an additional defense against service interruption. Also, the database and messaging software ran on a different machine from the webserver so that core functions would remain operational even if the webserver was compromised.

During the RNC, TXTmob experienced a temporary disruption when extreme message volume apparently tripped a T-Mobile spam filter. This experience was discussed by a small group of techies (including the author) during an "SMS Summit" organized in Oakland, California by the Ruckus Society. The outcome of these discussions was the idea for a massively distributed network of mailing clients to run in web-browsers, coordinated through a central server. Referred informally to "spammi@home" (referring both to the well known SETI@home distributed computing project and to the capacity for the solution to bypass spam controls), a prototype was developed in time for the November 2004 elections. Although wonderfully poetic, the concept ran into several practical problems largely having to do with providers' SMTP servers rejecting connections from unresolvable IP addresses. A more modest version of spammi@home was incorporated into TXTmob shortly after the elections. This version consists of a Java client running on remote machines that fetches messages from TXTmob's MySQL server and connects directly to providers' SMTP servers to deliver messages.

<u>Protect activists</u>
Several measures were put in place to secure activist communications during the protests, including the use of encrypted communications with the various servers and supporting invitation-only message groups that did not appear on public listings. As previously described, none of these measures were believed to be fully effective and most activists took additional precautions to protect their identities and communications.

Of greater concern was the possibility that TXTmob server logs and database records could be subpoenaed by law enforcement agencies in subsequent prosecutions. Indeed, this was a core concern driving the decision to develop an independent service under activist control, rather than rely on existing commercial services.

To mitigate such eventualities, a minimum of personal information about each user was collected (only phone numbers and optionally email addresses). This information was not archived, and could be deleted from TXTmob's database at any time by the user. In addition, inactive user accounts and message groups were purged on a regular basis such that records were not maintained of message activity for long periods of time following an event.

Ensure message quality

A key challenge in activist communications is ensuring that messages are timely and accurate. Viral messaging strategies are notoriously poor in this regard, and often end up repeating and amplifying rumor and innuendo.

Also of concern was the potential for agent provocateurs to use TXTmob to disseminate inaccurate and inflammatory messages. This was addressed by enabling group administrators to moderate message content, enabling only trusted sources to send messages.

During the conventions verifiability was generally handled as a matter of policy rather than technology, with comms groups adopting various rules governing messaging. The NYCC chose to only broadcast information based on first-person reports provided by trusted members of their organization, many of whom were monitoring protest activities from the streets and communicating directly with individuals sending TXTmob messages. The BTS adopted the additional policy of only sending "actionable" information in order to reduce the number of messages and, presumably, avoid potential confusion.

Minimize costs

As previously discussed, a key consideration in designing TXTmob was keeping costs as low as possible. This was addressed by basing the system around service providers' SMTP gateways, which enable messages formatted as email to be delivered as SMS to subscribers' phones. This solution imposes several limitations on the system. First, SMTP messages are not guaranteed to be delivered in a timely fashion, although in practice this has rarely been a problem. Second, as was discovered during the RNC, SMTP gateway usage is subject to restrictions by carriers, although these too have proven to be not insurmountable.

The most significant limitation is the presumption that providers actually maintain SMTP gateways. While this is generally the case in the United States experience has shown many carriers around the world do not offer the needed gateways, which has limited the ability to deploy TXTmob in some international contexts. One such example was Mexico, where a group of activists were unable deploy TXTmob in support of 2006 protests in Oaxaca because suitable gateways could not be found.

Enabling technologies

The TXTmob website was written in PHP, as was the shell script used for processing inbound messages. TXTmob runs on two Pentium III machines, each running the Linux operating system. One server hosts an Apache webserver, the other supports a MySQL database.

Messages are delivered through service providers' SMTP gateways. TXTmob initially used Qmail, an open source mail transfer agent, to deliver messages to the gateways. This method was replaced with a custom Java client that fetches outbound messages from the databases and delivers them directly to the gateways. Multiple instances of the Java client are run simultaneously on multiple machines to reduce load and to bypass gateway filters. Java may seem an odd choice for this task. It was originally selected with the goal of creating an applet that volunteers could run in web browsers in order to help with messaging. While the applet ultimately proved infeasible (providers rejected messages from unqualified hosts), Java remains as a legacy technology.

How did it relate to existing infrastructure and technologies?
TXTmob makes extensive use of existing infrastructure. Messages sent and received by the TXTmob server are formatted as email; mobile telephone service providers manage the translation between email and SMS. TXTmob relies on a major research institution for connectivity, and for the machines that host its servers.

TXTmob also must been seen within a broader network of communications systems that organizers use both for internal messaging and for broadcasting information widely among networks and activists and journalists. During the D/RNC protests, several systems were deployed to achieve these aims. Indymedia activists used radio, television, and websites to broadcast information. The Ruckus society set up a separate SMS service for select RNC events. NYCC members used two-way radios to report on police and protest activities. I also helped the BTS establish an "always-on" audio link between several convergence centers, using speaker phones and conference-calling software.
These various systems were not in competition, and indeed often shared and rebroadcast each others' messages. They were generally seen as mutually-reinforcing, creating robustness that could accommodate service interruptions due to technical failure, human error, or police interference.

Resources

The first version of TXTmob was written in PHP and run under Linux on a Pentium III that I acquired through the Media Lab's informal equipment recycling program (i.e. I found a discarded computer in one of the Lab's many storage closets). The system relied heavily on existing open-source software including MySQL database, qMail mail transfer agent, and the Apache

webserver. The server was physically located in the Media Lab, and used the Lab's networks for connectivity. Because my own labor was donated (I was on leave from the Media Lab and employed by Motorola at the time), TXTmob was essentially developed and maintained for free.

Evaluation

Due to the compressed timeframe between project inception and realization, TXTmob underwent very little testing before deployment. Aside from a few informal testing and training sessions with activists before each convention, system evaluation was largely done in situ. During each convention, I actively monitored TXTmob logs, maintained constant contact with protest organizers, and responded to support requests by TXTmob users. Bugs were generally identified and fixed within a few minutes, usually by working closely with actual users. For example, after receiving email from a Cingular user who was unable to send messages to a group from his mobile phone it was discovered that Cingular's network used a different server to send SMTP messages than the one which received inbound messages. Sending a series of test messages to this user's phone and having report results via email enabled the problem to be identified and fixed in the midst of the demonstrations.

After of each event, I spoke directly with organizers and participants, read descriptions of the service in the media and on activist blogs, and solicited feedback from TXTmob users via email. Through these activities, I was able to get a sense of how the service functioned in practice, and identify new features and areas for improvement.

Use

Communications has always posed a challenge for protest organizers and participants alike. Anyone who has joined a mass mobilization is familiar with the sense of being lost in a sea of people – individuals at the back of a march frequently are unaware of what is happening at the front, and it is very difficult to gauge the size and sprawl of an action. Indeed, the problem of measuring crowd size remains an open research question that continues to foil activists, police, and academic researchers alike.

TXTmob was designed to help organizers and activists to share information and coordinate action during a new kind of massively distributed protest. 5459 people registered with TXTmob during the 2004 DNC and RNC protests. 1757 unique messages were sent among 322 separate groups. Most users joined more than one group. TXTmob supported several kinds of use during the D/RNC.

As hoped, TXTmob provided an effective means of maintaining "topsight" - "a 'big-picture' view of what's going on" [126]. Activists and journalists depended on TXTmob to build a "mental

RNC action

picture" [138] of actions occurring all over the city [139]. Non-activists also relied on the service to find out about traffic conditions and street closures. Several protesters reported feeling "safer" as a result of their involvement – particularly during large marches. It is assumed that police monitored TXTmob traffic as well.

Providing real-time information to activists in the street allowed fluid, spontaneous actions to occur across the city, and enabled new forms of participation and collaboration among activists. Reports of delegates seen eating brunch in neighborhood restaurants lead to impromptu demonstrations, calls for spontaneous "kiss-ins" gathered hundreds of participants, dissatisfied workers called in sick to join Critical Mass rides. Several users echoed this report of spontaneously joining demonstrations after receiving TXTmob messages:

> "I was getting up this morning, apathetic, no protest on the old agenda, when a Bl(A)ck Tea SMS alert for a Critical Mass ride popped up on my cell. The ride was big, and I bet I wasn't the only one there because of the SMS alert system:
> 29-Jul-04 07:35 a From:000000000 BTS@txtmob.com 7/9, 07:33, FNB serving breakfast in Copley Plaza across from Convergence Center. Critical Mass gathering. Canceled the old "showing up to work early" plans, jumped on my bike, and rode 2 Copley - yeah!"[140]

In addition to the massive demonstration organized by UFPJ, several unpermitted marches and gatherings were held throughout the RNC. For example, a group called

```
•  Police moving fast Westbound on 23 St toward the bike bloc
•  War Resisters League March is at Fulton and Church aprox 250 ppl, will
   leave shortly
•  Run against Bush in progress (just went through times sq).  media
   march starts at 7, 52nd and broadway,
•  A31 party mtg at 2 spots NW corner of Stuyvesant park, 2nd & 16th and
   SE corner of Union Sq
•  a31 party Penned in b/w irving and 16th. more in next message
•  a31 party disperse immediately
•  Un Sq: Apprx 150 person die-in just happened on south steps.
•  1 medic needed for bioterror: meet 1430 copley w/ Jim#
•  people beaten at 42 and 6th
•  If anyone sees police van #5305, please call in.
•  Video dispatch. Federal agents trailing activists at 6th Ave and 9th
   St. Situation tense.
•  "CT delegation @ Maison (7th Ave. & 53rd).  Outdoor dining area.  Try
   to get people there."
•  "Undecover cops have red/orange handbands. Scooters with plate 52L...
   - undecover cops."
•  "Front of march: slow down!"
•  "1000 protest coffins getting lots of time on c-span. Looks great!
   Congrats!"
•  Lisa & i are heading into the city now see yall soon
•  Chuck is safe and on the move (6th and 25th). be aware of unmarked
   scooter cops
•  Watchin u on cspan- the world hears u loud and clear!
•  Go, Go, Go wish we were there Kraash from So Cal.
•  60 protesters at us consulate in madrid... protesting conditions of
   RNC prisoners
```

Sample RNC messages

the "Still We Rise Coalition" organized an unpermitted march on August 31 from Union Square Park to Madison Square Garden. Because this was an unsanctioned event, its route and status were in constant flux as organizers responded to police deployments by changing speed and direction. SMS was used to keep participants informed about route changes and status updates throughout.

Spontaneous actions were also held throughout the RNC. For instance, groups like "A31 Street Party" invited subscribers to participate in an unannounced action to be held on August 31. When the time came, 509 subscribers received messages directing them to congregate at Stuyvesant Park and Union Square. Within minutes, hundreds of people converged on these locations with noisemakers and musical instruments. Over the next several minutes, messages

were sent to the group instructing them to move to new locations and appraising them of police activity. Eventually a final message was sent to the group, saying simply "A31 Party disperse immediately!"

More spontaneous were opportunistic actions in response to SMS messages sent out on general announcement channels. For example, a message announcing that members of the Connecticut delegation had been spotted dining at an outdoor midtown restaurant prompted several dozen protesters to converge on their location. Similarly, "Mouse Bloc" (the name was a playful reference to the Republican Party's elephant mascot) was a series of actions organized as a roving tour of delegate parties held on August 29. For over seven hours, Mouse Bloc participants intercepted delegates leaving Broadway shows, nightclubs, and gala events throughout the city while alternately engaging and eluding police.

TXTmob enabled broad participation, and lead to a variety of uses. Virtually anyone could join the communications network, reporting police, delegate, and activist activity, providing feedback on media coverage, or simply sending messages of support and solidarity. I now describe specific use patterns that emerged during the conventions, beginning with ways that it fulfilled designer expectation and proceeding to its many unanticipated uses.

Expected Uses: Message Blasts and Organizer Communications

Prior to the conventions, designers focused on two types of use cases. The primary goal was to support broadcast messaging by a relatively small number of organizers to a broader network of activists and journalists. Designers also believed that TXTmob would be useful for inter-group communications, providing a means for affinity groups and other small groups of trusted individuals to maintain communications with each other.

For protest organizers, TXTmob was primarily a broadcast medium that enabled small numbers of privileged users to send messages to many others. Most of the organizers' groups encouraged public membership but restricted messaging to trusted group members. Organizers established "comms" networks – highly structured information dissemination mechanisms aimed at providing reliable information from trusted sources to activists in the street. Both DNC and RNC protest organizers established fairly strict communications protocols. For example, the NYC Comms Collective (NYCC) relied on a network of bicycle-riding lookouts that maintained constant communication via cell phone and 2-way radio. Information was relayed to NYCCC operatives at a secure location, who then broadcast to the 901 registered members of the NYCC list. Only messages that came from NYCC members or from other trusted sources were broadcast. Messaging was used primarily for sharing actionable information such as march status,

locations of police barricades, and arrest information:

NYCC also maintained constant communication with other organizing groups including the Ruckus Society and Indymedia. These organizations maintained their own networks of trusted observers, and also broadcast messages using their own services, including Indymedia's website and radio broadcasts and Ruckus Society's SMS alert service. Through loose coordination, the various group provided ongoing redundant information services that enabled protesters to follow unfolding events.

In addition to the public broadcast groups, affinity groups set up TXTmob lists that restricted membership to affinity group members. Several groups set up private lists that allowed unrestricted (unmoderated) messaging. These channels were used to provide logistical information, but also included informal and personal messaging. The more organized of these groups tended to rely on one or more members whose primary responsibility was coordinating communications for the group. Groups of volunteer medics and legal observers often adopted a "dispatch" model, in which messages were sent by operators located safely away from protest activities who monitored a variety of information sources including police scanners, telephone calls, SMS traffic, and internet, television, and radio news.

Unanticipated Uses
Because TXTmob was designed with a fair amount of flexibility, it was also adopted in several unanticipated ways.

Open 'Loops'
During the design process, consideration was given to the utility of "open loops" – unmoderated, public message groups that were anyone could join and which had no restrictions on messaging. System designers generally assumed that they would be of little practical value during the protests, anticipating that open loops would quickly be congested with unreliable information and hostile commentary. Nonetheless, open loops were supported in the system design, keeping with the overall philosophy of supporting as wide a range of communications styles as possible.

As it happened, many users subscribed to open, unmoderated message lists. Open loop users monitored police and delegate activity, coordinated movements, and sent messages of support. Remote participants also used these channels to report on media coverage back to activists in the street (`Watchin u on cspan- the world hears u loud and clear!`).

Open loops also provided a means for previously unacquainted activists to meet and collaborate. A number of users set up "meetup" groups that provided opportunities for people to coalesce around geography (e.g. "DC folks up in NYC for RNC protests"), ideology ("queerpolitics"),

and planned activity ("RNC drummers"). Several open loops were also created to facilitate information sharing around various topics ("Use this service to send messages about safety, transportation and housing issues").

Not surprisingly, open loops encouraged the broadest participation and had the least accurate information. Users adopted several strategies to improve information quality including citing information sources, signing messages, and contesting false or inaccurate texts.

Remote Participation

It is interesting to observe that several users reported signing up to receive TXTmob messages even though they were unable to participate in street actions. In some cases, these users were hundreds of miles away from the protest site. While it is easy to dismiss this as mere voyeurism or as participation without risk, I would suggest that something important was going on. It is worth noting that TXTmob was not the only way to follow protest activities; numerous websites (including Indymedia) also provided up-to-the-minute coverage. By comparison SMS is a relatively invasive, expensive medium. That users chose to receive text messages without any expectation of being able to act indicates that simply following along – which several respondents described as feeling "like being part of the action" – was itself a meaningful form of participation.

Journalist Bait

Beyond the community of its immediate users, TXTmob had significant impact within activist and mainstream cultures. Articles describing the service appeared in a number of major publications, including the New York Times, the International Herald Tribune, the Washington Post and in numerous smaller publications who reprinted articles published by the Associated Press. These accounts tended to conflate descriptions of the technology with reportage about protest actions and tactics. As a technical innovation, TXTmob provided an additional "angle" for journalists interested in covering the convention protests, extending the scope and duration of media attention on the demonstrations and giving voice to activists, many of whom were directly quoted by journalists writing about TXTmob.

Cultural Impact

There is a tendency among academic researchers to emphasize operational aspects of both social movements and communications technology. For communications technology researchers, this means analyzing computational artifacts in terms of usability and efficiency. This is perhaps unsurprising given the field's foundation in engineering disciplines and the fact that most communications technology research is conducted under controlled environments, in academic and industrial laboratories. One often finds a similar materialist trend among some social movement scholars who evaluate mass mobilizations in terms of either specific policy objectives

(such as influencing an election) or direct intervention in political processes (such as disrupting a WTO meeting).

While these analyses are of course important, I would suggest that they only tell part of the story. The conflux of communications technology and mass mobilizations is also fundamentally a social and cultural event. As such it is appropriate to expand our evaluation to include material and symbolic considerations. One of the benefits of working "in the wild" is that it becomes possible to examine both of these dimensions.

Public Proof

TXTmob functioned as a sort of public "proof of concept". Despite the well-publicized use of SMS in mass mobilizations in Europe and Asia, the consensus among American organizers in 2004 seemed to be that the medium could not be used effectively in the United States, where organizing strategies differed and the level of mobile phone adoption was lower. Prior to the RNC, one seasoned organizer told me "we've tried text messaging stuff before, it doesn't work" despite the fact that a successful trial had been conducted during the DNC just a few months previously. As Allen Gunn of Aspiration describes the adoption of SMS by US activists after TXTmob's deployment at the RNC,

> "Basically, this started with one person who thought text messaging was a good way to do on-the-ground organizing… when it all went so well at the RNC, everybody was like, "Holy shit this stuff is working! So, this fed into an activist SMS event in September. The event helped create SMS blasters and a two-dimensional communication system, so that people could use their cell phones to report information into the system. This fed into something very active, using SMS for get out the vote and election monitoring. A really cool thing they had during the election was that messages could be personalized with your polling place data, which is actually quite a feat with all the different pieces that had to emerge to actually pull it off. That's something that I think is really cool now and how I continue to be enamored with the technology"
> [141].

TXTmob's lessons were not lost on the business community either. Informed by journalist accounts, a number of entrepreneurs and venture capitalists contacted me after the RNC to inquire about commercializing the TXTmob technology. Although I declined these offers, companies like Twitter have since been formed offering functionality very similar to TXTmob's. Indeed, according to someone close to Twitter's development observes that TXTmob was "very explicitly talked about as a model to be copied / learned from in the creation of Twitter" [142].

Energizing Protest

Activists often say that protests are "energizing." There are at least two components to this experience. On the one hand is the heightened sense of solidarity present during large-scale convergences. This was certainly the case during the RNC at spokescouncils, in the Indymedia center, and of course on the street. As an enabling technology, TXTmob also gave its users a tangible sense of their participation in a network, acting as a sort of sign among members. This was particularly evident during actions like the Mouse Bloc and the occupation of Herald Square on August 31. The tactics employed in these actions played with notions of engagement, often transforming mere presence into participation. As one organizer put it, "bodies in the street – that IS the action". The "cat and mouse games" intentionally blurred distinctions between bystanders and activists. Activists were often indistinguishable from crowds of tourists and businessmen as they milled about, looking for opportunities for action. Protestors came together for brief interventions, for example confronting a group of delegates or swarming an intersection until the police moved in, at which point they would dispersing back the crowd only reappear at another location. The net effect was total disruption, with police and passers-by alike contributing to the chaos.

Looking up from their cell phones, activists on the street would see others around them reading the same messages. Suddenly the innocent-looking man in the ill-fitting suit was revealed as a fellow traveler; his disguise momentarily stripped away. Smiles and nods were exchanged, membership confirmed. Interestingly enough, remote users similarly expressed solidarity with demonstrators. Beyond feeling informed, they consistently felt connected, often used the phrase "it felt like being there" to describe the experience.

