

The Policy Knot: Re-integrating Policy, Practice and Design in CSCW Studies of Social Computing

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ABSTRACT

In CSCW and information science research today, the worlds of design, practice, and policy are often held separate, speaking to different audiences, venues, and fields of expertise. But many growing areas of CSCW work, including mobile, cloud, and social computing, run into problems precisely at this intersection. This paper presents a model for understanding processes of change and emergence in social computing in which policy, practice, and design show up in the form of complex interdependencies, or knots, that collectively determine the shape, meaning, and trajectory of shifting computational forms. We then apply this model to two recent social computing controversies: the 2011 privacy scandal surrounding the location-aware mobile app Girls Around Me; and controversies surrounding the 2010 launch of the Google Buzz social network. We argue that better attention to the mutually constitutive relations between design, practice and policy can expand the reach, depth, and impact of CSCW scholarship.

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INTRODUCTION

Emergent forms of social computing very often push the boundaries of design and practice simultaneously, producing challenges and problems for each. New social computing tools and systems may provoke CSCW researchers to think differently about the range of human interactions that can be built and imagined around them. At the same time, changes in social computing practice can

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push back on design, as users and communities enact and repurpose technologies in ways unimagined by their designers. This meeting point (or sometimes gap [1]) between technical design and social practice constitutes a traditional heartland of CSCW concern, and plays a central role in defining the shape, meaning and generativity of social computing today.

But this two-dimensional story captures only part of the dynamic by which new technological forms emerge and gain force in the world. This paper seeks to extend the analytic range of CSCW by arguing that emergent social computing practices and design often impact and are impacted by structures and processes in the realm of policy, with effects formative for each. Emergent technologies may suggest problems and possibilities for both social practices and the formal rules and institutions that govern them. New practices may challenge both designers and policymakers to rethink core assumptions of their work. And emergent policy arrangements may shift the institutional terrain that designers and users operate on, foreclosing some possibilities for action while opening up others.

This claim reverses how policy is sometimes thought about and practiced in CSCW scholarship. Too often (when policy is thought about at all) it is imagined to come *after* design and practice, in both time and importance. Under this basically linear presumption, emergent technologies are first designed; users then adopt and adapt them in contexts of situated practice; and on occasion, when a dispute emerges, aggrieved stakeholders turn to public agencies or the courts to clean up the mess. We argue that this presumptive sequence is both wrong and deeply limiting to work in the field, for at least two reasons: first, because it removes important questions of oversight, governance and control from the heart of CSCW scholarship; and second, because it fails to recognize how policy – large and small, enacted by public bodies or private organizations – may precede and prefigure design and practice. Reframing the relationship between these three core elements (and reviving CSCW attention to policy more generally) can therefore help to expand the analytic scope and range of CSCW scholarship – perhaps especially around emerging technological forms like social, cloud, and mobile computing.

Under the alternative model advocated here, the nominally separate moments of design, practice and policy show up as deeply intertwined, with no presumptive ordering in time or priority between them. They are mutually constitutive (or ‘co-productive’ [42]), informing one another in forceful and sometimes subtle ways that feed back into the independent constitution of each (while sometimes erasing the traces of their connection, making it possible for observers to tell design-, practice- or policy-only stories). This three-way back and forth plays out across the complex unfolding of time, in processes of emergence that *themselves* give form to many of the languages and effects – determinism, dependency, trajectories, diffusion, etc. – through which we try to account for and make sense of the dynamics of computational innovation and change.

Our preferred metaphor for this set of relations is the *knot*: the multiple gatherings and entanglements through which worlds of design, practice and policy are brought into messy but binding alignment. Knots highlight both contingency and the work of assemblage: they help map the precise points of connection by which processes of design, practice, and policy are brought together (or held apart), often while establishing while twisting together the ‘autonomous’ constitution of each. Knots help account for the existence of durability and order through time, in that once knotted they tend to hold fast, ensuring “sticky” and stepwise progressions from old to new: a key challenge in rapidly changing fields. Knots highlight the irresolvable complexity of sociotechnical worlds and the analytic stories we must tell around them, ensuring work for CSCW and allied fields for generations to come. And knots provide an analytically compelling account of change and innovation: it is through processes of unwinding and retying, loosening and tightening, straightening and reweaving that the worlds of social computing, past, present and future, are formed.

This paper develops these points through analysis of two recent controversies: the 2011 privacy scandal surrounding the location-aware mobile app Girls Around Me, and controversies surrounding the 2010 launch of the Google Buzz social network. We conclude by arguing for the contributions that “knot-like” thinking can make to CSCW research around social computing, innovation, and problems of socio-technical change.

WEBS, GAPS, AND KNOTS: CSCW AND POLICY RESEARCH IN HISTORICAL PERSPECTIVE

CSCW and information science scholarship has long had an ambiguous relationship to work in technology policy. On one hand, policy concerns were central to some of the key movements and influences that informed the founding of the field. And since then, specific policy issues (most notably privacy) have periodically emerged as concerns within many of the immediate contexts examined by CSCW researchers (though called out with varying degrees of attention). On the other hand, organized approaches to policy as a site and modality of CSCW work have been

rare, and the field’s own recent efforts to connect or contribute to wider policy debates, with few exceptions, have been limited.

This has not always been the case. Early work in CSCW and allied fields showed a deliberately ambitious breadth, seeking to situate micro and design-oriented accounts of collaborative work within larger systems of practice and order. CSCW work informed by the social informatics tradition of scholars like Kling, King, Scacchi, and other members of the Irvine School adopted a notably holistic orientation, embedding questions of design, use, and collaboration in an expansive context that included organizations, institutions, and systems of public policy. In this understanding, specific artifacts, collaborative practices, and design interventions operated against the backdrop of a broader canvas that could be shaped (and misshaped) by forces and institutions operating at the level of policy. The assemblage as a whole constituted what Kling termed the “web of computing”: roughly, the broader set of actors, systems, organizations, rules, and institutions within which discrete computing interventions and computerization “movements” unfold [44,45,46,47].

The same expansive orientation characterized early CSCW work sourced from other theoretical traditions, including cybernetics, activity theory, and symbolic interactionism. Important work by scholars like Grudin [34], Engeström [24], Nardi [57], and Star and Ruhleder [51] described a world in which application failures, activity systems, and infrastructures lived within larger systems of interaction that ran all the way up and down: from fine-grained details of design and practice to the exigencies of law, institutions, and other mechanisms for the large-scale organization of collective choice and power. The net result was analytical scale and suppleness, as well as an in-principle commitment to tracing the shaping and consequences of emergent computing practices beyond and outside their moments of design and early adoption.

However, this explicit attention to scale, perhaps especially at higher levels of aggregation, attenuated as the field moved on to new concerns in the later 1990s and 2000s. The field turned to the new possibilities of practice and design that were emerging, as successive waves of computing pushed CSCW beyond its traditional workplace groundings and in an increasingly ‘social’ direction.

Core CSCW work from this period did vital work to sort out the relationship, theoretical and empirical, between the shape and affordances of designed technology and the complex worlds of practice that such design-level interventions were meant to address. This included strategic attention to more thoughtful transits between social practice and technical design, which had gradually solidified as the two dominant pillars of CSCW scholarship. But it also directed attention to the potential *irreducibility* of these worlds, arguing for the ways in which technological design, like other efforts at formalization, must always operate at

some distance from the complexities and subtleties of practice. Work by Ackerman on the “social-technical gap” points to the necessary “divide between what we *know* we must support socially and what we *can* support technically” [1]. From this perspective (and citing a rich tradition of CSCW work grounded in pragmatist, ethnomethodological, activity theory, and structuration approaches) the world of practice is fluid, nuanced, emergent, contextually shaped, and above all navigated by artful social actors with extraordinary (if often invisible) skill, flexibility, and care. By contrast, technical systems meant to support collaborative action may be excessively fixed and rule-bound (“brittle”), lack nuance, struggle with ambiguity, and fail to accommodate the kind of flexibility and discretion regularly deployed by competent social actors in the everyday run of their work.

More recent CSCW work has sometimes addressed policy-relevant themes, but rarely as a first-order priority of work. A variety of workshops, panels, and tutorials have sought to bring questions of law and policy to the attention of CSCW scholars, on topics ranging from privacy and data sharing to medical information and scientific infrastructure [52,64]. CSCW research papers, most notably in the area of privacy, have documented user attitudes and responses to organizational and public policies embedded in specific social computing applications (e.g., Facebook, third party apps, etc.) [4,31,50,72]. Others have explored privacy dynamics in the context of medical care, with special attention to design, user attitudes, and practices [17,61]. Still other researchers have investigated the connections between CSCW tools and research programs around collaborative scientific work, and more broadly the organizational, institutional, and national-scale policies related to scientific funding and data-sharing that may alternatively advance or frustrate such efforts [6,22,39,43,70,71].