The other way that protests energize activism is by providing symbols of accomplishment to movements. The history of social movements is rife with such symbols. Recent examples include People Power in the Philippines, Seattle '99 for the antiglobalization movement, and Mayday 2006 for American immigrant rights; for an earlier generation the list might include the 1963 March on Washington, and the 1968 Columbia University sit-in.

Significantly, responsibility for these successes is not limited to a number of key actors. The collective nature of street protest enables agency to be distributed throughout the network. Just as Seattle is a cast as a victory for the whole movement, the successful blockade of delegate busses by a dozen or so Save Our Civil Liberties activists during the RNC became a victory for everyone who participated in the A31 actions, even those whose participation was limited to sitting at home, sending messages of support to demonstrators in the street.

TXTmob also became a symbol of accomplishment for the activist community. Part of the TXTmob story was its emergence as a technology of dissent, surfacing as a tool developed by and for activists. Its creator was a visible presence at spokes meetings, known on a first-name basis by many and available for consultation throughout the DNC and RNC actions. The mere fact of its existence spoke to the movement's capacity to appropriate the tools of "the system" to meet the needs of dissent. This fact was not lost on the activist community. Online activist discussion about the TXTmob often claimed a kind of collective ownership over the service (e.g. "if nothing else good came out of the no-DNC protests last July, we got the ball rolling on the TXTmob thing"[143]), and TXTmob was cited by several activists as "one of the coolest things" to come out of the DNC and RNC convergences [144].

Termination

TXTmob currently exists as an internet service and a software package. The internet service is available at http://www.txtmob.com. At the time of this writing, it has 15,749 registered users and 1365 groups, although many of these are inactive. The service is not actively supported, although requests from to use TXTmob for specific events and activities are considered on a case by case basis and are often engaged.

The software package was been released under open source license in 2005 and is available for download at http://sourceforge.net/projects/txtmob/. At the time of this writing, the software has been downloaded nearly 1000 times. The open source release was assisted by Openflows, a group of software developers based in New York who work primarily for progressive NGOs. As an organization, Openflows is committed to open source software development and believes that making the TXTmob source code accessible to other developers would provide it's best chance for long term sustainability.

Openflows is also been helping to develop a Drupal module based on TXTmob. When completed, this will add SMS functionality to an open-source content management system used by many NGOs. Work on the Drupal module began to support messaging during the 2007 US Social Forum.

Results from the TXTmob project have been shared with the activist community at several post-RNC "report-back" events in NYC, at a Ruckus Society organized summit in Oakland CA, and at a Mobile Activism workshop organized by Aspiration Tech in Toronto. The project has been widely discussed on websites and has been featured in several journalist accounts. There has also been some academic writing on the project by the author and others, although these publications are not widely read by activists.

TXTmob proceeded through a series of limited partnerships with activist groups in order to achieve specific goals and to support singular events. After each event, collaborations naturally dissolved, but I have maintained informal contact with several participants.

Conclusion

TXTmob was designed to support loosely-organized activists engaged in a range of activity. It provided real-time information that allowed fluid, spontaneous action by autonomous affinity-groups while simultaneously allowing for remote participation and adoption by journalists, medics, lawyers, and curious onlookers. TXTmob allowed users to maintain "topsight" over a complex and rapidly changing protest environment, and also supported a wide range of expression. The system also filled an important gap in activist communications by connecting formal communications networks with informal, viral messaging groups.

In looking over the TXTmob case study, several factors come to the fore. First is the degree to which the project was directed by anticipation of opposition action. The design inquiry began with an analysis of police tactics during previous protests, and was driven by an protest strategy intended first and foremost to confound law enforcement. The design project began with a consideration of what was possible, rather than what was optimal.

Anticipation of police response was a central fact throughout the design process, influencing such decisions as the reliance on "inconspicuous" mobile phones and policies governing the amount of personal data required of users. Spokescouncil meetings began with an announcement asking undercover police officers to identify themselves (none ever did). One comms group attendee was shunned after he was determined to be an infiltrator.

Ultimately, TXTmob's deployment at the RNC was considered a success in large part because it was seen to have played a key role in enabling protesters to monitor police activity and avoid detention. This, despite the record number of arrests by the New York Police Department during the RNC.

Second is the manner in which relationships were structured within the project teams. Design was largely carried out by a series of ad-hoc coalitions, each of which came together for a specific purpose and for a limited duration. While some participants were introduced to the project by mutual acquaintances, the majority of participants were essentially strangers to each other. Assessments of each others trustworthiness and reliability were formed quickly; working relationships were founded in great part on faith. This is surprising given the great deal of trust that was required of all participants. As previously discussed, mere involvement in protest planning can lead to arrest. In addition, project members had no way to compel each other to live

up to their commitments – there weren't contracts to be honored, or payments to be withheld. Nonetheless, participants were dedicated, hardworking, and reliable. They were bound together by notions of solidarity and a sense of commitment, but not much else.

Third, one is struck by the co-evolution of tactics and technology. The design project began with a loosely-defined notion of wanting to develop a comms system to support distributed protest groups. Once the technical development began and it became clear that bulk SMS was both desirable and feasible, the opportunity emerged to support not just a few select affinity groups but rather an entire protest network. Once identified, this goal became the driving force for the design. After the project was deployed, various groups began to adopt and appropriate the technology for a wide variety of uses. While some of these had been anticipated by the system designers, the majority of uses were unexpected.

Technically, the project relied heavily on existing infrastructure including mobile phone networks and the existence of free email to SMS gateways. These gateways represented an excess network capacity that was exploited to full effect by system designers. Despite the parasitic nature of the project and the lengths to which designers had to go to bypass spam filters and bandwidth limits, there was a concerted effort to "play nice" with the providers' networks. This was seen as necessary for the long-term health of both the providers' networks and the TXTmob service.

Fourth, we recognize the design teams' commitment to long-term movement-building. Participation in the project was largely structured as a series of voluntary involvements through short-term, temporary associations. Participants had neither contractual obligation nor long-held loyalty to an organization, but they did express deeply held commitments to the broad activist network. In a sense, participants were working for the movement rather than a particular organization.

The orientation towards a movement informed the emphasis on creating infrastructure to support a broad network of activists engaged in a variety of actions. It also provided a foundation for supporting the project's migration from context to context, and drove such decisions as continuing to offer TXTmob as a free service long after the 2004 conventions were over and releasing the software under an open source license. Movement-orientation also lowered barriers to collaboration with a variety of individuals and organizations.

Finally, it's worth saying a word or two about the experience of being involved with TXTmob and organizing the 2004 convention protests. This was an exceptional project, in every sense of the word. Most of the participants weren't full-time activists; they were students, technicians, and

office workers who came together to create this project. The work was fast-paced and intense, fueled by an urgency that grew both from the compressed time frames and the contentious nature of the project.

Working with activists is also expressly different from everyday activities. While rituals like wiggling ones fingers in the air to indicate consent during spokes meetings, the late night meetings in unusual locations, the reliance on "street" names and coded conversations all have pragmatic value, collectively they create an atmosphere of unreality, of separateness from everyday life that is both palpable and intoxicating.

The work was also intensely gratifying. Beyond the adrenalin rush and camaraderie that often accompanies short-term intensive collaboration was the satisfaction of knowing that thousands of people were using something I had created to do things that would not otherwise have been possible. It should also be acknowledged that the recognition received from both the popular press and the activist community was a sort of reward in itself.

I mention all of this because I think it begins to get at the question of why contestational designers do what they do. It's certainly the case that many designers derive personal satisfaction from bringing their skills to bear on social issues. However, we should recognize that this gratification derives not only from altruistic notions of "making the world a better place," but also from the tangible, emotionally-charged experience of being immersed in activist culture.

Dialup Radio

This chapter describes the design of Dialup Radio (DUR), a telephone-based independent media service developed for the Kubatana Trust, a civil society organization based in Harare, Zimbabwe.

Engagement

My primary collaborator on this project was Brenda "Bren" Burrell, co-founder of The Kubatana Trust. Kubatana is a Zimbabwe NGO that provides email and internet technology and training to Zimbabwe human rights and civil society organizations. The organization's mission is to "make human rights and civic education information accessible from a centralised, electronic source" [145]. Kubatana's primary project is Kubatana.net, a website that functions as a sort of clearing house for Zimbabwe's civil society sector. Kubatana.net features articles and reports on current issues, a directory of Zimbabwe NGOs, and blogs by several Zimbabwe activists. Kubatana staff, including Amanda Atwood and co-founder Bev Clark, helped conduct user testing sessions.

I also worked closely with a programmer and Indymedia activist known as Salaud. He is a longtime software developer and activist in his 30s who currently resides in Portland OR. Additional technical support was provided by another Indymedia activist known as Juggo and by Ken Banks, founder the nonprofit technology and advocacy website Kiwanja.net.

Participant Expertise

Bren and her partner Bev Clark founded Kubatana in 2001. They were both experienced activists who have been involved with human rights struggles and oppositional politics in Zimbabwe and were supporters of the MDC's challenge to Mugabe in the 2000 and 2002 elections. Through Kubatana, they have become primarily "internet" activists, making extensive use of websites and blogs. Kubatana has also been involved with several SMS campaigns. Bren generally assumes technical and project management roles, while Bev tends to focus on writing and graphic content. They often work with technical and content development consultants.

Bren's professional background also includes database administration and software development experience while Bev has worked in advertising and marketing. Kubatana has enabled them to combine their expertise in technology and communication with their passion for social justice activism.

On the technical site, Salaud has worked as a programmer, activist, and technology consultant

for many years. Much of his recent work has focused on telephony and voice-over-IP (VOIP). He is also co-founder of a technology consultancy that offers software development and network administration services and also hosts several Indymedia sites.

Motivations and Expectations

I met Brenda Burrell in 2005 at a conference for activists and technology developers organized by MobileActive, a US-based NGO that supports the use of mobile phones by advocacy organizations. I had been invited because of my experience with TXTmob and Speakeasy, a telephony application I had developed in 2002 to support community networking and volunteer language interpretation among Boston's Chinese community.

Bren was keen to learn about voice-over-IP (VOIP) and Asterisk, an open source telephony software package that I had used in the Speakeasy project. Our discussion soon turned to how these technologies might be used in the Zimbabwe context, and resulted in a concept for delivering independent media via telephone.

Although Kubatana had successfully used SMS as an advocacy tool, Bren was interested in voice telephony because it offered a richer media experience and didn't require literate users. In her words, "our main motivation in this project is to make audio content available to local Zimbabweans via the most common ICT device available - the mobile phone."

Salaud and I had two primary motivations. We wanted to support Bren and Kubatana's work to promote democracy and human rights in what was clearly a difficult context. We also were interested in seeing how Asterisk and VOIP could support new kinds of advocacy, with a mind towards developing tools and learning lessons that might be useful in other contexts.

Assessment

History

Zimbabwe's political, social, and economic situation are almost uniformly described as being in "crisis". Three decades of authoritarian rule have transformed this once-prosperous nation into a pariah state of corruption and poverty. The story of this decline has been well documented elsewhere; interested readers are directed to texts by Geoff Hill [146] and Martin Meredith [113].

Zimbabwe currently finds itself amid one of the worst humanitarian crises since its independence. Corruption and questionable policy have been exacerbated by region-wide droughts, leaving the local economy in tatters. Perhaps a third of the population faces food shortages [147].

The "breadbasket" of Africa, once the primary exporter of food throughout the region, is now dependent on imports and foreign aid to provide nourishment for most of its citizens. Rampant inflation and government-imposed price controls that force retailers to sell foodstuffs for less than their cost of production has led to food shortages. This, in turn, further entrenches ZANU-PF's (Zimbabwe's ruling party, lead by Robert Mugabe) hold on power as the party reportedly refuses to distribute food aid to areas seen as hostile to the government. In addition, there are routine power outages and declining infrastructure across Zimbabwe. The unemployment rate hovers around 80% [148], which has contributed to mass migrations of Zimbabean nationals to South Africa, Botswana and the United Kingdom [149]. Zimbabwe also faces a major HIV/AIDS epidemic.

While region-wide droughts contributed to Zimbabwe's current economic malaise, most independent observers claim that the primary causes are land-use policy and government corruption. In 2000, ZANU-PF forcibly evicted white landowners and their employees from many of the nation's farms. At the time, the government claimed the evictions were retribution for colonialism. However, it is widely acknowledged that these evictions were aimed at shoring up support for Mugabe, punishing white farmers who were generally supportive of the opposition, and raising fears of white minority domination in the run up to the 2000 parliamentary elections. According to Bren and Brenda, much of the seized land has been given to military leaders and political cronies who had neither expertise nor interest in agriculture.

Between 2000 and 2004 agricultural output plummeted. The result was a 30% decline in Zimbabwe's gross national product and instigating rising inflation rates that are now the world's highest [150]. In 2007, the Zimbabwe government stopped publishing inflation figures.

In 2005, the Zimbabwe government undertook "Operation Murambatsvina" (Operation Drive Out Trash) -- a series of evictions that removed Harare's urban poor from shantytowns and informal settlements around the nation's capital, mostly on land previously occupied by white farmers and slated for redistribution. Homes, market stalls, and shantytowns were bulldozed, making an estimated 700,000 people homeless [151]. Although the government claimed that Murambatsvina was necessary to combat Harare's thriving black market, many alleged that the evictions were politically motivated, noting that the shantytown inhabitants generally supported the Movement for Democratic Change, Zimbabwe's chief opposition party. Murambatsvina was also seen as an attempt to disperse urban centers of dissent into rural areas where the government had more control [152].

Mugabe is now in his 80s, and there is growing recognition both in Zimbabwe and around

Operation Murambatsvina: Satellite images document destruction of Porta Farm settlement, 2005.

the world that his regime is on its last legs. At the time of this writing (June 2008), Mugabe has just successfully defeated MDC leader Morgan Tsvangirai in a closely-contested election international observers have roundly criticized as illegitimate. After winning a preliminary round of voting Tsvangirai withdrew from the race citing violence and intimidation by ZANU-PF, leaving Mugabe to run unopposed in a run-off election.

With the election now over, some observers expect Mugabe retire and to pass control to ZANU-PF, who will then begin instituting economic and political reform. However, Mugabe has so far made no moves in this direction.

Oppositional Politics and Civil Society

Opposition to the Mugabe regime has a complicated history in Zimbabwe. The most serious recent threat was posed by the Movement for Democratic Change (MDC), a social democratic party founded in 1999 by trade unionist Morgan Tsvangirai. In 2000, the MDC played a central role in defeating a referendum on a draft constitution put forward by ZANU-PF that would have permitted President Mugabe to seek two additional terms in office, granted government officials immunity from prosecution, and authorized government seizure of white-owned land. Shortly after the referendum Mugabe's government began to forcibly (and often violently) evict white farm owners and their employees, most of whom were MDC supporters.

The 2000 parliamentary elections were marred by violence and widespread claims of fraud and irregularities on the part of ZANU-PF, especially in rural areas. Nevertheless, MDC won 57 of

the 120 contested seats, including all of the seats representing the two biggest cities Harare and Bulawayo. This was the first time an opposition party had a substantial presence in Zimbabwe's government since the merging of ZANU and ZAPU into ZANU-PF.

After the 2000 elections, Tsvangirai was jailed on charges of treason. Although he was acquitted in 2004, his removal from day-to-day operations sowed the seeds for internal party turmoil that eventually lead to a split in 2005. The proximate cause of this fracturing was disagreement over whether to participate or boycott the 2005 elections, although the use of violence within the MDC also played a role [153].

After the split, the MDC was comprised of two factions, one lead by Tsvangirai and the other by Welshman Ncube and Aruthur Mutambara. Each side accused the other of being infiltrated by ZANU-PF spies and by engaging in political violence. Prior to the 2008 elections, talks were undertaken to bring the two factions back together to present a united front against ZANU-PF. These were unsuccessful, and the Ncube/Mutambara sat out the presidential elections. MDC has lost supporters since 2000, and has been particularly unsuccessful in engaging youth.

The rise of MDC should be seen within the larger context of civil society organizations in Zimbabwe. Throughout the 1990s, international donors channeled funds to a growing number of human rights organizations, labor unions, and student and church groups promoting "civil society" in Zimbabwe. These institutions provided much of the organizational infrastructure for the MDC, and continue to play a major role in education, economic development, HIV/AIDS prevention and wildlife preservation.

Civil society organizations occupy a peculiar place within Zimbabwe society. Predominantly urban and internationalist, they tend to have limited connection to rural movements and the agrarian issues that dominate local politics [154]. They play the often uncomfortable role of interface between "global civil society" networks and local people, organizations, and governments [155]. They are attacked by ZANU-PF as instruments of western imperialism and distrusted by some Zimbabweans who view them as self-interested schemers interested primarily in "raising money from England and America" [156]. NGO agendas are often dominated by the interests of the international funding agencies on which they rely [157], and their limited resources are further strained by strenuous bureaucratic and reporting requirements [158].

Zimbabwe's civil society organizations are further hurt by shifts in international aid strategy. The past decade has shown a dramatic shift in the way that donors and NGOs approach funding. What was once considered charity has been recast as a form of investment. The new approach

is championed as a way to empower nonprofits and a guarantor of NGO accountability [159]. After the 2002 elections, however, Zimbabwe was largely written off by the international civil society community. As a representative of one funding organization told me, the collapse of the MDC and the lack of a viable opposition made Zimbabwe unattractive to funders, who generally preferred to direct money to places with higher likelihood of a good "return on investment."

The run up to the 2008 elections saw renewed energy among opposition groups. MDC participated in behind the scenes negotiations with ZANU-PF, which MDC accused the ruling party of subverting by unilaterally moving the election date [160]. At the same time, several smaller organizations including Women of Zimbabwe Arise (WOZA) and Combined Harare Residents Association (CHRA) held several public demonstrations in Harare, which were met with police repression including beatings and arrests. According to contacts in Harare and in the US State department there has also been an increase in US support for civil society in Zimbabwe. Much of this funding flows through organizations like USAID and the Freedom House, and likely originates with the US government. At least one person I spoke with viewed these efforts as part of a last-ditch effort by the Bush administration to secure its legacy by focusing on Africa.

Brev and Bren viewed these developments with great skepticism. According Bren, Zimbabwe's opposition is a fractured, marginalized movement based primarily in Harare with little connection to the larger, rural population. Many former MDC supporters have left the country; those who remain are frightened, jaded, and aging. They may have little connection with the country's youth population, which ultimately will have to take up the mantle of mounting any opposition. Bren told me on several occasions that the movement never recovered from the MDC split, and was rapidly aging and becoming marginalized. Young people in Zimbabwe, she said, are focused on getting their education and getting out of the country.

Media Control

One of the ways that ZANU-PF has maintained its hold on power is through tight control of Zimbabwe's media. This control is exerted through several means, including outright ownership of newspapers and broadcast stations, legislation limiting foreign ownership and imposing restrictions on editorial content, and licensing processes that result in self-censorship by media outlets.

Despite the 2001 passage of the Broadcast Services Act which promised to open up the airwaves to independent media, the government-owned Zimbabwe Broadcast Holdings (ZBH) enjoys a monopoly over Zimbabwe broadcast media, including four radio stations and one television channel [161]. SWAfrica and Voice of the People (VOP) are both independent radio stations that broadcast over shortwave radio, although the government appears to have successfully

blocked their signals. SWAfrica also maintains a medium wave broadcast which reaches the southern part of Zimbabwe. Voice of America (VOA)'s Studio 7 program has been more successful at penetrating local airwaves, however it is generally labeled by ZANU-PF as an "imperialist" propaganda outlet for the United States [162].