But this work constitutes a vanishingly small proportion of CSCW work in general and rarely acknowledges the generative three-way relation of design, practice, and policy argued for here. Nor does it typically address policy itself as a legitimate site and target of CSCW work (as opposed to positioning policy as the external backdrop against which such work unfolds). For example, witness the relative paucity of discussions around ‘implications for policy’ in comparison to ‘implications for design’ in the discussion sections of CSCW papers and presentations [18,40].

There are several possible reasons for this absence. With important but limited exceptions, the disciplinary education of CSCW scholars in computer and information science and allied fields has tended *not* to include the kinds of legal and institutional training central to work in technology law and policy. Similarly, scholars in technology policy have paid scant attention to CSCW and other fields where technical design figures centrally. Because of this disconnect, there may be widespread misconception within the CSCW

community that policy is necessarily static, irrelevant, or purely reactive to questions of design and practice - perhaps especially under the conditions of emergence and rapid change that characterize the worlds of mobile, social, and ubiquitous computing today. This connects in turn to a larger error in the way that technology law and policy has been sometimes thought about and practiced: as an arcane and largely foreign set of rules that stands outside the real worlds of practice they are meant to govern.

This error of omission becomes immediately apparent when we switch from the abstraction of concepts to the concreteness of real-world social computing problems. In such contexts, researchers without legal training are often surprised (and frustrated) by the apparent relativity and context-dependency of the law. Privacy law, for example, remains deeply embedded in norms and subjective orientations that both live at the level of practice and are deeply inflected, sometimes serendipitously, by the designed form of existing technologies. Policy debates often assume these design-contingent features of social practice as they anticipate regulation of new technical forms – which may in fact operate on a substantially different basis of design and practice. Under the dominant “reasonable expectation” test established by *Katz v. U.S.* (1969), for example, courts are asked to weigh potential privacy violations against two notably fuzzy standards: whether the individual in question has demonstrated a “subjective expectation” of privacy (for example, by closing a phone booth door!); and whether the court (and society as a whole) is prepared to recognize that expectation as “reasonable”. Courts weighing privacy violations also draw a postal-based distinction between ‘envelope’ and ‘content’ information, granting the former less constitutional protection than the latter on the grounds that information like addressing or numbers dialed has always been more exposed and therefore ‘public’ than the materials contained on the ‘inside’ of private letters and conversations. U.S. constitutional protections against “illegal search and seizure” – a category now expanded to include government intrusions on private information of all kinds, from phone taps and library records to the domestic surveillance activities of the U.S. National Security Agency recently uncovered by the Wikileaks and Edward Snowden whistleblower cases - remain almost entirely dependent on these kinds of highly subjective and context-dependent assessments of privacy.

The same complex relation to design and practice shows up in the nuanced application of the fair use balancing tests used to carve out exceptions to U.S. copyright law. Designed as a heuristic rather than as a set of hard-and-fast rules (as discretionary legal standards are sometimes misinterpreted), the four factors of fair use, manifestly *cannot* be reduced to a simple set of rules and prescriptions (despite periodic attempts to do so) [2]. This makes them famously hard to design for in technology systems that

would permit some kinds of copying as fair and restrict others as infringing [29].

This double embedding of policy – in discretionary and subjective assessment, and in past forms of design and practice – is more than a simple error or limit, or reflection of the fact that law and policy have somehow failed to ‘keep up’ with the pace of social and technological change. Indeed, echoing a longer line of legal and policy scholars, we’d argue that the kinds of flexibility built into things like reasonable expectation or fair use balancing tests are precisely what allows law and policy to grow and remain relevant over time, and our systems of order and governance to remain supple and ‘live,’ rather than fossilized remains of a different sociotechnical moment. Such properties become particularly important at moments of rapid change and emergence, such as those characterizing social computing today (and indeed many other areas of CSCW scholarship).