While there is a tradition of community radio in Zimbabwe, lack of licenses, cost of equipment, and fear of repraisals block attempts to establish independent stations. There have been innovative attempts to distribute audio programming, including a project called Taxi Tunes in which radio producers distributed audio cassettes to taxi drivers in Bulawayo, Zimbabwe's second largest city.

There is more diversity among print media, where both the *Independent* and *Standard* are independently owned and compete with government controlled offerings like the *Herald* and *Sunday Mail* [163]. However, the independents are extremely limited in what they can print, lest they fall afoul of the Media and Information Comission (MIC), the government licensing agency that, in 2002, revoked the registrations of several of the most successful independent newspapers including the Daily News and the Tribune [162]. Additionally, the independent papers are generally upmarket publications read by urban elites, and have little circulation in the countryside [162].

The internet remains a relatively free medium, albeit one to which very few Zimbabweans have access.[2] Independent news and information about Zimbabwe is available on locally-produced (though usually not locally-hosted) and international websites from such organizations as the aforementioned SWAfrica and WOZA. Content on these sites is generally hard-hitting, often featuring pictures, video and narratives of police brutality and government corruption. Bren believes that these sites are tolerated because they are generally inaccessible inside of Zimbabwe where internet adoption rates remain low. She says that they function as propaganda, demonstrating ZANU-PF tolerance for dissent and support of civil society.

As documented in other parts of the world [165], there is anecdotal evidence that state control of Zimbabwe media has had the unanticipated result of fostering deep distrust of official media sources. During the 2006 currency devaluation, a local source reported meeting a woman from the countryside who earnestly informed him that she would not be exchanging her old currency

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2 Data on media use by Zimbabwe nationals is hard to come by. 2006 statistics indicate 10.15% of the population uses the Internet 148.   (CIA), C.I.A., The World Factbook. online ed. 2008, Washington DC: Central Intelligence Agency.]. Access is primarily at work or via Internet cafes. The 2006 UNDP Development Report indicates 3.1% of the population has a mobile phone account, although this number doesn't include pre-paid SMS cards which appear to be the most common type of usage 164.   (UNDP), U.N.D.P., Development Report. 2006, United Nations: New York.]. Informal observations by project partners indicate that mobile phone usage is fairly ubiquitous.

for new bills. Having only read various newspaper accounts, she was convinced that the currency conversion was "a scam" by the government to steal her money. The tragedy is that by not participating in the exchange meant that this woman – clearly struggling to stay above the poverty line – stood to lose all of her assets.

Design Objectives

Dialup Radio was initially intended as a covert media service that would provide independent and activist information to Zimbabwe's citizens. There is a pressing need for independent, trusted media that can provide Zimbabweans with local and international news, as well as information about economics, human rights and AIDS/HIV prevention. This information should be generally accessible to as broad a proportion of the population as possible, regardless of location, native language, or economic status. Furthermore, it must be produced independently of the Mugabe regime, and be relatively secure from government interference. Finally, it must function in an environment of often nonexistent or unreliable public communications infrastructure.

At the same time, it was hoped that the system that could foster collaboration among Zimbabwe's disparate human rights and civil society groups. There is a need for Zimbabwe's citizenry to build a broad-based movement that can challenge the Mugabe government and ensure that whatever regime follows takes seriously its obligations to protect human rights and support the most vulnerable citizens.

Ultimately, the project objectives shifted away from creating an activist media service to developing a less contentious offering that could be used by sanctioned NGOs within Zimbabwe and throughout the region. There were several reasons for this change, including a need to mitigate risk, the limitations of Zimbabwe's communications infrastructure, and a desire to capture available funding.

Requirements and constraints

Limited Local Infrastructure
Corruption and neglect has deteriorated much of Zimbabwe's infrastructure. Electricity is often rationed and power outages are common. When I visited Harare in October 2007, much of the city was without power which also meant limited water supplies in many areas. Communications systems are similarly affected. Telephone systems are frequently inoperable and internet service is often interrupted. Mobile telephone networks are growing but are unable to meet demand, often leading to network congestion and missed calls.

Zimbabwe's regulatory environment also limits the accessibility of local infrastructure. VOIP

telephony service – an obvious choice for this project – is currently illegal in Zimbabwe . Vendors are required to record customers' identities when they sell mobile phone SIM cards. However it should be noted that Zimbabwe also has a thriving black market, where it is possible to bypass some of these restrictions.

<u>Independence</u>
The initial goal for this project was to provide news and information that counters ZANU-PF propaganda and promotes democracy and civil society. This requires mechanisms for producing and distributing content without government interference. However, it was also important to avoid other associations that could undermine public perceptions of independence. This issue was particularly relevant in considering funding or other partnerships. For example, Voice of America (VOA) is already active in Zimbabwe and would seem a natural partner for the DUR project. However, Kubatana is leery of working with VOA or any other American government agency because such associations are easily painted by ZANU-PF as examples of interference by "Western imperialists."

The goals of the project ultimately shifted away from directly challenging ZANU-PF. Independence remained an important objective but became less critical as the emphasis moved to offering such "safe" messaging as HIV/AIDS awareness information.

<u>Security</u>
ZANU-PF has a long history of suppressing political opposition. Protecting the service, equipment, and project staff was a pivotal concern in early stages of DUR's design. Consideration was given both to creating a solution that would be resistant to government interference, and to protecting the identities of any Zimbabweans involved with the project.

<u>Cost</u>
Any project based in the developing world must be conscious of costs both for service providers and end users. In Zimbabwe, the problem of cost is exacerbated by high unemployment rates, runaway inflation, and pervasive corruption that has caused many international donors to withhold aid to Zimbabwe's NGO community.

Government-imposed price controls add another, often surprising dimension to the local economy. In June 2007, for example, limits on mobile phone charges severely reduced call costs – which would have actually helped the DUR project. Unfortunately, the lower fees resulted in massive network congestion. The sanctioned costs were also unsustainable because they were below the operators actual cost of service. In September, the government announced that the operators could raise rates again [166].

Organizational Support

As a project partner, Kubatana brought their own opportunities and constraints to the design process. Kubatana is an established organization, well connected within Harare's activist community and to international civil society networks. The organization taps international support networks for funding and resources, and connects with local activists to develop projects. Although the organization has not previously been involved in a technology innovation project, Kubatana was experienced at using internet and SMS technology for activism within the Zimbabwe context.

Kubatana's staff faces the same challenges of fundraising and burnout confronting NGOs the world over. When I first visited Harare in the summer of 2006, I found an exhausted and dispirited organization whose principals were burned-out and depressed. Kubatana was running out of money with few prospects for new revenue streams. Bren and Bev were debating where to take the organization given both their exhaustion and growing financial difficulties. Shortly after my visit they greatly scaled back operations, giving up half their office space and reducing staff.

Although well connected in Harare, Kubatana has limited influence outside the capital. As with many professional NGOs in the developing world, Kubatana is a predominantly middle-class, urban organization [167]. It operates without a mass base and appears to have better connections among international aid and development networks than among the poor, rural populations in its own country [168]. Kubatana's principals – white, middle-aged English-speaking women – are further isolated by age, race and language.

Kubatana's isolation is exacerbated by fear of reprisals. As Bren said on more than one occasion, fear is a pervasive force among Zimbabwe's activist community, keeping groups from publicizing their activities and preventing strangers from reaching out to each other. This sentiment is echoed by other Zimbabwean activists (see for example the 2002 discussion on establishing a Zimbabwe Indymedia site [169]). Fear is of course highly subjective. Large public demonstrations in 2007 and 2008 organized by Women of Zimbabwe Arise! (WOZA) and Central Harare Residents Association (CHRA) indicate that some Zimbabweans are finding their voice. For Kubatana, fear was an ever-present factor that deeply influenced the way the organization approached the DUR project.

Assessing requirements and constraints

Determining requirements and constraints was particularly challenging given Zimbabwe's dynamic nature and the lack of clear, accurate information. For the most part participants relied on informal communications networks referred to locally as "the grapevine". Although rife with rumor and speculation, the grapevine is the primary means through which Zimbabweans keep

abreast of local events, particular as international news sources are scarce and the local media are generally not trustworthy.

Informal communications networks were the primary source for all sorts of information, from government policy to the availability of mobile phone cards. Participants also monitored the international media and local newspapers for information about Zimbabwe's politics and economy. Predictably, the quality of information varied widely, leading to frequently changing assessments of requirements and constraints.

The project also involved a fair amount of trial and error. For example, testing revealed that initial assumptions about call quality in Zimbabwe were overly optimistic, and also demonstrated differing degrees of reliability between contract and prepaid accounts, even on the same mobile phone networks.

Planning

For the most part, the design process was managed remotely. Time zones and other commitments precluded regular meetings by the whole team. Bren and I maintained a weekly internet chat session, and also regularly communicated via email. I maintained contact with Salaud and Juggo via email, IRC, and telephone.

Face-to-face meetings were few, but important. In addition to our 2005 meeting in Toronto, Bren and I met twice in Harare (2006 and 2007) and once in Nairobi (2007). Salaud and I also met in Portland in 2007.

In general, Salaud and Juggo focused on technical issues while Bren concentrated on the local deployment, including assessing local conditions, testing the system, reporting bugs and identifying features for future development. She also arranged user testing sessions and managed fundraising efforts. I was responsible for system architecture and user interface design and also took on a project management role, communicating with everyone and trying to keep development moving forward. When Juggo was pulled away by other commitments, I took over developing the content management system as well.

Decisions were generally made by consensus, although it was rare that all participants were involved in a particular decision. In general, the "talk groups" consisted of Salaud, Juggo, and me; Bren and me; and Bren and Kubatana. Decisions arrived at in those talk groups were communicated to other participants either by Bren or me. In theory, decisions were subject to challenge by any participant although this rarely happened.

Key decisions

Decision: Develop a new tool
Many of the project goals could be met with existing technologies. In particular Asterisk (an open-source telephony package) supports much of the needed functionality. Asterisk can be integrated with MySQL databases and works with a variety of VOIP and traditional telephony. It is highly configurable, and several GUIs have been developed to assist with interactive voice response (IVR) menu management.

Where Asterisk fell short was in meeting the requirement of allowing multiple, remote content providers to collaboratively offer a shared service. For the most part, the Asterisk community is focused on home and business applications in which an individual or organization needs to manage its telephone network and/or offer telephone-based information services. In these scenarios, the IVR is generally managed by a small number of highly-skilled technicians. By contrast, we sought a solution that would allow lots of people with limited telephony experience to manage individual parts of the IVR, without needing or even being allowed to manage the system as a whole.

This pointed to the need for a content management system that could interface with Asterisk, and enable various users with limited telephony experience to manage audio files. Although there had been a fair amount of discussion about Asterisk integration by CMS developers, little had been accomplished. The closest fit was Leo Burd's "What's Up" system, which integrated Asterisk and Drupal [170]. What's Up development began at around the same time that work was begun on Dialup Radio and primarily focused on shared calendars and voicemail, making it an interesting but not ideal project. Additionally, Salaud and Juggo were concerned that PHP, the underlying programming language upon which Drupal is based, was too insecure for use in Zimbabwe.

Decision: A shared system
A key decision was to develop Dialup Radio as a shared system that would rely on groups of individuals and NGOs to provide content rather than having a single organization responsible for hosting the service and developing all of the content. In addition to lessening Kubatana's burden, this was a powerful idea because it broadened the scope of the project beyond simply providing one kind of information to providing a piece of communications infrastructure that could support civil society organizations working on a range of issues. As such, it offered the potential to facilitate collaboration across institutional barriers, hopefully laying the foundations for reconstructing a broad-based opposition movement within Zimbabwe.

Conceptually, we began to think of the service as kind of a radio – each option on the telephone

menu system (called an IVR, for "interactive voice response menu") is roughly analogous to a different station or channel, offering content provided by a different person or organization. A user calling in to the service might chose to hear news items produced by local journalists, AIDS/HIV information provided by an NGO, or political music offered by an aspiring DJ.

Decision: Kubatana maintains ownership and editorial control
Offering a shared service raised concerns about control and ownership. It was important to Kubatana that they exercise editorial control. This consideration was partially intended to ensure the quality of programming, but was also an issue of "branding" the project as a Kubatana offering for fundraising reasons.

We decided to adopt a user model with varying degrees of permissions. Each content provider could upload and manage the audio files pertaining to their "program;" however, new files would have to be approved by an editor (presumably, someone at Kubatana) before it was allowed to go "live" on the system.

Decision: VOIP
The initial idea for the project was to set up an independent telephony service featuring locally produced content housed on servers in the US, UK, and/or South Africa and made available to Zimbabweans through international VOIP service providers. This solution was attractive because it placed essential hardware outside of Zimbabwe (and therefore out of reach of government agents), and because it was economically sustainable – content would be offered as a dial-in service, meaning that the access costs would be distributed among the users rather than be borne by the hosting organization. This was predicated on an assumption that a significant number of Zimbabweans could afford to make short calls to South Africa, as Bren initially believed to be the case. We also considered several solutions to make the service accessible to Zimbabweans for whom the cost would be prohibitive. The most interesting of these was a scheme to distribute audio cables that would connect users' mobile phones to home audio equipment, thus enabling a kind of micro-broadcast system that would allow small groups to listen to content together.

Early discussions about the project with several technologists and activists raised alternative solutions including setting up GSM modems in South Africa and Botswana, near enough to the border to reach Zimbabwe mobile phone networks. On further reflection, this seemed overly complicated and probably unworkable, as they depended on significant infrastructure on both sides of the Zimbabwe border -- mobile phone towers on the Zimbabwean side and shelter, power and internet connectivity on the Botswana and/or South African side. We decided to move forward with the concept as described.

Decision: Offer a callback service

While a dial-in service is economically sustainable for the host organization, we recognized that some Zimbabweans could not afford to make voice calls. In retrospect, it appears that Bren's early appraisals seriously underestimated the size of this population.

We considered several alternatives to address lower costs for end-users. An ideal solution would be to offer a toll-free service, which in Zimbabwe is only feasible if the information on offer is not considered threatening by ZANU-PF. An alternate solution was to implement an SMS-callback system, in which users could send their phone numbers by SMS and have the system call them back. We also developed a "tickle call" service in which inbound calls would not be answered, but instead would initiate a return call back to the caller (identified using callerID).

While these solutions enable users to access the system free-of-charge, it significantly raises the cost of the service for the hosting organization, requiring a substantial fundraising effort. It is unclear where this funding would come from. The majority of Zimbabwe's NGOs are dependent on aid from Western governments and foundations, leaving them open to the oft-repeated charge of being beholden to Western interests. Despite an influx of funds connected with the 2008 elections, international funding for Zimbabwe's civil society organizations has generally decreased in recent years, and likely will continue to decline as long as ZANU-PF remains in power.

We also discussed various kinds of "sponsorship" solutions, in which Zimbabwe ex-pats might donate money to the service to underwrite the costs of calls by friends and family living in Zimbabwe. This is an attractive possibility that should be examined further as the project moves forward.

Decision: Maintain local focus

Another critical decision was to maintain a local focus for the project. As the barriers to offering a voice service within Zimbabwe became increasingly apparent, we considered focusing our energies on delivering locally-produced content to international audiences, especially the diaspora communities in South Africa and the United Kingdom. This was an imminently feasible objective that could be achieved at very little cost, and also would have provided a test bed for the core components of the system while the remaining challenges were being worked out. This proposal even received informal encouragement from one funding agency that is particularly interested in cross-border communication.

Bren ultimately chose to keep the focus on local audiences, stating that Kubatana's mission does not include providing information to diasporans. Her feeling was that international audiences already had many ways of following events in Zimbabwe (including the Kubatana website), and

that the bigger challenge was in offering an independent media service to people still in-country.

<u>Decision: 'always on' vs. temporary service</u>
Another option under consideration was to develop a temporary service that might only be available for a few hours a day or perhaps in support of protest marches, labor strikes, elections, or other events. This solution would maximize impact while reducing both cost (by limiting the total number of calls, and restricting service to off-hours when rates were lower) and risk to the host organization. However, it gained little traction especially as the project moved away from its activist orientation.

<u>Decision: 'Above-ground' vs. covert service</u>
The project was initially conceived as a covert media service, delivering human rights and civil society information in the midst of a politically-repressive environment. Much of the design process was dedicated to security issues, devising tools and practices to protect the service from disruption and the service providers from harassment or arrest.

The decision to reformulate the project as an "above-ground" entity had profound impact on the design process and on the artifact itself. The decision to surface was motivated by several factors. During the early stages of the project, the insistence on secrecy was a significant design challenge. It put a premium on protecting content providers' identities and finding hard-to-detect ways of connecting to local mobile phone networks. It limited the ways that the service could be publicized, and required that the project be highly mobile and reconfigurable.

Developing a covert service also limited Kubatana's ability to recruit volunteers and build relationships with other Zimbabwe organizations because it required a degree of mutual trust that was difficult to achieve.

Most significantly, Kubatana began to view Dialup Radio as a significant fundraising opportunity. In 2006, the organization faced financial crisis. Their major funding program was coming to a close, and Kubatana had been unable to locate a new source of income for its activities or its principles. Bren described the situation as desperate. She and Bev scaled back operations, reduced the size of their offices and staff, and considered shutting down the organization. They talked about leaving Zimbabwe, a consideration they approached with a great deal of ambivalence. On the one hand, five years of working on Kubatana had left them burned out and discouraged. On the other, Zimbabwe was their home. They were reluctant to abandon it as so many others had done.

As the project gained momentum, Bren and Bev saw its potential to attract new funding from the international community. Funding agencies had become very interested in mobile phones,

particularly in the developing world. However, Kubatana found it difficult to raise funds for an underground service. While several potential funders expressed interest in the project, they were reluctant to invest in an initiative that couldn't be publicly branded.

Once the decision was made to develop a "legitimate" service, Kubatana immediately began a partnership with a well-funded local NGO called Training and Research Support Center (TARSC). The two organizations intended to use Dialup Radio to provide HIV/AIDS and sexual health information to Zimbabwean youth. In addition to providing an established HIV/AIDS education curriculum, TARSC would underwrite the costs of a toll-free call-in line. In the summer of 2007, a prototype of the service was created and evaluated through a series of user testing sessions. Kubatana also expanded the geographic scope of the project to include all of southern Africa, and began an aggressive fundraising effort that culminated in a major grant by the Knight Foundation.

Implementation

Dialup Radio is a software package that allows groups of individuals and organizations to collaboratively offer a menu-driven telephone information service. The main components are a web-based content management system and a database-driven interactive voice response (IVR) telephone menuing system. Host organizations upload and manage short (1 – 3 minute) audio programs via the website, which users access by dialing in to the telephone service. Callers navigate audio content through a series of IVR menus that are automatically generated by the system.

Dialup Radio initiates "callbacks" in response to SMS messages and inbound "tickle" calls. Several mechanisms are in place to connect to Zimbabwe's mobile phone networks.

Addressing design objectives and constraints

Dialup Radio was designed to provide independent media to Zimbabwe's citizens by enabling NGOs and activist groups to distribute radio-style programming via telephone networks. It provides an easy-to-use mechanism that allows local activists and journalists to access local phone networks while bypassing government controls.

The system is designed to support collaboration among various activists and civil society organizations. Each organization manages its own "channels" on a shared service, independent of what other organizations are doing. Control over the entire system can be maintained by a single "host" entity, or can be shared by multiple organizations.