But it is also a source of complexity and complication. It is *not* the case that emergent forms of design and practice can look to policy as a fixed and stable point of reference around and against which to evolve. Nor will law and policy always provide clear answers to the challenges posed by emergent design and practice, since one of the things that such developments may challenge is the terrain of policy itself. Instead, we live in a world where all three are changing together, in complex, interlinked, and mutually constitutive ways. CSCW efforts to understand and contribute to such changes need to take on this complexity..

POLICY AND EMERGENCE IN SOCIAL COMPUTING: UNDERSTANDING THE KNOT

For purposes of clarity (and because the term is subject to a wide variety of uses and interpretations) it may be useful to say an additional word about what we mean to include under the category of policy. As developed here, “policy” means something wider, though not limitless, than is often meant in common parlance. Certainly, policy includes the forms of public law that regulate technology design and use. This includes both the public bodies and processes charged with establishing laws and regulations (e.g. the U.S. Congress and its relevant sub-committees, the United Nations and their more technology-focused working groups) and the public agencies charged with implementing them: the courts, state regulators, and a wide variety of administrative agencies (e.g. the U.S. Federal Communications Commission, Federal Trade Commission, the European Commission, etc.). But it also includes a wide range of rules and procedures set by private firms – software licenses, end user license agreements, policies for app developers, and at the limit corporate philosophies (where actually backed and followed through in organizational practice) – that may intersect with formal law and policy in complex ways.

While policy is often formally expressed through legal and contractual language designed to bind with precision the range of allowable practice, it also depends on a wider set of ideas and tropes to which formal law and policy very often return (in more and less explicit ways). As alluded to above, technology law and policy is full of reference to figures like ‘reasonable actors’ and ‘persons having ordinary skill in the art’ which are meant to infer cultural baselines of expectation and normalcy. Where formally expressed rules and cultural norms are out of step, as Jessica Litman has argued for the case of copyright, or where norms and values may be shifting (as some have argued for privacy), deep instabilities in law and policy can ensue.

Under present institutional configurations, the world of policy is also organized into distinct issue spaces (e.g. privacy, telecommunications, antitrust, security, intellectual property, etc.) governed by usually separate regulatory bodies, logics, and processes. Any given instance of technology design and practice may cross and implicate more than one of these, producing additional jurisdictional and practical complexity. Gathering this range and complexity into a single definition (and borrowing from international relations scholar Stephen Krasner’s description of transnational regimes [49]), we define policy here simply as the “set of explicit or implicit principles, norms, rules, and decision making procedures around which actor expectations converge.”

When brought back together with design and practice as advocated above, the relationship between design, practice, and policy might be modeled after something like a mutually causative triangle, in which each pole interacts with the other two in mutually transformative ways:

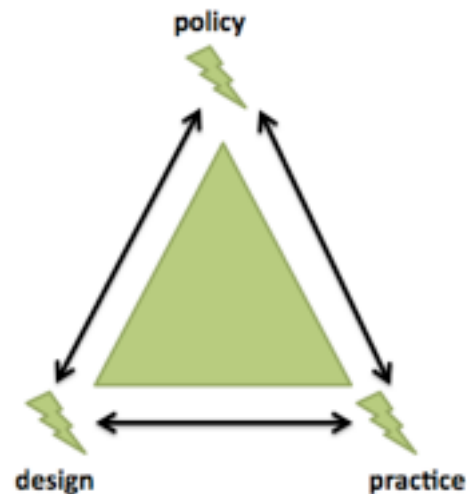


Figure 1. Design, practice, and policy as co-constitutive

Understood in any particular case, however, the story rapidly becomes more complicated than the clean and linear geometry of the triangle will allow. To get at this process, we must unpack the simple lines of the triangle and replace

straight-line connections with more supple threads or strands that intersect and combine in specific and sometimes unpredictable ways. The entanglement of design, practice, policy can be better understood as strands woven together, yielding one or more integrated or interlinked entities. In moments of formation, we may see these strands coming together (as in the right side of Figure 2 below); once accomplished, these separate strands may blend into the appearance (and reality!) of a single unified force, all the stronger for their combination and mutual reinforcement: practices valorized through law, law passed into code, etc. But knots can also come apart, fraying through time and change and through the forms of tension and friction that remain endemic to such combinations. The net result of these activities constitutes the landscape or 'web' [46] of social computing, as it grows, shifts and evolves over time.