Dialup Radio was conceived to take advantage of the emergence of mobile telephony as a
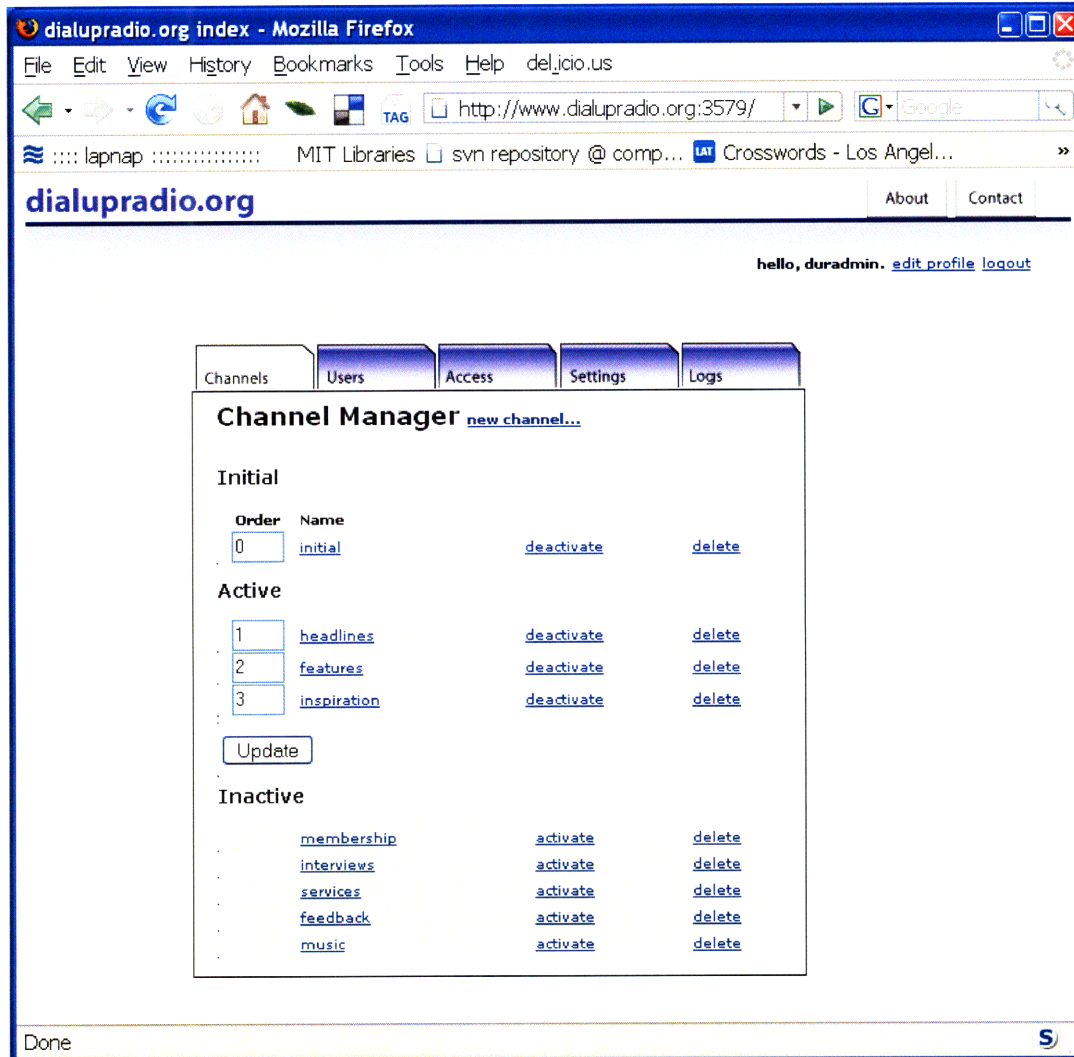
Dialup Radio content management system interface

relatively new, relatively ubiquitous communications infrastructure in Zimbabwe. The initial version assumed servers located in international countries, and local content providers with at least intermittent internet access. Calls were to be routed through VOIP service providers in South Africa and Botswana. The second version included a GSM gateway that could route calls from remote servers directly to local mobile phone networks using anonymously purchased SIM cards. The current version places the server on the same local network as the GSM gateway, thus eliminating the need for internet connectivity. This version can also operate independently of unreliable electrical grids, and can be powered by gas or solar generators, or other independent power sources.

Mitigating against service disruption and protecting activists were central design concerns. Several solutions have been implemented including using international servers and VOIP gateways (placing critical infrastructure out of the reach of local government) and employing small, inconspicuous server and GSM gateway hardware that fits inside of a backpack for easy mobility. Reliance on anonymously-purchased SIM cards protects participants' identities. Measures have also been taken to protect the server from malicious attack, including strict firewall policies and encrypted communications. A "blacklist" feature blocks access by callers who appear to be trying to overload the system.

There was a great deal of discussion about whether or not to keep records of callers' sessions. On the one hand any such archive is a potential security risk, although Bren believed that government agencies were unlikely to target people who called in to the system – especially if there were a lot of them. On the other hand Kubatana sought to develop a database of phone numbers to be used in other campaigns including their ongoing SMS efforts, a practice that seemed uncomfortably close to spamming for my taste. The issue was never fully resolved; the system currently includes the capacity for simple call logging which can be easily disabled.

Dialup Radio hardware: the entire system fits into a small backpack, and can be easily moved or hidden.

router

GSM gateway

server
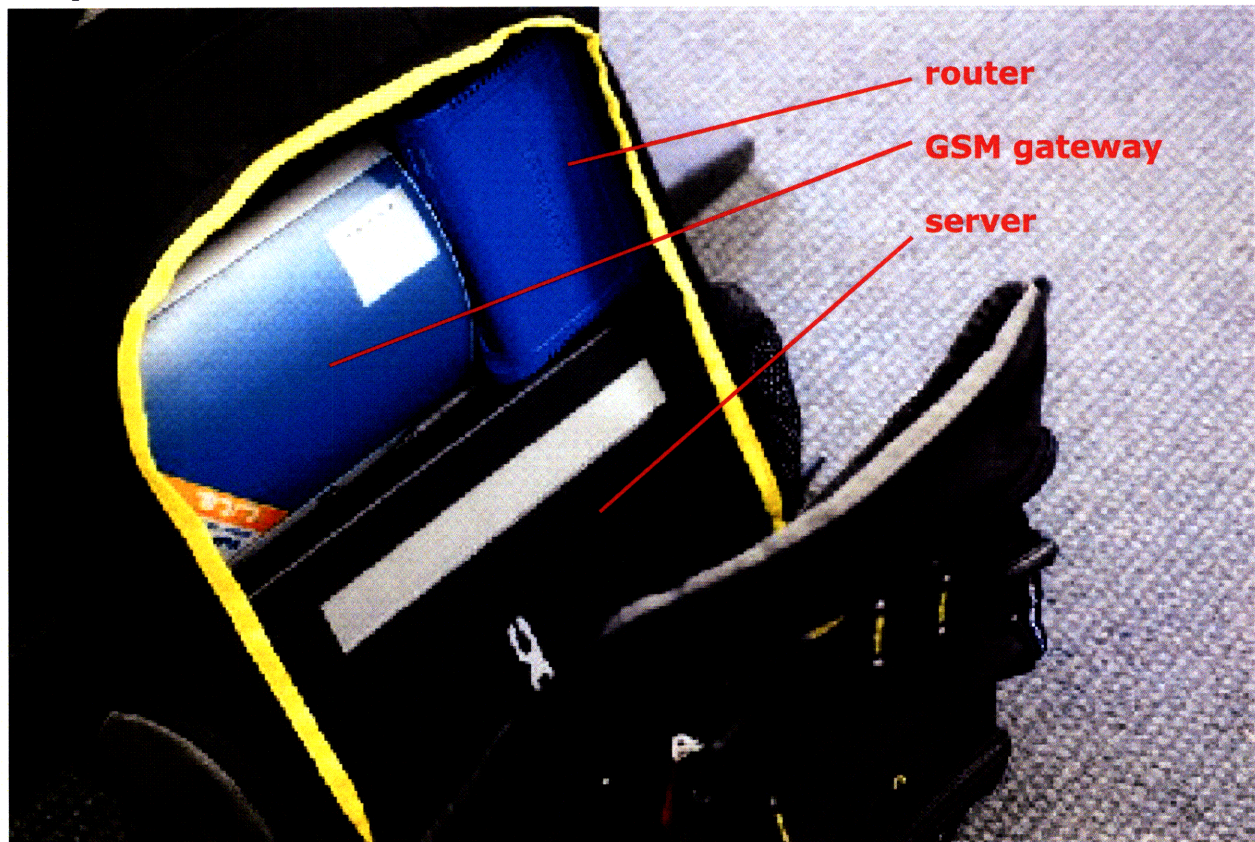
Cost has been an ongoing challenge. There are fundamental limitations to what a voice system can accomplish in the developing world. Simply put, voice calls are expensive. The key question is whether end users or the host organization will bear the cost. DUR supports several approaches. Where available, calls may be routed through VOIP networks. These are substantially cheaper than traditional phone lines, and enable callers to access international servers and local rates.

DUR can be offered as a toll-free service and also supports callbacks -- system-initiated calls to users in response to SMS messages or "tickle" calls received on dedicated phone lines. Callbacks and toll-free lines don't eliminate call costs; they simply shift them from the users to the host organization. While these approaches lower barriers to end users, they present a major fundraising challenge to the organization. Several approaches were considered to address the funding issue, including partnering with larger NGOs to host a toll free call-in line, soliciting funds from disapora Zimbabweans living in the UK, and in limiting service to specific events or off-peak hours.

Reformulating the project as an above ground service has allowed new partnerships and new funding that will enable Kubatana to bear the brunt of calling charges. However, the organization still has to contend with the limitations of local infrastructure. For example, requests for new telephone lines currently take over a year to process. It is likely that the service will first be deployed outside of Zimbabwe.

Capabilities and limitations

Dialup Radio allows groups of individuals and organizations to collaboratively offer a telephone information system that is configured via a web-based content management system. Each user manages one or more "channels," collections of thematically-related audio files. Examples of channels might include "news," "human rights," "banned music," and "HIV/AIDS info." Each channel in turn may contain multiple audio files.

Editors – privileged users – designate which of the channels are "active" (meaning they are available to callers), and also determine the order in which channels appear on the IVR. System administrators manage user accounts and system configuration.

When callers dial in to the service, the system answers the call, greets the caller, and assembles an IVR using designated "name" files from each active channel. The caller then is presented with a list of options. For example, a caller might hear something like "You have reached Dialup Radio. Press 1 for BBC news headlines, press 2 for Human Rights Watch's human rights report, press 3 for music by Comrade Fatso, press 4 for Auntie Stell's HIV awareness line. Please make your

selection now." When a selection is made, the system retrieves audio files associated with the selected channel and plays them back in the order specified by that channel's owner. "Greeting" files will be played first, followed by "Message" files. For example, if the user were to select option 3 from the list above, she might hear "You are hearing Comrade Fatso, live and direct on Dialup Radio. Call back each week for my latest track!" followed by one of Comrade Fatso's hip hop diatribes.

Dialup Radio supports toll-free access via a callback feature. The service can pull callerID info from inbound calls to dedicated "tickle" lines. Instead of answering tickle calls, the service pulls callerID and terminates the session, then initiates a return call. The result is that the cost of call is incurred by the service, rather than by the end user. When the end user answers the phone, the interaction is as described above. Callbacks can also be initiated by SMS.

Dialup radio can also be configured to monitor the number of minutes each caller spends on the system, and to block access for users who appear to be attempting to disrupt service. There are also basic reporting features that allow system administrators to monitor performance and usage.

Dialup Radio is a relatively barebones offering. Much of the development effort was dedicated to addressing Zimbabwe's unique infrastructure and security climate. It was also intended to provide a user-friendly, web-based interface to Asterisk. Since the project's inception, several other initiatives have emerged that provide some similar functionality. trixbox[3] is an open-source PBX configuration manager that provides an easy-to-use interface for installing and configuring Asterisk. FreePBX[4] enables trixbox to be managed remotely over the web. Both trixbox and FreePBX have large user bases, established developer communities, and are supported by for-profit companies.

Future development efforts would integrate Dialup Radio with these larger projects and emphasize DUR's contribution of providing support for collaboration by multiple, loosely affilitate content providers via a CMS interface. Additionally, there continues to be a need for multi-leveled IVRs and user-generated messaging.

At present, menus are only one level deep. While channel managers can include multiple files in their channel and may operate multiple channels on the service, they are unable to create submenus within a channel. To use the above example, it is not currently possible for the Comrade Fatso to present callers with a second menu offering "Press 1 to hear 'Ma Streets,' press 2 for 'Like a Riot,'" etc.

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3 http://www.trixbox.org; the name is not capitalized
4 http://www.freepbx.org

Dialup Radio currently does not support callers to leave messages. Ideally, it is desirable that callers can record messages at any point in the IVR and that these messages appear to channel managers on the website, according to the point in the system where they were recorded.

Technology

Dialup Radio is based on several open-source software packages. The content management system is written in Ruby and utilizes the Rails application framework. It relies on a MySQL database and a Mongrel web server. The whole system runs on Debian Linux.

Phone calls are managed by an Asterisk telephony server. Custom software written in Perl manages interaction between Asterisk and the database and is used to dynamically create IVRs. Connections with VOIP gateways are managed according to SIP (session initiation protocol), a standard VOIP protocol.

Inbound SMS messages are handled externally by custom software written in Visual Basic by Ken Banks, running under Windows XP. This is the only proprietary code in the project, and will be replaced in future versions. Data from SMS are passed to Dialup Radio via HTTP.

The deployment in Zimbabwe currently runs on a Shuttle XPC, a very small computer intended for use as a home media center. Connections to mobile phone networks are managed by a four-channel GSM gateway called Voiceblue Lite (VBL) and developed by 2N, a Czech telecommunications company. The XPC and VBL communicate via TCP/IP on a local area network through a local router. The entire system fits in a small backpack.

Existing infrastructure and technologies

Dialup Radio makes extensive use of existing infrastructure and technologies. As previously described, it relies on a suite of existing open-source software applications. It also depends on existing communications networks. However, its relationship with those networks is complicated. Engagement with existing communications infrastructure necessarily means that significant portions of the system are under the direct control of outside interests which, in the case of Zimbabwe, are tightly controlled by the government.

Given the project's contentious nature, it was desirable to operate under the radar for as long as possible and to take steps to mitigate government interference when the service becomes widely known. This has put aspects of the project outside the law, or at least has pushed it into legal grey areas. Clearly, permits have neither been granted nor sought to provide a public information service. The SIM cards that provide connection to Zimbabwe's mobile phone networks can
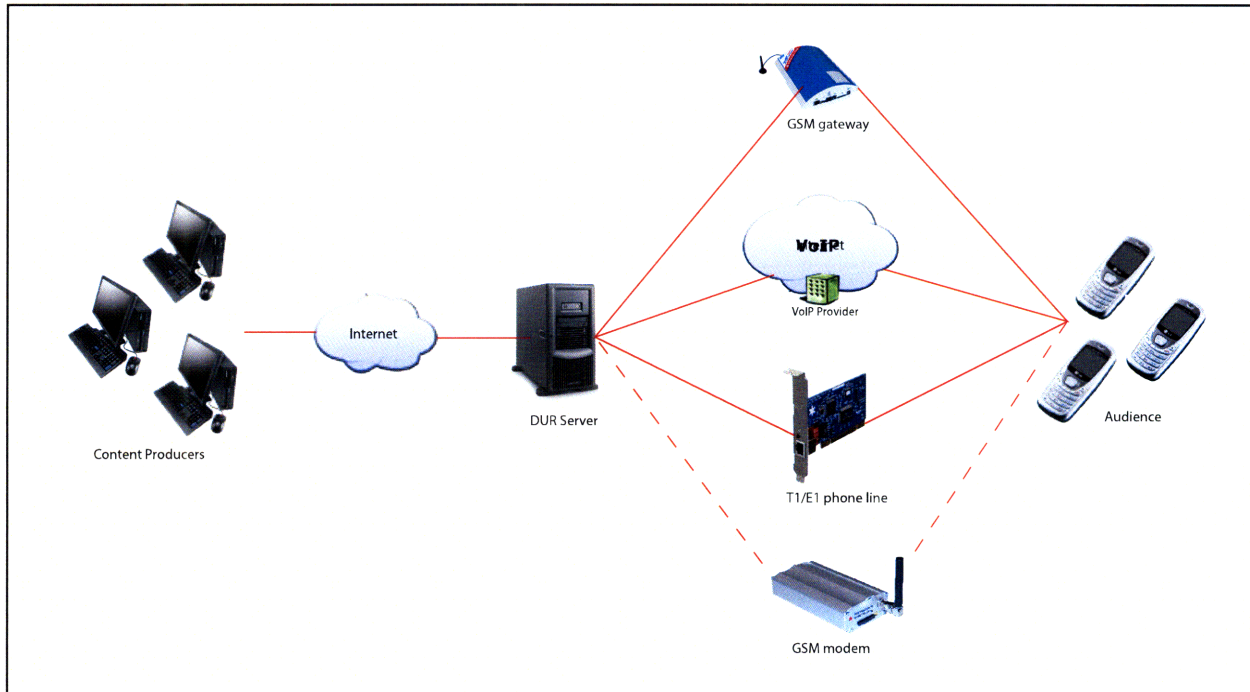
Dialup Radio system diagram: mutiple interfaces to local mobile phone networks.

no longer be purchased anonymously (when this was announced, the project partners quickly purchased a large number of SIMs before the new policy took effect). The server and GSM gateways were not imported into the country through official channels, but were simply included in participants' carry on luggage.

Provisions have also been made to allow the project to function independently of Zimbabwe's crumbling communications and power infrastructure. Routine blackouts interrupt communications and are hard on computer equipment. As a result, aspects of the system that depended on internet connectivity were reworked and the whole solution can now be operated from independent power sources, such as diesel generators or solar-powered batteries.

The project also depends on a rich social infrastructure. Dialup Radio was designed to support networks of content providers collaborating to offer a shared service. While the benefits of such an approach in the Zimbabwe context are well understood [162], this model raises significant organizational challenges including how participants are identified, recruited, trained and sustained. This in turn requires an established organization with significant resources, the creation of a new organization, or establishing new relationships between existing organization to host the project.

In Zimbabwe, such organizational infrastructure is hard to come by. Activist collaboration is stymied by fear of official retribution. Additionally, an NGO culture that depends on outside sources and must be minutely accounted for is also a barrier to participation. For example, Bren has suggested that hosting content from multiple producers on a shared system requires an accounting feature so that each partnering organization could be billed according to the popularity of its content. While this approach makes sense from one organizational perspective, it clearly limits participation by poorly funded NGOs and by grassroots organizations that often work without any funding.

Funding requirements also influence the kinds of content that can be hosted. For example, the decision to partner with TARSC was largely driven by a belief that TARSC would underwrite significant aspects of the project, including a toll-free phone line. This partnership had significant impact for the direction the project could take. It implied both that AIDS/HIV awareness would be a central focus and that overtly political material which might jeopardize TARSC standing would not have a place on the system.

The conflict between available funding and the project's goals became more pronounced as Kubatana's other sources of funding began to run out. By the end of my work with Kubatana, fundraising had become the primary motivation for their continued interest in the project. This lead to a substantial reformulation of the project. Initially conceived as a Zimbabwe activist effort, the project goals became developing communications infrastructure for civil society organizations throughout southern Africa.

Cost, materials, and resources

The cost of setting up a Dialup Radio system varies greatly, depending on local context. The version currently running in Zimbabwe requires approximately $4000 in hardware (XPC server, VBL gateway and GSM modems for inbound SMS). Materials were purchased in the United States and Great Britain and imported into Zimbabwe in participants' carry-on luggage.

The software is predominantly open source and is available at no cost; however it does require a relatively knowledgeable technician to install and configure. The most significant expense, however, is the cost of calls. Kubatana intends to provide a toll-free service which places the burden of underwriting squarely on the organization's shoulders. The actual cost will depend entirely on the popularity of the service and, given the thirst for independent media inside Zimbabwe, is expected to be substantial.