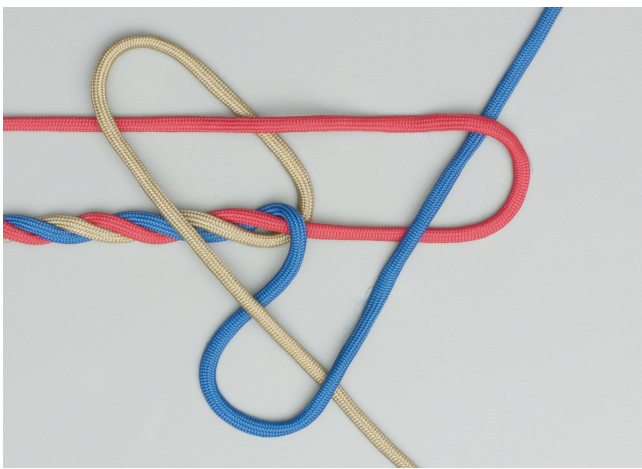


Figure 2. The Design, practice, and policy knot

These three-way intersections between design, practice, and policy show up with particular complexity and importance during periods of formation and emergence, such as those characterizing the world of social computing today. As work in the history and sociology of technology has demonstrated, new technologies in their formative states typically experience complex and uncertain trajectories during which multiple dynamics are being sorted out at once: the design of individual objects or tools, the imagination of their uses and users, and the broader social context in which emerging technologies and practices will fit [5,8,42,48,54,63]. Historians of technology have called attention to the conflictual processes of 'stabilization' or 'closure' through which emergent technological artifacts and practices take on their more settled and durable forms, arguing that it is these tensions and conflicts, rather than isolated or autonomous acts of design per se, that shape the form and trajectory of technological practice going forward [7, 8].

But a common side effect of this work is to obscure the constitutive interrelations that characterize this emergent moment. Tensions and conflicts tend to be written out of

the understanding of objects over time, producing the misleading appearance of inevitability, or a too-simple model of agency that construes technology, now stripped of the social forces and processes by which it was imagined, produced, and enacted, as an actor in its own right [54]. This misreading stems in part from the rearview mirror effect by which established objects and practices become naturalized in the world. Put simply, echoing the principle of 'Whig history' long criticized by professional historians [14], things that come to exist can quickly come to seem inevitable (witness, for example, the effort required to imagine an academic life without email!). Viewed historically, the speed of this ontological adjustment may be breathtaking. Philosophers like Ian Hacking have developed the language of 'historical ontology' to reflect precisely this time-bound quality of our basic categorical understandings of the world [35].

But such effects can also be explained, somewhat more modestly, from the standpoint of the knot metaphor described here. Over time, and with our tendency to overlook the interrelation of these forces, the mutually formative influences of these elements can drop from sight (leaving sometimes strange and inexplicable 'kinks' in the rope – why on earth would they design it that way? why would they make policy like *that?*). The structuring presence of the other strands drops away, and we are left with an image in which objects (or practices, or policies) appear to stand alone. The technology, as concretized in the object, simply *is*. The policy, as concretized in the rule, takes on a life of its own. The practice, now embodied and identified with a determinate set of social actors, becomes what Durkheim would call a 'social fact' [21]. With this distance, we are now able to neglect their common origins – until new controversies emerge to disrupt the presumed settlement, unwinding and revealing what may be the contingent or even arbitrary connections at its core.

In arguing for this model, therefore, we seek to do more than make the simple point that design that fails to take account of policy is likely to be bad design; or that user practices that ignore the policy frameworks around them are likely to prove practically or legally unsustainable (though both these things are true). Rather, we argue that these worlds are *practically speaking* inseparable. Design operates in the shadow of practice and order, whether those figures are represented through the mechanisms of user experience research, or memos from corporate legal departments, or in the hunches and intuitions of the design team. Policymakers may take explicit account of design and practice in their deliberations, or they may not; but in either case, design and practice will muscle in, sometimes in the form of the stories or folk theories that so often shape public decision processes, sometimes in the details of the case being adjudicated or the imagined misuse being prevented. Users can ignore design or policy until they can't, as practices that operate at odds with design or law may be swiftly and forcefully corrected.