Of course, the listed figures don't account for the many hours of labor that went into developing
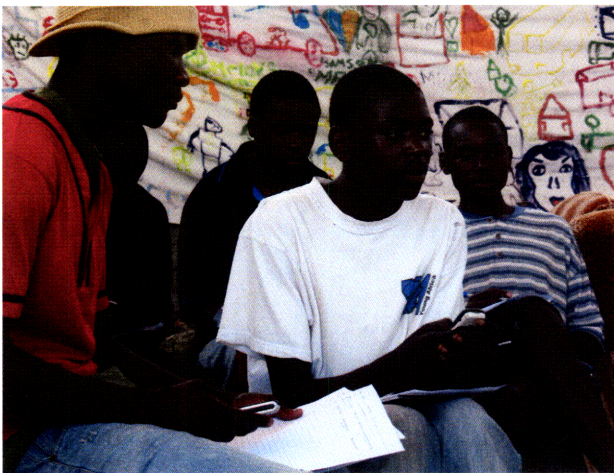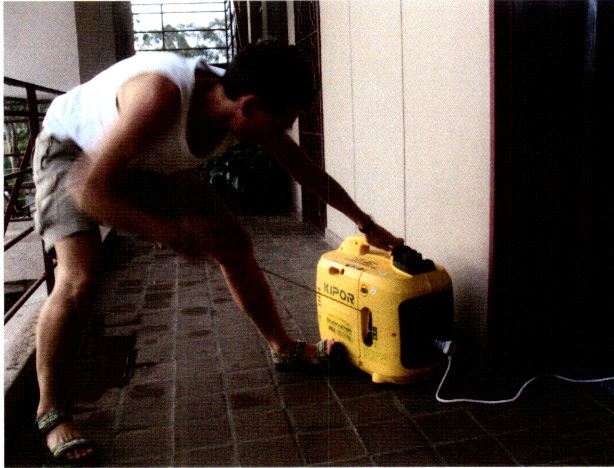
User testing, October 2008

the system, including the many false starts and dead ends that invariably form a part of any experimental project. A rough estimate would be of 500-600 man hours of development time, which might conservatively be valued at $40,000. While some of the development work was underwritten through a grant from the Open Society Institute, the payments were largely symbolic and did not approximate market value for services rendered. The bulk of the OSI funding supported equipment costs and Kubatana's operating expenses.

Evaluation

The system was evaluated throughout the project, including informal usability, reliability and network congestion tests with friends in the U.S. and Zimbabwe. In October 2008, I travelled to Harare for a formal evaluation.

Three testing sessions were held. The first involved 22 young (twentysomething) urban professionals living in Harare, recruited from among one of Kubatana's bloggers' friends and family. The second group was approximately 20 middle-class Zimbabweans, mostly middle-aged aside from two teenagers and two young adults in their twenties. This group had a strong activist bent, including several participants with close ties to the MDC, one currently organizing in rural areas, one former member of the CHRA, and one member of the Auntie Stella staff. The third group was ten teenagers (eight male, two female) all enrolled in the Young Africa Skills Center, a jobs training center based in Chitungwiza. All members of this last group are involved with the TARSC's HIV/AIDS prevention program, called Autie Stella.

For the tests, Kubatana produced a series of audio recordings based on content developed for the Auntie Stella program. Each recording featured "Auntie Stella" reading and responding to a letter she had received from a Zimbabwean youth dealing with issues of sexuality and HIV/AIDS

Each session followed a similar format. Participants were divided up into groups of 3 – 5 people and asked to either call in or send an SMS to one of several numbers. After several minutes, the groups exchanged numbers, such that each group tried each number but no two groups were calling the same number at the same time. No training was offered, participants were simply asked to call the provided numbers and follow any provided instructions. Participants recorded their experiences on a simple form.

After about 45 minutes of calling, the participants were brought together for a group discussion facilitated by Bev. The discussion began with a debriefing of their experiences using the system, and then moved into a more speculative mode in which participants were asked to imagine how they might want to use a service like DUR in the future.

There were three goals for the evaluation. First was to assess usability and to identify any user interface issues for future work. Second was to gauge end-user interest in the project and to identify application areas. Third was to evaluate the reliability of Zimbabwe's mobile phone networks to determine the project's feasibility.

Performance
Although plagued by network congestion, the tests were considered successful in demonstrating system usability and for identifying several new application ideas. Of the 50 participants, only one had difficulty navigating the IVR even though several had no previous experience using such systems.

In general, user response was quite positive. They found the system easy to use and were excited

by the DUR concept. There was some disagreement about the use of pre-recorded messages for sensitive information. One of the young urban professionals thought the recordings were too impersonal while one of the rural teenagers thought this was actually a good thing, stating that it is easier to listen to messages than talk to friends about difficult issues. Another participant mentioned the anonymity of the service, likening it to her experience as a client of a local women's assistance agency that doesn't require personal information. "They just help me," she said. Several participants pointed out that often kids and women don't have their own mobile phones, but have to borrow them from their parents and husbands. In these cases, anonymity is particularly important and particularly difficult to maintain.

It was suggested that Auntie Stella should also offer additional, less contentious kinds of content (like homework assistance) which could provide a kind of "cover" if parents discovered their kids using the service. The implicit notion of camouflage was a recurring theme throughout the sessions.

These observations dovetail nicely with another discussion about whether the messages should be offered in Shona or English. The teenagers were split on this issue, with some arguing that Shona is better because it is their first language while others pointed out although not all Zimbabweans speak Shona (Ndebele is another widely used tribal language), everyone learns English in school. The most interesting comment came from a Shona speaker who preferred English, saying that he finds it uncomfortable to talk about sex and the body in Shona. This sentiment was confirmed by several other participants in the third session.

There was general consensus that the Auntie Stella content was a bit dry. Unlike the first set of DUR content Kubatana produced which featured very high production values including background music and a professional-sounding announcer, the Auntie Stella messages were recorded by an amateur reader and offered without musical accompaniment. When asked for suggestions on how to improve the content the teenagers uniformly mentioned offering music, particularly hip-hop. The idea of having celebrities like Tuku – a popular Zimbabwean musician and outspoken AIDS activist – record messages was also mentioned.

In imagining what other sorts of content might be appealing, both the urban professionals and the teenagers suggested news information. The young professionals also included sports and economic/business development information, while the teenagers mentioned music. When probed, the participants clarified that they were particularly keen on international news, rather than local information. The reason for this preference is unclear; it may simply be that international news is harder to come by in Zimbabwe. As Bren suggested, it might also be that

local news is inherently politicized which could discourage participants from stating such a preference publicly. Of course, it's also possible that the participants are genuinely more interested in international news. One can imagine several reasons why this would be the case, including limited access to international information, a sense of already knowing what is happening locally, and the fact that ambitious young people increasingly look to the outside world for economic and professional opportunity – hence the diaspora.

There was a real disinclination to discuss politics among young professionals. When Bev asked if anyone would be interested in hearing information about the upcoming elections, the group lapsed into an uneasy silence. In a private conversation afterward, the session organizer told Bev that the elections are too loaded a subject, that no one was comfortable talking about them in such a setting where they didn't know each other, didn't know their interrogators (the Kubatana folks), and barely knew where they were. Indeed, as one participant later commented, they'd essentially been locked into a private garden somewhere in Harare and interrogated by "strange white women."

Sample Auntie Stella script

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Zandile asks, "I am a 17-year-old girl, and I love my boyfriend very
much. But he always wants me to satisfy him in ways which hurt my
feelings. My girlfriends tell me that if I want to keep him, I have to
have sex with him. I'm worried that he will sleep with other girls if I
say no, so should I sleep with him? I also fear that my girlfriends will
laugh at me because I don't want to have sex - they say everyone has sex
when they are my age."


Your friends will also laugh at you if you become pregnant - your
boyfriend might laugh too. People should never have sex if they do not
want to, and your letter shows that you do not want to.
Your boyfriend should not demand sex from you if you are not comfortable
with it. You have no obligation to "satisfy him". Even if he says that
he has sexual needs, if he really loves you, he will respect your needs.
Please remind him that sex can lead to unwanted pregnancy, STDs and all
sorts of misery.


Do not do what your friends say just to stop them laughing at you. If
they want to have sex, let them go ahead and deal with the consequences.
But if you are a good friend, you will advise them against it too.
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The activist group had no such reservations, and engaged in a lively discussion about using DUR for mobilization and for the upcoming elections. The conversation quickly turned to censorship and government interference, and two strategies emerged. The first was the notion of 'camouflage' – to offer a service that allows social groups like hiking clubs to promote their events, and claim ignorance when activists began using the system to promote protests. The second approach, which was more widely supported, as to make sure the service appeared politically neutral, emphasizing it as "a civic and information" service that only provides information about polling locations and so forth. It was suggested that there might be substantial funding available for election monitoring. However, several people suggested that it might not be possible to separate "civics" and "politics," especially in the minds of government officials. A related suggestion was to offer DUR as an impartial information service with messages from both ZANU-PF and the MDC.

There was also a fair amount of discussion among the activist group about how the service could be used for business development. This is perhaps unsurprising, given that many participants were active members of Harare's business community. Also mentioned was potential use by the gay community.

The system lived up to designers' expectations in many of its essential aspects. Despite the network issues, the system generally functioned as expected. The servers didn't crash, the software didn't fail, and users had very little difficulty with either the web interface or navigating the IVR system. More importantly, we found a great deal of enthusiasm for the project among end users, even those who outside the project's core audience.

There were, of course, many surprises. Most distressing were the network failures, which were far worse than expected. Call completion rates were initially in the single digits. Some of this can be explained through poor evaluation protocol, as in many cases seven or more people attempted to simultaneously access the service which with the VBL was capable of fielding at the most four calls at a time. However, even when we correct for self-generated congestion, completion rates remained unacceptably low. This was due in part to network congestion (at least one of the tests was conducted during peak calling time), but also revealed an unanticipated difference in quality of service between "contract lines" (i.e. subscription accounts) and prepaid SIM cards.

The unreliability of local phone networks has serious implications for the project. It may be that in fact the service is infeasible for Zimbabwe. More optimistically, it may be that the project has a future in Zim, but in an altered format perhaps only being offered during non-peak hours or targeting holders of contract lines exclusively.

On a more positive note, the evaluation revealed a broader range of possibilities than envisioned by the project team, including election monitoring, disaster relief, and commercial applications. Informed by discussions with potential end-users, the project team has identified several development tracks for the project which are now being pursued. One is to continue the relationship with Auntie Stella to develop an HIV/AIDS education service. Another is to partner with community radio organizations to develop a "magazine" service featuring music, information and culture and emphasizing content that is unavailable in other formats. The third is to develop an information service specifically for the upcoming elections. A fourth idea, which may dovetail with some of the others is to take advantage of lower call costs to develop an off-hours service called "Harare by Night," which would feature more cutting-edge content.

Finally, it is worth stating that the evaluation had the unexpected but welcome effect of reinvigorating the project team. A lot of effort went in to organizing the evaluation sessions, and having them come off even semi-successfully provided a much-needed shot of adrenaline. This was particularly evident among the Kubtana staff, for whom the evaluation provided a particularly welcome sense of accomplishment.

Because it has yet to be deployed outside of limited evaluation sessions, it is premature to consider DUR's impact in Zimbabwe or elsewhere. Nonethess, the project has attracted some attention among international media and civil society activists. The general consensus seems to be that the project has "bags of potential" (according to a potential funder). Discussions are currently underway for DUR deployments to support independent journalists and activists in a variety of places, including New York, Cairo, Capetown, and Karachi.

Termination

Kubatana is continuing to develop the Dialup Radio project with support from the Knight Foundation. They are pursuing partnerships with several southern African NGOs to produce content and deploy services. It is likely that the earliest deployments will occur outside of Zimbabwe, where deteriorating communications infrastructure continue to stymie development efforts. Continued political instability raise additional challenges, although though the project has shed its overtly political ambitions.

The software has been released under open source licenses, and is available for download from the project website (http://www.dialupradio.org). An interactive demo and project documentation are also available.

Several new projects with significant development and user communities have emerged since

2005 whose features overlap with Dialup Radio. There is some interest among the technical team to port unique aspects of Dialup Radio, such as CMS integration, to one of these platforms. Initial conversations have taken place about taking up this effort in order to create a telephony tool for Indymedia activists.

Dialup Radio has been presented at MIT, RISD, and Virginia Commonwealth University. Several forthcoming publications are anticipated. The project also has garnered interest the civil society and development communities. I have consulted with several organizations about how to setup similar projects in Zimbabwe, South Africa, Egypt, Iran, and Indonesia. Although we are no longer working together on this project, I continue to communicate with Kubatana and support the organization as needed.

Conclusions

This project was marked by competing goals. On the one hand, there was a strong desire to challenge ZANU-PF and build an opposition movement within Zimbabwe. At the same time, Kubatana's founders maintained entrepreneurial aspirations to provide stable revenue streams for their struggling NGO. Ultimately, the project's emphasis shifted from providing a covert, activist service in Zimbabwe to developing telecommunications infrastructure for NGOs and civil society organizations throughout the southern African region. Tracking the move from contestational design towards social entrepreneurship and its implications for the design process helps get at the specificity of contestational design practice.

Early stages of the design process were driven by notions of opposition and retribution. These concerns translated into an emphasis on privacy and security that drove such decisions as which programming languages to use and the reliance on anonymously-purchased black market SIM cards. They prompted the design team to use encrypted email and fueled debates about user information should be collected and archived. The oppositional approach also lead to such ideas as offering temporary, event-driven services and embedding subversive programming within less contentious content.

The need for secrecy significantly hampered project development. Bren and Bev were unable to build relationships with local activist groups, and were also stymied in their attempts to raise money from international funders. Offering a covert service placed significant constraints on the service design, requiring methods of accessing mobile phone networks without the cooperation or even the awareness of network operators. This lead to a reliance on small, mobile hardware solutions that would be difficult to trace but which didn't scale easily.

Recasting the project as an above-ground service offering less contentious information

removed many of the privacy and security concerns. It opened up the possibility for nationwide deployment through official relationships with local telephony providers and enabled public collaboration with other established NGOs that could offer programming and financial assistance. However, going public also curtails the kinds of information that the service may provide. While the principals maintain notions of embedding subversive information within "acceptable" content streams, this is expected to be a gradual process that will remain subject to censorship and suppression.

As sustaining Kubatana became a more significant objective for the project, the organization took on a more central role in the design. Early ideas about offering content produced by a network of loosely-affiliated opposition groups gave way to the desire to brand Dialup Radio as a Kubatana offering (difficult to do with a covert service). Kubatana's related need to maintain editorial control over content was motivated in large part by the desire to protect Kubatana's image both locally and internationally.

It is worth attending to the ways that institutional and economic concerns drove the design process. Kubatana is a professional organization with an international standing that provides middle-class employment to its staff. Occurring as it did during a period of financial crisis for the organization, this project was significantly affected by Kubatana's funding situation. Ultimately, Dialup Radio came to be seen by Bev and Bren primarily as a way to sustain Kubatana in the face of diminishing international support for Zimbabwe civil society NGOs. It was this fact as much as any other that drove the abandonment of the project's covert aspects. The expectation was that going public opened the doors for the project to attract financial support from international agencies.

Institutional concerns influenced the search for project partners. While there were certainly ideological and social affinities between the two organizations, Kubatana sought out a partnership with TARSC primarily because it thought the development agency could underwrite some of the project's costs. Similarly, Bren's identification of a billing system as a key feature required for a hosting content from multiple agencies revealed fundamental beliefs about how relationships between NGOs are structured.

Relationships with funding organizations also influenced the design. In choosing to maintain the project's focus on providing information to Zimbabweans rather than the simpler task of offering locally-produced information to diasporans in South Africa and elsewhere, Bren stated that Kubatana's mission, as defined by the organization and understood by its funders, did not extend beyond Zimbabwe's borders. This concern stood in apparent contrast to her earlier

acknowledgement of the high number of international visitors to the Kubatana website and her suspicions that the organization was tolerated by ZANU-PF precisely because it had such limited reach inside of Zimbabwe.

Bren was also concerned that such a shift in focus would jeopardize Kubatana's relationship with OSI, who funded the Dialup Radio pilot. Bren viewed the proposal that OSI funded as essentially a contract between Kubatana and its funder. Significant design changes represented potential breaches of contract, and required re-negotiation with OSI.

As it happened, OSI had a more fluid view of the project. Conversations with staff revealed that the organization viewed Dialup Radio as an experimental project, and fully expected that its development would take unanticipated turns. As it happens, OSI has a long-standing interest in exactly the kind of transnational communications represented by providing locally-produced content to Zimbabwean ex-pats and was willing to support a move in this direction. As she later acknowledged, Bren did not realize OSI's flexibility until well after the grant period ended.

As fundraising took on greater importance, it exerted more influence over the project. At times, funding opportunites conflicted with Bev and Bren's political beliefs. For example, Kubatana began work in an abortive attempt to adopt Dialup Radio as a voter information service during the 2008 elections. These efforts were in contrast to their own beliefs that Zimbabweans should refuse to participate or spoil their ballots. Kubatana's voter information initiatives were solely driven by funding possibilities. That the money was to come from Freedom House, a US-based NGO with longstanding ties to the US State Department is noteworthy,[5] and reflects the complexities of doing civil society work in the developing world. Bren often used the phrase "strange bedfellows" to describe her relationship with funding agencies.

The project came to be dominated by fundraising concerns. Deadlines and deliverables were driven by funding opportunities. The sense of urgency one might have expected to find for contesting elections or supporting mobilizations was instead channeled towards funding and reporting deadlines. Anticipated deployments were replaced by evaluation and testing sessions whose primary aims were to satisfy funders.

The move towards fundraising and institutional development lead to tensions between Kubatana and the technical team. As it became clear that an actual deployment was not in the offing, interest in the project by the developers began to wane. Sensing this, Bren offered to direct more

5   As it happens, Freedom House has a complicated history with election monitoring in general, and with Zimbabwe in particular. It's monitoring of Ian Smith's and Robert Mugabe's elections in 1979 and 1980 respectively have been criticized as biased.

money to the developers. These offers met with little enthusiasm, and demonstrated a significant divergence of perspectives. From Bren's point of view, involvement in the project was closely connected to livelihood. While there were certainly many motivations driving her participation, income opportunity was an important one. For the developers, however, participation was largely voluntary. While payments were made to technical staff, the amounts of money were relatively small. They neither reflected actual market value for services rendered nor served as a major motivator for continued engagement. For the technical staff, involvement in projects like Dialup Radio is a form of activism undertaken because it is personally fulfilling. However, this fulfillment was tied to seeing one's work have real-world impact. As Dialup Radio's emphasis shifted from deployment to demonstration, developers turned to other projects. As Salaud later told me, "[Kubatana] didn't understand that you keep developers happy with deployments."

Ultimately, the decision to take the project above ground represented a decoupling of contestational and entrepreneurial goals. This is not to say that the project shed its social aspirations; indeed the driving motivation continues to be providing infrastructure to civil society and activist organizations throughout southern Africa. If successful, this effort could have huge payoff for the entire region and for NGOs around the world. However, the strategy of developing communications capacity that can be leveraged for many purposes is undertaken without a clear path to explicitly activist adoption. This is an inversion of the development model employed by projects like TXTmob and Indymedia, which begin with a specific campaign or event and then evolve to become activist infrastructure.

Discussion

Having described two contestational design projects in depth, I now consider them together. First, I reflect on the design process and identify key themes that played a significant role in both projects. Drawing on these themes, I then describe several principles that shape contestational design activity.

Design in Contestational Contexts: Themes from Practice

Having presented a framework for analyzing contestational design projects, I now turn to common themes that emerge from the two case studies. While I rely on the framework to identify issues and concerns I do not mean to draw a close connection between each theme and particular parts of the design process. To be sure, the issues described in this chapter are in play throughout contestational design projects. However, laying out the design process in an orderly way enables us to attend to each theme independently.

Engagement

The early stages of a contestational design project are a lot like dating. Initial conversations are tentative and wide-ranging as participants probe each other for areas of mutual interest and imagined opportunities for action. Participants try to manage their expectations while at the same time acknowledging feelings of excitement about a possible collaboration.

As with dating, there is often an informal vetting process in contestational design projects. The marginal nature of contestational design projects places a premium on trust and reputation. Particularly when the mere act of participation can make someone vulnerable to harassment or arrest, activists and technicians alike often prefer to work with people whom they already know or whom can be vouched for by a trusted colleague. It is hardly surprising that activists in New York were careful to check my bona fides with mutual acquaintances before meeting with me to discuss TXTmob – even after the well-publicized successes during the DNC. These activists weren't merely concerned that I would deliver reliable software in a timely fashion (overriding concerns when hiring a contractor in a commercial setting), but also that I could be trusted – for example, that I shared a similar ideology and wasn't secretly in the employ of law enforcement.

Early discussions tend to underdetermine outcomes. For example, TXTmob arose out of general discussions about communications and street protest; Dialup Radio began with a broad conversation about open source telephony and Zimbabwean politics. This is partially an

issue of managing expectations while participants feel each other out before committing to a collaboration. It is also reflects the nature of social movements. Among activists and organizers, it is generally understood that the ultimate goal of any given action is movement-building; i.e to recruit and sustain members of social movements. This is an important distinction between activist projects and social entrepreneurship. Whereas social entrepreneurs are committed to creating social *enterprises* – i.e. self-sustaining institutions – organizers focus on *movements* – collections of people that both transcend and elude organizational boundaries. In this context, then, the goal of a given project is often simply to do *something*, rather than to achieve a particular objective. For social movements, actions that encourage participation and contribute to a shared sense that movement is indeed happening may be their own reward.

Early discussions about new projects therefore tend toward the speculative, exploring the possibilities that arise at the nexis of technical opportunity and local constraint. It is through this process that project contours began to take shape and design collaborations emerge.

Designer Autonomy

In commercial settings, design teams are often formed by decree. Managers assemble collaboration groups and task them with creating products according to specifications provided by business units and market research specialists. Inter-organizational relationships are formalized with contracts, proposals, non-disclosure agreements and the like before design activity is allowed to proceed.

In comparison, contestational design projects tend to be highly informal. As we saw in both case studies, collaborations often arise through existing social networks. They also often occur outside of formal organizational frameworks. The urgency that drives contestational projects undermines RFP processes. The work is often unpaid, and liability concerns may dissuade participants from signing contracts.

In this setting, designers exercise a great deal of autonomy. As a form of volunteerism the work is expected to be personally satisfying, which means that the designer has an imperative to select projects based on emotional and social factors in lieu of financial compensation. Because contestational designers often view their work as a form of activism, political dimensions of the project are given explicit consideration.

The social dynamics of contestational design also give the designer a great deal of power. There are far fewer designers and technicians than NGOs and activist groups; their services are therefore much in demand.

Volunteerism and informal practices allow for a great deal of leeway, but they can also limit the scale and scope of design activity. Several organizational models have emerged that support contestational design practice and place a premium on designer autonomy.

A few large advocacy NGOs, like Greenpeace, maintain a paid staff of technicians and designers to support campaigns. Smaller organizations like The Ruckus Society and The Beehive Design Collective receive funding and donations to offer training and support to advocacy groups. Still other organizations, like the various Indymedia collectives, are established around a specific project and are often volunteer-based. Openflows, a progressive technology services company that generally works with labor unions and NGOs allows its employees to devote some amount of their time to advocacy projects of their own devising at the company's expense.

Other organizations focus on fostering social networking between activists and technicians. Mayfirst, an internet service provider catering to the nonprofit sector, hosts mailing lists for "radical techies." Aspiration, a nonprofit organization in San Francisco, sponsors workshops and conferences that bring together activists and designers around such themes as "mobile activism" and "managing nonprofit technology."

Together, these organizations present a variety of models for supporting and institutionalizing contestational design practice. At the heart of the contestational design movement, however, are networks of volunteers who maintain affiliations with multiple organizations and for the most part remain fiercely independent.

Activists and NGOs

In deciding to enter into a contestational design project, designers give a great deal of consideration to their potential partners. One of the key factors to be taken into account is the partner's organizational structure, as this can play a key role in determining how decisions will be made and the kinds of activities that can be undertaken.

In our case studies, we examined two radically different organizational models. The groups participating in designing TXTmob were essentially ad-hoc coalitions – temporary alliances among disparate actors in order to achieve a common objective. Membership was generally voluntary, and although some actors had secured funding to support the protests, labor was generally unpaid. The expectation among members of both the a31 and BTS were that the coalitions would dissolve once the respective conventions were over.

Kubatana, on the other hand, is a civil society organization with an established reputation in Zimbabwe and among international philanthropy and NGO networks. The organization

maintains an office and paid staff, and devotes substantial time to fundraising and management. Kubatana is an *institution* not a coalition. Among its central concerns is its own maintennce and self-preservation.

When we look at the two cases, we see remarkably divergent models of agency/structure tensions. In the former case, activists and designers were relatively free to pursue any design solution they wanted and were under relatively little external pressure to actually produce anything. This allowed the design team to take risks with little fear of consequences. For instance, the design team used speaker phones and free conference call service to create an always-on audio link between convergence centers during the DNC, intended to enable organizers at disparate locations to speak to each as though they were in the same room. Ambient sound levels at the convergence center rendered the system inaudible and it largely went unused. While the designers were perhaps disappointed, there was little riding on the outcome and so there was no impetus to either improve perfomance or to find ways to describe it as a success. Instead, it was simply written off as an interesting idea that didn't pan out and was dropped.

This ability to take risks came at the expense of having very limited resources, which had significant impact on the design process. For example, lack of funding precluded the use of two way radios or the ability to purchase SMS capacity from an aggregator. While these constraints in turn lead directly to the development of TXTmob, there were no guarantees at the outset of such a result.

The Zimbabwe project, on the other hand, was circumscribed from the outset by the availability and scope of external funding. This impacted both the timing and the form of the eventual design. For example, there was a substantial delay between project conception and the start of work while Kubatana secured funding from OSI. Once funding was secured, substantial effort was devoted to creating documentation and reports for the funder, which always had to be couched in positive terms despite the sense among participants that the project was stymied – perhaps irrevocably -- by costs and the limitations of Zimbabwe's infrastructure. The grant application also became the project brief, and was cited several times by Bren as a reason not to explore such new directions for the project as providing information to expat communities.

Bren's reluctance to stray from the terms of the proposal made sense in the larger context of NGO development, where funding agreements between organizations and funders are generally structured as "work for hire" contracts that oblige the NGO to fulfill relatively well-defined terms and to seek funders' approval in the event of significant divergence. The currently dominant paradigm of NGO funding, which emphasizes milestones, deliverables, and accountability is largely constructed to protect funding organizations from making "bad investments," and makes

sense from a funders' perspective. However, the insistence on predictable results and "return on investment" may be at-odds with the flexibility and risk-taking required by technical innovation in general, and contestational design in particular.

It is also interesting to note how organizational structure impacted the ability to collaborate with other groups. For the D/RNC activists, collaboration was the norm. Ad-hoc coalitions were made up of represesntatives of other organizations, and there were few barriers to membership. Indeed the organizational model that was inherited from the anti-globalization movement was self-consciously inclusive, intending to support the widest possible range of ideologies and tactics as long as each participant agreed to a few statements of principle. Within this model, it was natural to extend the TXTmob service to support as much of the broader activist community as possible.

Kubatana, on the other hand, was more reluctant to partner with other activists. Some of this hesitancy was due to mistrust and fear that is pervasive among Zimbabwe's civil society community. However, there were other structural factors at play. For instance, Kubatana needed to own and brand the system as a Kubatana offering. This lead to the creation of a permissions system that required any content to be approved by a Kubatana moderator who conceivably would ensure quality control (and perhaps enforce some kind of ideological conformity). The only colloaboration that actually occurred during the project was with TARSC and was motivated primarily by the belief that TARSC would be able to underwrite project costs. When I raised the possibility of working with other organizations within Zimbabwe to provide content, Bren's immediate reaction was the need for a billing system that could determine how much each partner organization would "owe," based on the popularity of its content.

Assessment

Both projects presented here proceed from a complex, multilayered analysis of local conditions. As with many design activities, each project had to contend with such factors as cost, scalability, and security. On top of these are added such organizational, ideological, and social factors as tactical and strategic objectives, political commitments of the participants and end users, and likely responses by the State.

These factors interact with each other in complex ways. In some cases, they may be mutually exclusive. There is an old maxim about design which suggests that for any project, the requirements always specify "fast, good, and cheap" and the solution is always "pick two." This is certainly the case in contestational design projects, which are complicated by having even more considerations, and by the fact that many of these are inherently indeterminate. For instance, police response to new activist tactics is not easily predicted. Effects of new legislation on, say,

network accessibility may not be clearly understood for many months. The indeterminacy of activist design constraints and the lack of access by activists such critical information as police strategy and communications infrastructure reliability means that contextual analyses by activists are necessarily speculative.

Activsts' understanding of their own history also privileges subjectivity. While activists certainly do spend a lot of time situating themselves in the world, activist history and pedagogy is generally not institutionalized. Activism is taught by word-of-mouth and through first-person narrative; hence the lengthy descriptions of Cancun and Miami that occurred during RNC and DNC spokescouncil meetings and the detailed conversations with Bren and Bev about their own experience and of Zimbabwe opposition movements more generally. These discussions are not only key to conveying movement history to new members; they also play a central role in contestational design. The seeds for the TXTmob and Dialup Radio projects were sewn in these narratives; both projects were presented as a direct reaction or outgrowth of recent activist experience.

It is important to note that complexity, speculation, and subjectivity are inherent to contestational design processes. This recognition suggests that contestational design problems generally don't have optimal solutions – simply ranges of possible choices. It also highlights the needs for flexible, responsive practices that can embrace contingency and uncertainty.

Opportunism

Design scholars often remark that real-world design is often a nonlinear process. This is particularly the case for contestational design with all of its contingencies. TXTmob and DUR involved a lot of back and forth between 'planning' and 'assessment,' in which initial evaluations were called into question as situations changed or new information emerged. For example, revelations about the reliability of Zimbabwe's mobile phone networks – which could only be discovered after the project had entered an implementation phase – which caused a significant a project overhaul.

Contestational design is a highly opportunistic practice. That is to say, contestational design doesn't always begin with a statement of an existing problem to be solved but often proceeds from the first question of "what can be done?" This sensibility recognizes that contestational designers exercise relatively little control over the situation in which they operate. It is also rooted in activist practice, which recognizes the most important aspect of resistant activity is that it happens at all. This is apparent in planning for the 2004 D/RNC protests. Radically distributed protest was not an "ideal" tactic, it was simply deemed the best approach for the given situation. Similarly, the possibility of creating a communications tool for the entire protest network only

emerged after the decision was made to utilize SMS and the design process had begun. Once identified, of course, this opportunity became a core requirement.

Opportunism requires a willingness to change direction and revisit earlier decisions. It also demands an acknowledgement of and willingness to confront 'governing mentalities' – implicit assumptions that guide decision making and action. This is a curious challenge for contestational design projects. Activism is often aimed at changing the governing mentalities of the cultures in which it operates, whether regarding a particular issue (e.g. asserting the rights of marginalized groups) or simply in challenging reigning hegemony (e.g. asserting that another world is indeed possible).

Indeed, significant energy is directed at creating discursive modalities within activist circles that challenge implicit beliefs held by the broader culture. Hence the never-ending discussions about "process" among anti-authoritarians and the rise of such innovations as "spokescouncils," "affinity groups", and consensus-based decision making, all of which are aimed at ensuring a full airing of ideas and guaranteeing the ability of all participants to be heard. By their very definition, activist groups often find increased participation among socially marginalized groups. Indeed, in both design projects we find involvement by men and women, gay and straight from across the socio-economic spectrum. While it is true that participants were predominantly Caucasian, this fact was much discussed by participants in both projects (and, needless to say, the meaning of being white in the US and Zimbabwe is radically different).

Nonetheless, activists and the designers who work with them are as easily hampered by their own unexamined beliefs as anyone else. It's easy to find circumstances in which mistaken assumptions impinge on design processes. Prior to the 2004 conventions, for example, there was a widely held belief among established organizers that SMS was not an effective mobilizing tool in the United States. As one organizer told me, "we've tried that, it doesn't work." One of the most important contributions that TXTmob made to the activist community in North America was in providing a very public demonstration that in fact text messaging could be utilized effectively. Indeed, since 2004 it has become a central component of many mobilizations in the United States.

Dialup Radio depended at several points on what turned out to be mistaken assumptions, including the belief that Zimbabweans could afford to make international calls, and that Zimbabwe's mobile phone networks were reliable enough to support the project. These mistakes were in part due to changing situation on the ground – the economic situation has continued to escalate and communications infrastructure has continued to deteriorate. There may also be a class and/or structural basis at work. At heart, Kubatana is a middle-class, urban NGO that is

frankly not representative of the constituents they hoped to reach (indeed, one of the project's goals was to help bridge this gap). While it may have been true that Kubatana's principals were capable of making international voice calls, this was clearly not the case for many Zimbabweans. Similarly, Bren's faith in the reliability of the mobile phone networks was perhaps largely shaped by her own consumer experience with her contract line. As we discovered through testing, not all SIM cards are created equally, and that prepaid cards (with the possible exception of EcoNet's new Libertie offering) offer substantially inferior service.

The disconnects between Kubatana and their hoped-for constituents were even clearer during the evaluation sessions. In one, Kubatana's founders were surprised to find a reluctance among young urban professionals to engage in any sort of political discussion even about relatively innocuous topics. In another, a group of rural teenagers seemed more concerned with giving session leaders the "correct" answers than with stating true opinions. In a third, white middle class high school students disagreed with the idea (put forward by one of Kubatana's founders) that AIDS education was primarily for poor black youth. In each case, the social dynamics of the situation seemed to shape the discourse (or lack thereof). Middle-class white teenagers who had a previous social relationship with Kubatana's founders were comfortable expressing disagreement, while the session with working class rural black students seemed to take on familiar classroom dynamics, with young students trying to please the older "teachers." Young black professionals were uncomfortable discussing politics with middle-aged white interlocutors in an unfamiliar setting.

To their credit, the Kubatana's staff was quick to catch on to the social dynamics at play and to recognize the significance of their own assumptions. This ability may in fact be one of the things that distinguished contestational design from other design activities. It's not surprising that governing mentalities were at play in the design process; indeed, it would be more surprising if they weren't. What is remarkable is the ease with which these implicit assumptions were recognized by project participants. It seems reasonable to assume that this capacity may grow out of the activist experience, particularly when that activism centers on issues of culture or identity (Bev and Brens have a long history in Zimbabwe's civil rights struggles, including deep involvement with gay and lesbian issues). Because so much of this kind of activism is devoted to rooting out and challenging governing mentalities in the broader culture (e.g. sexism, homophobia, free-market fetishism), activists may be primed to identify and address their own implicit assumptions about the way the world works. In such a context, one would expect heightened awareness of 'governing mentalities' especially in the broader, social sense of the term.

It is also worth noting that in flexible design processes, dead ends and false starts are not only par for the course, but in fact can be valuable learning opportunities. After a particularly frustrating

system test in Zimbabwe with very low call completion rates, the project team sat down to review the project history. This was a helpful exercise that allowed the team to appreciate how much it had accomplished, and how much development time had been devoted to eventual dead ends like the VBL gateway. Although ultimately unfruitful, our experiments with the VBL were not unproductive as we learned valuable lessons and emerged with a much clearer sense of where the project was heading. Of course, recognizing this does not make the false steps any less frustrating for the designer.

Planning

Typically, there is very little separation between designers and users in contestational design projects. In each of the case studies presented here, communications systems were developed by and for the very same activists who expected to use them out in the field.

Both projects relied on consensus-based decision making. This fits the informal style of contestational design processes, which are generally undertaken by small, nonhierarchical groups. Consensus-based decision making is also an outgrowth of the political orientations of progressive and radical-left organizations which generally privilege individual autonomy.

Coping with disagreement

Consensus-based decision making assumes that each participant understands the issues and takes part in deliberations. This can be a time-consuming process, which may appear to be at-odds with the sense of urgency that often drives contestational design projects as any disagreement has the potential to derail discussion until all members' concerns are addresses. In my experience, however, disagreements are relatively rare and tend to be resolved quickly. Let us consider why this might be so.

Generally speaking, design disagreements happen between designers and end users, and among members of design teams. Disagreements between designers and users often occur late in the design process, when complete proposals are presented to the public or products are offered for sale. For example one might think of contentious public hearings when new plans receive hostile reaction from community members, or the long and colorful history of workers sabotaging new workplace productivity technologies.

Contestational design projects are deeply participatory; they generally involve activists designing tools for their own use. As with other participatory design practices, the involvement of end-users in the design practice breaks down distinctions between users and designers and mitigates disagreement by providing mechanisms to place users' interests at the center of design processes.

Participatory design projects often have to come to terms with disagreements arising within the design process. Conflicts between stakeholders can easily occur in interdisciplinary projects, were differing perspectives can lead to competing design visions. To take a common example, marketing, engineering and human factors specialists often disagree about product specifications, largely because they disagree about project goals and/or about the relative importance of factors like cost and aesthetics.

These conflicts are relatively uncommon in contestational design projects. There are a few factors to consider. First, contestational design projects are often too-short lived for serious disagreements to develop. Projects initiated as tactical responses to specific, near-term events generally require early agreement on a set of objectives that may not be seriously challenged until after an initial (and sometimes only) deployment. This was certainly the case with TXTmob, where a new collaborative group formed shortly before each convention and disbanded almost immediately after. DUR, by comparison, was a much longer project. During the two-year collaboration, significant disagreements about features, timetables, and project goals surfaced among the design team.

The extensive-self selection that proceeds most contestational design projects also probably helps to mitigate disagreements. As described above, designers and activists generally choose to work together based on past achievements, shared ideologies, and personal relationships. Relationships within contestational design projects are usually based on a kind of solidarity. Stakeholders are therefore generally not in competition with each other.

The engagement process usually includes some amount of agenda-setting as well. By the time design activity begins participants generally have an agreed upon set of goals. They also have at least implicitly come to consensus about the criteria for decision making, usually dictated by the specific activist goals the project is meant to support.

Of course, disagreements can and do occur within contestational design projects. Consensus-based decision making implies that these are given a full and open hearing until all parties come to agreement. In practice, this process is often expedited. With TXTmob and Dialup Radio, we saw two methods employed to address differences that did not come to resolution.

In some cases, attempts were made to accommodate disagreements by adding features or supporting end-user configuration. For instance, TXTmob groups could be moderated or left open; a Dialup Radio installation could limit content providers' privileges if desired. Accommodation is an inclusive strategy that supports multiple usage styles and ultimately leads

to more flexible and therefore more widely useful tools.

It is not always possible to accommodate disagreements into a design. Sometimes the conflicts are irreconcilable; sometimes time or resource constraints prohibit the addition of new features. In these cases, it is common for one group of participants to defer to another. Deference allows the yielding group to accept an alternate viewpoint without endorsing it. Consider again the discussion among the DUR participants about whether or not use the project to reach Zimbabwe ex-pats in South Africa and the UK. This option was attractive both to the technical team and to one of the project funders, especially as the technical and economic challenges to a Zimbabwe deployment mounted. However, it was rebuffed several times by Kubatana. In each case, the team deferred to Kubatana's judgment. There were several grounds for deferral. To begin with, it was generally acknowledged that Kubatana were the experts on Zimbabwe activism. Because the team had agreed in advance that the primary objective was to support Zimbabwe activism, it was easy to accept Kubatana's leadership on this issue. Equally importantly, Kubatana would be expected to devote significant resources to gathering and managing content for a diaspora information service. Their desires took precedent because other project members had neither the desire nor the means to compel Kubatana to undertake such activity.

Fuzzy Expertise

Saying that the technical team deferred to Kubatana's judgment raises the question of how expertise is structured within contestational design projects. As should be clear from the case studies, contestational design projects tend to be interdisciplinary endeavors that draw upon various kinds of technical and contextual knowledge. By technical knowledge we of course refer to practical skills like programming, network administration and graphic design. Contextual knowledge, on the other hand, refers to an awareness of the conditions in which the artifact is meant to be deployed. There are many dimensions to contextual knowledge including understanding relevant social, geographical, and historical issues and having insight into potential users' motivations and expectations. In contestational design projects, contextual knowledge also includes an ability to such predict opposition tactics as arresting activists, confiscating equipment, and interfering with communication signals.

While conceptually useful, it is clear from reviewing the case studies that distinctions between knowledge domains are much fuzzier in practice. It is interesting to note that many of the participants in the case study projects had both technical and activist experience. For example, Brenda – the Zimbabwean activist -- has previously worked in software development and also serves on the board of Tactical Tech, a European nonprofit that promotes technology adoption by NGOs. Similarly, the TXTmob project team included activists who worked as programmers and system administration, and techies with rich experience as activists and community organizers.

Indeed, my own experience working in activist and nonprofit organizations predates my training as a designer or an engineer.

This is not to say that every member of every project team possesses precisely the same knowledge going in to the project. Clearly each person has his or her particular strengths and weaknesses, and where appropriate participants would defer to others' judgment. However, the overlap between participants' areas of expertise is significant, and I suspect ultimately helps the design process both by helping participants to find a common language and by allowing team members to productively question each others' judgment and challenge each other's assumptions.

Also important to note is the conflation of technical and contextual aspects to knowledge problems. We see this in several places. For one thing, each project was highly dependent on everyday knowledge about local technical environments, such as having a general sense of how people use mobile phones and their familiarity with text messaging and IVR menus. Also important is an awareness of how technologies work in various settings – knowing, for example, whether there is mobile phone coverage at a given location, how long it generally takes text messages to be delivered, and how congested mobile phone networks are likely to be at different times of day. These are technical issues, but ones whose resolution depends on technical literacy that comes with being an avid user rather than from specialized training.

Similarly, predicting opposition response is a social or contextual issue with a significant technical dimension. Determining, for example, the likelihood that police will disrupt mobile phone communications involves a familiarity with both how local law enforcement decisions are made and with the technical niceties of network security.

In addition, the explicitly political context in which contestational design activity occurs adds an additional dimension to design decisions. For instance, choosing if and how users' personal information is collected and archived is not determined solely by technical limitations. Similarly, deciding whether to use open source or proprietary software and operating systems is not purely a technical consideration. These are choices with ideological implications that are explicitly acknowledged and debated within contestational design projects.

As we can see, the common trope of the 'domain expert' found throughout user-centered design literature turns out to be much slipperier in practice. The standard model of interdisciplinary collaboration posits distinct knowledge realms embodied by various disciplines and recommends that design teams include representation of each relevant field on the team (e.g. an interface designer, and interaction designer, a software engineer, and perhaps an anthropologist to

provide the user's perspective). In contestational design projects, domain knowledge tends to be more broadly dispersed. We have already identified several factors at play here. First, much of the knowledge required by the design process comes from "everyday experience". Secondly, participants often have both technical and contextual experience. Finally, the indeterminacy of some of the design problems – how police are likely to respond to a new activist tactic, for example – defy easy expertise, and are best addressed through collective speculation.

Perhaps more productive than describing the categories of expertise is to ask how project participants came to understand and address the problems they faced. Here we see the importance of social dimensions to knowledge and information gathering. In both the TXTmob and Dialup Radio examples, expertise was based on a combination of personal experience and information gleaned from informal sources. This was true both for contextual and technical knowledge. For example, predictions of police strategy at during 2004 D/RNC was based on activist accounts of earlier police tactics. Similarly, information on various methods for sending SMS was largely gathered through conversations with fellow techies.

Participants in contestational design projects rely on social networks to gather information and solve problems. Expertise isn't simply a matter of technical or contextual fluency, but also is also tied up in access to broader knowledge networks.

Implementation

Activist Infrastructure
Projects like TXTmob and Dialup Radio are primarily concerned with creating capacity for communication and collective action. They function as infrastructure for activist movements, rather than as props for particular campaigns.

There is a long tradition of activist infrastructure. Earlier forms tended to emphasize independence and autonomy. Radical newspapers and fanzines have rely on alternative presses and independent distribution networks. Community radio stations use low-power FM (aka "pirate radio") transmitters to broadcast signals over unregulated or underutilized bandwidth. Squatted buildings, safe houses, and "free spaces" create networks of liberated zones in urban centers around the world.

Alternative networks may be independent, but they are also vulnerable. Community radio signals can be jammed, independent newspaper publishers can be jailed, activist meeting spaces can be raided.

Contemporary activist infrastructures maintain a more complicated, even parasitic, relationship with existing systems. Total independence is neither possible nor desirable. Instead projects like TXTmob and Dialup Radio attempt a balance between embeddedness and autonomy.

<u>Parasitic Design</u>
Modern communications systems cannot fully detach from existing infrastructure. They rely on extensive computer and telephony networks that are under the direct control of governments and private companies. Indeed, their very embeddedness is one of their virtues. It can be difficult for law enforcement agencies to disrupt services enmeshed in the same communications infrastructure relied on by government and the commercial sector. Unlike, say, a low-power FM radio signal that can be easily jammed, activist SMS is very hard to distinguish from the millions of text messages that are sent and received in a major city on any given day.

The tactic of embedding subversive communications into existing communications infrastructure represents a shift in activist communications strategy. The value of this approach was demonstrated during the 1999 Seattle protests. Activists initially set up a low-power FM radio station, a communications system that operated independently of existing communications infrastructure, such as commercial radio, television, and the Internet. Although protesters maintained control of the network (a concern among media activists in the late 1990s), its isolation made it vulnerable and it was jammed by police. In response, the activists purchased mobile phones and established an ad-hoc network of "talk groups" [134]. The new system was far less susceptible to police disruption:

> "The dense and diversified communications used by the Direct Action
> Network could not have been significantly harmed by any action less than
> a total media and communications blackout in Seattle. Not only is such an
> action impossible because of the economic and social costs that would result,
> but a blackout of the required magnitude would be the netwar equivalent of
> unconditional surrender by the establishment" [171].

Many activist communication strategists emphasize the need for multiple redundant systems (for example, multiple websites and radio stations) to protect against technical failure or intentional interference. The Seattle case suggests an additional, more provocative lesson for activists; that security comes not only from redundancy, but also through deep immersion in corporate communications networks. Rather than creating independent, alternative networks, the next generation of tactical communications may instead depend on temporary connections drawn between nodes of the existing communications infrastructure.

Despite their reliance on government and corporate infrastructure, activist communications systems also maintain a degree of autonomy. Their operators generally do not enter into formal agreements with commercial service providers. They often operate by utilizing excess capacity and exploiting quirks in official communications networks. TXTmob, for instance, employs several methods to bypass provider limitations on the number of messages that may be delivered to SMTP gateways; Dialup Radio relies on SIM cards purchased anonymously on Zimbabwe's black market.

These strategies offer a form of protection against official surveillance of subversive activity. Each project intentionally limits the amount of personal information that is collected about each user and therefore, how much information is passed upstream to the commercial and State infrastructures upon which they depend. This is a critical consideration at a time when ever-growing use of mediate communications enables governments and corporations to monitor a widening array of individual activity; a point that was driven home to the author earlier this year when he was subpoenaed by the City of New York to provide TXTmob records relating the 2004 RNC.

Evaluation

TXTmob and Dialup Radio were designed to meet two sets of goals. On the one hand, they each had immediate tactical objectives which we can loosely describe as supporting communication and collaboration by loosely-affiliated activist networks. At the same time, their development was also tied to longer-term, organizational objectives. In the case of TXTmob, these had to do with notions of movement-building. Dialup Radio, on the other hand, was closely linked to the institutional objectives of a particular NGO.

Before turning to how TXTmob and Dialup Radio met their objectives, it's worth saying a few words about the kinds of evaluations that were conducted over the course of each project. Reviewing our two case studies reveals several types of evaluations, performed by different sets of actors using different kinds of methods with different goals in mind.

First, designers and activists conducted informal evaluation of system performance throughout the life of each project. These generally consisted of "report-backs" in which participants would gather to reflect on their experiences with the project to date. The goal of these sessions was to inform tactical and technical development by identifying strengths, weaknesses and opportunities for future enhancements. It is worth noting that report-back sessions were not limited to individuals directly involved with project development. In the fall of 2004, for instance, a summit was convened by the Ruckus Society to discuss the use of SMS during the convention protests. Present at this summit were people who had firsthand experience with TXTmob and with

Ruckus' SMS tool, as well as other activists and technicians who were interested in future uses.

Second, activists and other TXTmob users engaged in informal discussion via blog posts, email, and face to face conversation. These conversations were generally disconnected from actual development efforts, and were generally less critical than the report-back sessions. There was a strong element of pointing to TXTmob as a way of claiming success for the movement in these discussions.

Third, journalists reported on TXTmob use during the conventions. These accounts often included examples of specific messages and first-hand accounts gleaned from interviews with activists. The tenor of this reportage was generally in the vein of "heroic technology empowering new forms of activism." This was particularly true in the technology-oriented press.

Finally, formal evaluations were conducted of both TXTmob and Dialup Radio by project members, including controlled user-testing sessions and analysis of server logs. These efforts were generally geared towards academic publication and funders' reporting requirements. There was a strong impetus – particularly in the latter case – to produce positive results, as a successful evaluation both justified previous expenditures and argued for future funding.

Centralized vs Viral Communications

At a systems level, TXTmob and Dialup Radio are similar projects. Both are hybrid Internet and telephony applications that facilitate communications between distributed users and a central server. Despite their reliance on cell phones, neither project is properly speaking a mobile phone application. In both projects, phones are primarily employed as connection points to a communications network rather than performing significant computation on their own.

Both projects rely on a "hub and spoke" communication network, which differs significantly from the viral messaging model often associated with mobile phone communications. Messages are not passed person to person, but flow instead through central servers to prescribed recipients. This arrangement has significant security and accountability implications.

Security and Reliability

Piping communications through a central server poses security risks. The server is a vulnerable point in a communications system subject to seizure or attack. They can also simply become overwhelmed when the volume of data they attempt to process exceeds the bandwith capacities at their disposal. If the server in a hub-and-spoke network is compromised the entire communications network is disrupted. TXTmob and Dialup Radio employed a variety of strategies to mitigate this vulnerability, such as concealing server locations and employing multiple, redundant machines.

Centralized servers also house logs and databases of messages and personal information, which are susceptible to confiscation and analysis by law enforcement. This vulnerability can be mitigated to some extent by system design; for example, designers determine the amount of information that is collected and the means in which it is stored. These decisions raise complicated legal, organizational, and interface issues whose resolution often compromise security concerns.

It should be noted that viral messaging models also have security implications. Messages are still transmitted (and therefore logged) by government and commercial networks. Person to person messaging also leaves traces on individual devices. When activists are arrested their mobile phones are often confiscated and scrutinized; law enforcement agencies have learned to pay particular attention to address books and message logs. Additionally, governments have come to employ social network analytics to identify relationships between individuals in both formal and viral messaging networks.

Trust and Accountability
One of the criticisms leveled at viral messaging is their susceptibility to rumor-mongering and a lack of accountability for message content. It is widely acknowledged that the majority of political SMS consists of message forwarding. Rumors circulate quickly across viral communications networks; Filipino text messaging is famous both for its ubiquity and its unreliability.

The service model allows content producers to communicate directly with end users. While direct communication by no means ensures message accuracy, it at least provides mechanisms for accountability and transparency by offering a point of origin for each message. Users can estimate message quality based on the reputation of a host organization, or on pervious experience with a particular communications channel.

For organizations like Kubatana and the New York Comms Coalition, accountability is a key concern. Kubatana insisted on maintaining editorial control of all Dialup Radio content in order to guarantee that all messages met the organizations standards. NYCC vouched for the reliability of messages associated with its message groups.

Organizational Goals
Dialup Radio and TXTmob were tactical media projects in that they were designed to meet specific, immediate activist needs. However, they also arose out of long-term strategic thinking. Considering the how each project met its strategic aims reveals sharp differences between the organizations involved.

Dialup Radio was developed for Kubatana, an established institution with a hierarchical administration structure and formal (i.e. contractual) agreements with its funders and partners. Kubatana had two sets of strategic goals. Its publicly-stated objective was to promote civil society in Zimbabwe. Toward these ends, Dialup Radio was intended to distribute independent information to Zimbabwe's citizens and also to foster cooperation among Zimbabwe's NGOs.

Kubatana also has the implicit goals of maintaining itself as an institution and providing middle-class incomes for its principals. As the organization's existing funding sources dwindled, financial considerations began to play a central role in decision making. Kubatana came to see Dialup Radio as something akin to a business development project. This makes sense both in the context of the NGO world, which privileges professionalism and "social entrepreneurship" and in the Zimbabwe context where jobs are scarce and the founders' positions were increasingly tenuous. Kubatana refocused the project away from activism and towards HIV/AIDS awareness. The organization considered using the tool to support the MDC's election campaign, despite staff's personal belief that Zimbabweans should boycott the election. Despite the early insistence that the project maintain a local focus, Kubatana began fostering relationships with NGOs outside of Zimbabwe with the goal of developing the project as a region-wide offering. These efforts ultimately paid off; in the spring of 2008, Kubatana secured $876,000 from the US-based Knight Foundation.

By contrast, TXTmob was developed through serial collaboration with several nonhierarchical, ad-hoc coalitions. Despite the fact that these organizations were intentionally short-lived, they also had long term-strategic objectives. These goals were connected to the long-term aims of the protests more generally, rather than to maintaining a particular institution.

Most mass mobilizations have two objectives. On the one hand there are short-term, tactical goals like generating press coverage or disrupting a meeting. At the same time, mobilizations serve the strategic goal of movement-building by energizing activists and recruiting new participants. TXTmob met these objectives by lowering barriers to participation and fueling narratives of collective empowerment that arose during and after the 2004 conventions.

TXTmob was designed to be an inclusive system. A range of communication styles were supported, and everyone was welcome to join and create groups. The software was made freely available under public source licenses, and the service continues to be maintained long after the conventions. As a result TXTmob has been used in many subsequent mobilizations, often by small activist groups with little or no technical expertise or resources.

TXTmob was the subject of much activist discussion during and after the conventions. The general consensus was that the service was one of the key achievements of the protests. Blogs, email messages, and informal dicussions emphasized both the service's utility and its origins within the activist community.

This latter point is significant in that it highlights the importance of activist technologies as symbols. To take a well-known an example, Indymedia is not only a collection of grassroots journalism websites. It is also an icon. The Indymed logo is emblazoned on T-shirts and spray painted on walls around the world. It serves as a potent symbol of collective action.

While TXTmob certainly has not achieved anything like the global recognition of Indymedia, it did in its way play a similar role. TXTmob was cited by activists as one of the most important achievements of the 2004 protests, and has become a referent-point in the activist community. It has also inspired new technical projects aimed at facilitating activist communications. Some of these efforts have come from established members of the radical tech community. Perhaps more exciting are the students and professional engineers who have been inspired to take their first forays into creating technologies for political action.

Termination

Activist campaigns are long-running affairs that deal with rapidly changing contexts; tactics and practices are continuously evolving. It is rare that a contestational design project is ever "finished." Changing circumstances and evolving tactics demand continual refinement and enhancement of tools and products.

Project participants are also often transitory. Sometimes, there is a natural rhythm to the transitions. For instance, the groups that participated in designing TXTmob were ad-hoc coalitions that came together for the sole purpose of organizing demonstrations at the 2004 Presidential conventions. Once those events finished, the groups disbanded and many participants left the project.

Dialup Radio has had a different trajectory. There was no single event driving the design and so there wasn't a natural point at which to end the collaboration. As the project evolved, however, the motivations and goals of the participants shifted until at a certain point their ideologies and interests were no longer well aligned. Accordingly the project has split with Kubatana emphasizing deployments by southern African NGOs, and my own efforts focusing on grassroots and radical activist organizations.

<u>Migration</u>

Contestational design projects tend to migrate from one context to another. Since the 2004 RNC TXTmob has been used in protests in the U.S. and Ukraine, and has also been employed for a wide range purposes with little or no connection to street protest. Pilots of Dialup Radio are currently in the works in Nepal, South Africa, and New York. When this shifting occurs, it is often necessary for additional resources to be mobilized. Equipment may need to be procured, technical expertise may be required to install software and to make software modifications, new users may require training, and so forth.

In order to ensure long-term sustainability for a project, there is often an impetus towards institutionalization. Successful social ventures often involve creating new organizations and/or hiring staff that manage development, generate publicity, and so forth. This approach is resource intensive, requiring substantial and continual fundraising.

Embracing migration is an alternative strategy that emphasizes lowering barriers to adoption by other individuals and organizations. Contestational designers often rely on open source licenses and clear documentation to enable other activists to adopt their projects. They share advice and insights, and participate in volunteer-based developer communities.

Ultimately, contestational designers recognize the temporarily of their works. The products they make are immediate, tactical responses to particular situations. They are expected to remain in service for as long as they remain useful. Obsolescence is taken as a fact of life; once a project ceases to be effective it is expected to quietly disappear.

Principles of Contestational Design

Having examined TXTmob and Dialup Radio both individually and comparatively, describing their processes and teasing out issues and themes, I now distill a set of fundamental principles underlying Contestational Design practice. These are adversity, solidarity, contingency, and movement-building. In this section, I describe each of these principles and describe some of their implications for design activity.

Adversity

The defining characteristic of contestational design is a willingness to take sides in contentious social issues. This is a radical departure from approaches to design and social change one finds in design scholarship that cling to notions of objectivity and neutrality. It also sets contestational design apart from other forms of "alternative" design that acknowledge design advocacy but don't account for opposition.

Even when it engages social issues, design tends to position itself outside of political conflicts. Some advocates, for instance, posit designers as mediators who strive to build consensus among competing stakeholders through participatory practices. Others describe a practice that serves "the public good", implying a universal design that ultimately benefits all social actors.

In contrast, the contestational design perspective does not attempt to "resolve" social conflicts as much as to create tools (weapons?) that enable partisan players to prevail in ongoing social struggles. Inherent in this formulation is the assumption of opposition, often in the form of more powerful, better equipped state actors. This has significant impacts on design processes, highlighting trust and security issues and pushing design teams towards tactical and technical innovation. Facing opposition also heightens one's sense of urgency and fosters feelings of solidarity. Designing in this context embraces strong forms of partisanship that challenge traditional approaches to design pedagogy.

Partisanship liberates designers from the constraints to objectivity and neutrality. Partisan designers are expected to engage in critical issues of the day, to hold and act on deeply-held political conviction. In short, designers are construed as citizens rather than mere technicians. Acknowledging partisanship thus extends the "humanist" conception of end users suggested by Buchanan and Fortun to designers themselves.

Positing designers as fully engaged social actors raises questions about the whether formal design education programs prepare students not merely as technicians, but as citizens. While a full consideration of this topic is outside the scope of this dissertation, I might mention some anecdotal evidence that seems worthy of further investigation.

In the course of undertaking this research, I have been in contact with a number of self-described "radical techies" who are involved in the sorts of project that I am calling contestational design. An informal study of their educational backgrounds is revealing. Of the eight techies with whom I've had the most contact, only two specialized in design or engineering at the undergraduate level. A third began his studies in computer science, but received his degree in the social sciences. The five remaining either received humanities or social studies degrees, or did not complete their undergraduate education.

One may interpret these findings in several ways. On the one hand, they indicate that formal training is not necessarily a requirement to be a contestational designer. This might speak to both a growing technical literacy and expanding accessibility of technical tools that enables amateur technicians to create viable technology artifacts. On the other hand, they might also

say something about design and engineering education. It may be the case that these disciplines' curricular emphasis on technical training dissuades participation by students with broader social or political interests. This certainly seems to reflect the experience of the informant who switched programs; he has confirmed that he felt that the computer science department at his university was "too limiting," and didn't support his interests in social issues. It also may be the case that design and engineering curricula actively discourage students from engaging in critical social thinking by systematically claiming such considerations to be "out of scope" in approaching design problems.

Solidarity

Relationships between contestational designers and activists are structured in various ways. Established NGOs like Greenpeace maintain a paid staff of technicians who are committed to supporting the organization's advocacy goals. Large, ongoing projects like Indymedia are supported by teams of dedicated volunteer techies.

For the most part, however, contestational designers collaborate with rather than join advocacy organizations. They essentially work as consultants or (usually unpaid) contractors who partner with activist groups for particular campaigns and projects.

As collaborators who are not members, designers offer a privileged, outsider perspective to ongoing social justice struggles. Designers can challenge the governing mentalities and implicit assumptions that shape activist strategies and beliefs. They also bring insights and lessons from global campaigns to bear on local problems, leveraging personal experience with other organizations and also drawing upon the collective experience of friends and colleagues.

Collaborative relationships between designers and activists mirror traditional arrangements of designers and clients. However the foundations of these relationships are fundamentally different. While commercial designers maintain contractual relationships with their clients, contestational designers and activists' relationships are based on notions of solidarity.

The distinction between solidarity and contractual relationships is significant in several respects. As described previously, contestational designers exercise a great deal of leeway in selecting the activist groups with which they choose to collaborate. Selection criteria is highly subjective, and generally determined by ideological compatibility and personal interest rather than by financial considerations.

Early stages of design projects in both the commercial and nonprofit sectors are generally a form of negotiation between designers and clients. The goals of these negotiations are to prescribe the

Principle	Description	Implication
Adversity	Core principle; CD is shaped by conflict and opposition	Designers are citizens, motivated by their own ideologies and values; pedagogy should be broadly-based
Solidarity	Relationship between designers and activists based on solidarity rather than contracts	Designers have a lot of autonomy, but also responsibilities and obligations to their partners.
Contingency	CD occurs in highly indeterminate contexts over which designers have little control	Opportunistic design practices, emphasis on tactical interventions.
Movement-building	Strategic goals often tied to movements rather than organizations	Migration may be preferable to institutionalization; cultural aspects are at least as important as utilitarian concerns

The organizing principles of contestational design

design activity in the most concrete terms possible, identifying features, delivery dates, and costs. Consider a typical process. A client drafts a request for proposals (RFP) that describe in as great detail as possible needs specifications, product requirements, budgets, and deliverable schedules. Designers respond by drafting proposals that respond to RFPs, which may then lead to a series of negotiations, often under the auspices of non-disclosure agreements (NDAs). Ultimately a set of features, deliverables, costs and the like are agreed upon and codified in contracts. These contracts are legally-binding documents committing each party to a set of obligations and responsibilities, and are enforceable by law. They prescribe the design activity in great detail, and establish rewards and penalties associated with each phase of the design process.

In contrast early stages of contestational design projects can be more exploratory, and tend to privilege relationship-building over project specification. Early encounters between activists and designers are often highly informal, occurring likely as not in bars and coffeehouses instead

of offices and conference rooms. The outcome of these meetings generally aren't proposals but rather a shared sense of wanting to work together, and perhaps a few ill-defined project concepts that require substantial research and refinement. Because both parties recognize that the design activity will be a risky endeavor, processes tend to support rather than penalize failure.

Solidarity implies mutual responsibility and obligation beyond those explicitly stated in contracts. Solidarity relationships also challenge notions of designer authority and privilege. This is partially a pragmatic concern. In the first place, it should be acknowledged that many practitioners undertake contestational projects relatively early in their careers, often while they are students. Activist projects provide opportunities for real world, in situ learning that many young designers find attractive. It also should be recognized that contestational design projects reliance on local contextual knowledge elevates activist awareness of communications technologies, political strategy, police tactics, and the like.

Beyond purely utilitarian concerns about expertise, contestational design projects privilege deeply democratic approaches to decision making as a matter of ideological commitment. Relationships based on solidarity are fundamentally relationships between presumed equals. While designers and activists may be understood to have areas of specialization, major decisions are generally arrived at by consensus rather than decree or even simple majority.

Contingency

Contestational design is generally directed towards social and regulatory environments over which the designers have very little control, and which are subject to sudden and unpredictable change. The implication for contestational designers is to develop flexible practices and responsive solutions that can adapt to dynamically changing environments. Designers must be willing to change directions and revisit decisions as situations change and new information becomes available.

Contestational design projects are highly opportunistic enterprises that identify and exploit often short-lived openings in which action is possible. Successful projects are able to move quickly from assessment to action, and are responsive to unforeseen changes. They often rely on speculation, anecdotes, and informal knowledge to identify opportunities, imagine innovations, and predict opposition. This knowledge is generally based on personal experience and on the stories one shares among friends and colleagues. It is expertise conferred by experience rather than training, and is just as likely to reside with activists as with designers. Contestational designers do well to take seriously the expertise of their collaborators over matters social and technical.

Contestational design projects often face direct opposition by more powerful and better equipped foes. Activists who work in such environments, particular those who engage in direct action, have developed a concept called "security culture" to describe sets of practices such as using pseudonyms and privileging face to face interaction for sensitive discussions that are intended to protect activists against surveillance, arrest, and prosecution. Contestational designers similarly engage in security culture, relying on encrypted communications and limiting interaction w. unknown or untrusted individuals. Security culture extends to communication systems design. Decisions about how identifying information is collected and stored are informed by the recognition that as long as such records exist they are vulnerable to seizure by law enforcement.

Other approaches to mitigating opposition include developing multiple, redundant systems and embedding activist communications services within existing commercial and public infrastructure. Redundancy is key principle that ensures continuity of communication even if one (or more) activist networks comes under attack. This is an established systems design principle well-known among industrial and military designers. Embeddedness, on the other hand, provides unique challenges in the contestational design context. Most modern activist communications systems rely on underlying infrastructure that is maintained and operated by commercial or government agencies whose interests may be directly at odds with activist goals. Activists often employ these services without contracts or formal agreements, indeed even without the providers' knowledge. Such parasitic design strategies seek to maintain activist autonomy and control despite the reliance on corporate and government infrastructure. As with any parasite, the impetus for contestational designers who work in this manner is to exploit the underlying service as much as possible without damaging the host. Contestational designers therefore are motivated to "play nice" with existing service providers, taking measures for example to ensure that users of their systems don't engage in abusive practices like spamming or malicious hacking.

Finally, contestational designers recognize that the artifacts they create are highly contingent, tactical responses to a particular situation. They are often temporary interventions whose success lies in their very novelty. They challenge opposition precisely because they are surprise moves in an ever-changing game. Designers recognize that when their novelty disappears their utility may soon follow. It is important therefore not to be wedded to a particular project or solution, but instead recognize them as short-term, temporary creations that are abandoned as soon as they are no longer effective.

Movement-building

Contestational design projects are often undertaken as short-lived, tactical interventions that support specific actions and campaigns. Nonetheless, contestational designers also consider longer-term, strategic goals. These may be tied to the strategic objectives of a particular

organization with which the designer collaborates, such as increasing membership or raising funds. Often as not, however, the designer considers strategy in terms of broader social movements.

As with commercial designers, contestational designers are challenged to provide for the long-term viability of their projects. However, the path to sustainability for contestational projects can be significantly different than their commercial counterparts. Commercial, NGO, and social enterprise projects tend to emphasize institutions. Projects are expected to enhance the long-term viability of an existing organization, or are coupled with the creation of a new institution.

Contestational design projects, by contrast, are often created by ad-hoc coalitions and are not necessarily tied to a particular host organization. Rather, successful projects are expected to migrate across multiple organizations and contexts. Even in cases where contestational design projects do lead to new the creation of new organizations, there is often an emphasis on replicability rather than sustainability. Indymedia, for example, has evolved into a global network of activists and journalists. However, the majority of nodes in the Indymedia network may be inactive at any given moment. The key challenge for the Indymedia network is not necessarily to ensure continuous activity across all of its local chapters (which would be an institutional approach), but rather to ensure that nodes can be quickly re-activated or easily added to the network as conditions warrant.

Among contestational designers, the convention is often to encourage others to adopt projects rather to use projects as a means of generating revenue or employment opportunities for the designer. The most successful projects tend to be those that can be recreated and adapted by other developers, without requiring the project initiator to be directly involved in subsequent design or development activity.

Designing for migration takes various forms. An emphasis on open source and creative commons licenses, releasing source code and disseminating reports and case studies are all strategies intended to enable adoption by new organizations. Developing or adopting projects to extend the capabilities of widely used content management systems like Drupal can at times complicate design processes, but ultimately lower barriers to adoption.

A key challenge in designing for migration comes as designers seek to reframe the needs of specific partner organizations in more general terms in order to develop solutions that can be applied to a range of situations and organizations. Designers continuously balance specific, local needs against generalizable solutions.

The ultimate goal of most advocacy campaigns is movement-building. Beyond raising money or collecting signatures for a particular piece of legislation, social activism is generally aimed fostering ongoing engagement with activist networks that engage in collective action across a host of campaigns and issues. It is generally understood among activists that participation in movements is not an exclusively rational process, but involves a set of emotional and social factors. Simply put, movements are about lifestyle as much as they are about policy.

The implication for designers is to acknowledge the cultural aspects of the products they create. This is familiar territory for graphic designers, who engage in the creation and manipulation of symbols. Advocacy posters don't simply engage in rational argument, they make emotional appeals. Designers are aware of the effects that compelling images have on viewers, just as they understand the need to appeal to committed activists and potential recruits alike.

The important insight here is to recognize the cultural aspect of *all* contestational design artifacts, including infrastructure projects that are intended to facilitate communication rather than embody particular messages. This is at least tacitly acknowledged by many contestational designers. Consider, for example, the names of such activist infrastructure projects as Indymedia, Riseup, and Resist. In additional to creating software, considerable time and energy is devoted to designing logos and "cool" project names that capture the aspirations of the designers and the movements within which they operate. These are reproduced on T-shirts and stenciled on walls, part of an activist cultural milieu that reinforces collective identity by appealing to notions of subversion, unity, and empowerment.

Cultural significance extends to how contestational design projects are evaluated. Designers and researchers are used to considering the ways that an artifact contributes to the success or failure of a particular campaign. The suggestion here is that they should also attend to the kinds of narratives that arise about the artifact itself, and how these may or may not contribute to collective identity and movement building.

Conclusions

I have described contestational design as a unique form of design activity whose aim is promote particular agendas in contested political arenas. Contestational design is characterized as an openly partisan practice engaged in antagonistic political relations. Contestational designers' relationships with activists and advocacy organizations are primarily based on notions of solidarity, which frees the designer to seek out collaborations that are personally meaningful while simultaneously binding designers and activists in long-term, mutually respectful relationships.

Contestational design projects conflate technical and tactical innovation. Because it occurs in rapidly changing environments over which the designer exercises relatively little control, contestational design is a highly contingent practice. Design processes are highly opportunistic, seeking out often short-lived opportunities for intervention. Contestational designers engage in a sort of parasitic practice that embeds activist artifacts in existing infrastructure by exploiting excess capacities and overlooked inefficiencies.

Contestational designers balance immediate, short-term tactical objectives with broader movement-building strategies. They design artifacts that can easily migrate from one activist context to another, and recognize their products' potential to support narratives of empowerment that foster collective identity and strengthen social movements.

I have proposed a framework for analyzing contestational design projects. Based on the Margolins' "social design" model, this framework lays out chaotic design processes in an orderly manner. It captures design processes in enough granularity to facilitate nuanced reflection. At the same time, the framework maintains a sufficiently broad perspective to enable multiple sites of analysis.

Using this framework, I have presented TXTmob and Dialup Radio as examples of contestational design projects. Both projects involve integrated mobile phone and internet services. However, the interesting points of comparison derive from their many differences.

TXTmob was developed by an ad-hoc coalition of activists to support mass mobilizations in several major American cities. It enabled radically distributed protest by hundreds of loosely affiliated affinity groups who communicated and coordinated action via text messaging.

Development cycles were relatively short, occurring in several bursts each lasting a few weeks and leading immediately to a real-world deployment. TXTmob has been used by thousands of people in dozens of different cities. It was cited as one of the key innovations by protesters at the 2004 Republican National Convention and has inspired new projects in both the nonprofit and commercial sectors.

Dialup Radio, on the other hand, was developed through long-term collaboration with a civil society organization based in Harare. It was intended to allow networks of independent media producers to disseminate activist information through a shared telephone service, and to bridge Zimbabwe's urban/rural divide. The development process was long and had to contend with a host of infrastructure, financial, and organizational challenges. The project ultimately produced a prototype that was tested with potential users in Harare and rural Zimbabwe, and shows great promise for future deployments throughout southern Africa. Dialup Radio also enabled the partner organization to re-invigorate itself and offered new opportunities for fundraising and organizational development.

Examining these two projects side-by-side revealed several key issues that designers face when they engage in contestational projects. These include:
- balancing designer autonomy with structural requirements.
- employing flexible methods and processes that support risk-taking and can quickly exploit often short-lived opportunities.
- coping with disagreement and recognizing the fuzzy nature of expertise within design teams.
- allowing for complex, even parasitic relationships with existing infrastructure and institutions.
- recognizing that evaluations are conducted using different methods and with various objectives
- balancing tactical objectives and strategic goals.

It is acknowledged that several of these issues are not unique to contestational design projects. For example, many design activities contend with disagreement and balance long and short-term objectives. However, the specific ways that these issues are manifest, understood, and resolved within contestational design projects are distinct due to what we might call the "organizing principles" of contestational design: adversity, solidarity, contingency, and movement-building.

Contestational design is fundamentally concerned with affecting social change through design. While informed by other alternative design strategies, it is a unique way of working

and a distinct frame through which to view design practice. For example, the close, boundary-blurring collaborations one finds in contestational design projects – driven both by necessity and ideological commitment – are a radical form of participatory design that finds little common ground with the industrial practices one often finds in the participatory design literature. At the same time, the openly partisan nature of contestational design projects coupled with compressed time frames and fears of retribution both compels and enables designers to deal with exclusion – refusing participation by certain stakeholders – as a design strategy.

Similarly, contestational design's emphasis on co-developing technology, social practice, and organizational structure mirrors approaches taken by social entrepreneurs. However, priorities and practices are often inverted in the two approaches. Social entrepreneurship often begins with issues of sustainability, scalability before committing to a deployment, while contestational designers tend to focus on the specificities of a given intervention, often with little concern about how to institutionalize particular projects.

As an analytic orientation, the study of contestational design holds many of the same concerns as other alternative design scholarship. It shares ethical design's belief in the productive power of designer agency, feminist design's concern for the role of governing mentalities in decision making, and environmental design's embrace of irreducible complexity. Contestational design studies is an integrative approach, weaving these disparate concerns into dense narratives that reflect the complex interplay of social and technical factors determining real-world practices and outcomes.

Future Work

Taking a close look at projects like TXTmob and Dialup Radio helps socially-minded designers bridge the gap between methods that are taught in school and practiced in industry, and the real-world needs of on the ground political activists. It also poses fundamental challenges to often implicit assumptions about what it means to be a designer.

Contestational design also offers a tangible, grassroots approach technology and product innovation that can hopefully mitigate some of the Luddite tendencies that continue to hold sway in many activist circles. It also offers examples of activist success stories; crucial for building and sustaining movements that, according to one source, "usually feel like we don't achieve anything."

This thesis represents a first effort to establish contestational design as a unique and significant area of practice and study. There is clearly additional work to be done.

To begin with, there is a need for more case studies. While we can easily list numerous examples of contestational design, there have been very few serious examination of the design processes that lead to their creation. New case studies will no doubt challenge some of the assertions I have made, and will hopefully reinforce and expand others. Ideally, additional case study work should include very different kinds of contestational design projects than the ones I have presented here; obvious places to look include graphic design advocacy work and low/no-tech protest movements.

Second, there is a research opportunity to examine contestational designers themselves. The individuals who make up the contestational design movement are a diverse and fascinating bunch, with wildly divergent lifestyles, personal histories, and motivations. A rigorous examination of how and why they do what they do will expand conventional notions of what it means to be a designer. Serious consideration of the economic and lifestyle decisions that allow them to devote their time to unpaid, high risk endeavors will demonstrate alternatives to traditional design and engineering career paths. Furthermore, close study of the education and training that they rely on will challenge design pedagogy and may reveal deep disconnects between design education and the requirements of socially engaged practice.

Finally, there is a need for deep thinking about what institutional infrastructure, if any, is required to support and expand contestational design practice. I have described the tensions between advocacy work and the funding mechanisms that dominate the nonprofit sector. Also at issue is the difference between technology transfer and technology innovation. There are a growing number of organizations, both non-profit and commercial, that provide technology services to advocacy organizations. The majority of their efforts involves adapting existing technologies to meet the needs of nonprofits. This is necessary and important work. However, contestational design is about technical and tactical innovation; it is essentially a high-risk R&D effort that is frankly at odds with most funding organization's insistence on reliable return on investment.

Several organizations are experimenting with ways to support radical r&d. Greenpeace maintains a small staff of technicians who have a history of cutting edge communications work. The Ruckus Society provides technical and logistic support to advocacy organizations and at times engages in technical innovation. The Riseup collective, a major provider of email and web hosting to radical organizations, has started "Riseup Labs" to develop new technologies for social change. Openflows, which is described in the TXTmob case study, supports its employees to dedicate a portion of their time to unfunded research projects.

Other organizations focus on supporting the social networks from which contestational design

projects emerge. Aspiration, for example, hosts workshops and retreats for designers, engineers, and activists. MobileActive is an NGO that fosters communications among a distributed network of practitioners using mobile phones in advocacy work.

These are important efforts that point to a larger need. While finding the "right" structures to support contestational design projects requires substantial time and research, we can identify at least some of the key issues.

First, funding mechanisms must be developed that preserve designer autonomy. This likely means finding ways to function independently of donor organizations, perhaps by developing constituent-based or commercial funding schemes.

Second, it must be acknowledged that contestational design will remain a largely volunteer activity. The funding opportunities that exist to support contestational design work are few and far-between, and generally don't provide full-time employment. The organizational challenge therefore becomes understanding and supporting the needs of volunteers. This likely means finding ways to connect activists with designers in addition to providing material support for specific projects.

Finally, funders and organizations should support project migration. This means an emphasis on lowering barriers to adoption by others, often without compensation. The open source movement has developed models for how this can be achieved including permissive licensing, a dedication to clear documentation, and support for developer communities. Migration in an activist context may require additional steps, in particular creating and distributing case studies that describe how new tools have been used for activism. Substantial thought also must be given to how one can apply open source models to non-software artifacts.

Developing the right kind of institutional infrastructure will expand contestational design practice. It will connect practitioners and researchers in an exciting and emerging field, and will provide students and professionals alike with entry points into new ways of thinking and working. Ultimately, these institutions will facilitate the creation of robust networks of people and resources dedicated to enacting social change through collaborative design practice. This will be a boon to practitioners and to the advancement of social justice and human rights. While an expanded contestational design practice may not make the world a "better" place, it will certainly make it a more democratic one.

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