We believe that CSCW studies of social computing can benefit from this kind of analytic reframing, and more generally from efforts to bring considerations of policy more centrally into our programs of research and action. In the sections that follow we apply this framework to two separate empirical cases. The first concerns a series of actions and debates around the limits of privacy and the repurposing of publicly available data sparked by ‘Girls Around Me,’ a mobile application for locating women based on public Foursquare and Facebook profiles that was launched and quickly removed from the Android and Apple app stores in March 2012. The second concerns the launch of the social networking service Google Buzz in February 2010 and the subsequent complaint filed by the Federal Trade Commission (FTC) about its handling of user privacy. In both cases, questions of design get inextricably linked to problems in practice and policy. And in both cases, the precise configuration by which policy, practice, and design get put together proves decisive.

CASE 1: GIRLS AROUND ME

Girls Around Me (GAM)¹ was a mobile application for iOS and Android that integrated data from two widely used social networking platforms, Foursquare² and Facebook³. Released in December 2011 by SMS Services O.o.o. and its parent company i-Free, GAM re-used and repurposed geo-location data and user profile information made public through individual Foursquare user ‘check-ins.’ The application’s design and supporting online materials suggested its primary use: *“In the mood for love, or just after a one-night stand? ...browse photos of lovely local ladies and tap their thumbnail to find out more about them”*⁴

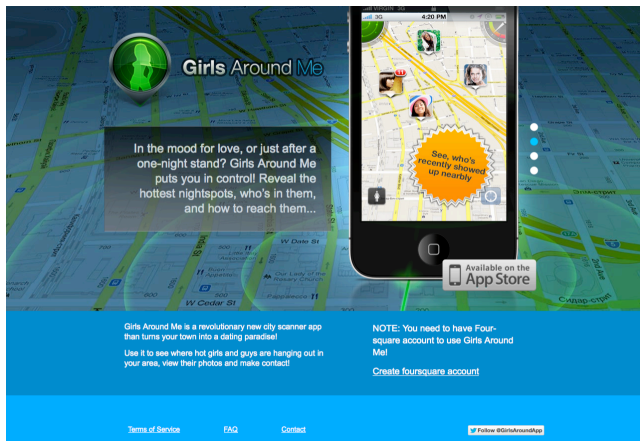


Figure 3. Girls Around Me website

¹ Girls Around Me. 2012. <http://girlsaround.me/>.

² Foursquare. 2013. <https://foursquare.com/>.

³ Facebook, 2013. <https://www.facebook.com/>.

⁴ This is one of several rotating marketing messages for Girls Around Me on its webpage at <http://girlsaround.me/>.

From a technical perspective, Girls Around Me was a simple tool that gathered data publicly available on other social media sites. By using the application programming interface (API) provided by Foursquare, GAM dynamically queried Foursquare’s database to locate users (either gender, though the application defaulted to women) who had recently checked-in near the location of the GAM user. These were displayed as photo icons on a Google Map overlay, with more detailed information just a click away (Figure 4). Foursquare users whose data were being repurposed in this way received no alert that this was happening. And for those with publicly linked Facebook accounts, the GAM app also provided instant connection to the individual’s public Facebook profile.



Figure 4. Radar-type view in user interface⁵

Reactions flared in March 2012, after John Brownlee (writing for the news site *Cult of Mac*) decried the application as a “wake up call” for the changing dynamics of online privacy: “It is as innocent as it is insidious; it is just as likely to be reacted to with laughter as it is with tears; it is as much of a novelty as it has the potential to be used a tool for rapists and stalkers” [12].

In the days following Brownlee’s expose, coverage of GAM spread across online technology news sites and blogs, and from there into major newspapers [3,9,19,53]. Critics objected to the presumed relationship the app expressed toward the women it targeted (and women in general), like the writer at TechCrunch who offered, “I submit to evidence that these nice guys present women as shiny metallic objects, targets to be taken down, complete with radar imagery. These nice guys developed an app that made some who first saw it think the women within were prostitutes” [65]. Defenders of the app emphasized that all of the data had already been deliberately made public by the Foursquare users and blasted the patronizing tone of the

⁵ This screenshot was captured by John Brownlee, blogger at Cult of Mac.

critique, such as the Forbes staff writer who argued that “[i]n rejecting and banishing the app, we’re choosing to ignore the publicity choices these women have made in the name of keeping them safe. And we make the ugly assumption that men who might want to check out women in the area have nefarious intentions” [36].

The public controversy ended just a few days later when Foursquare, bowing to user complaints and online pressure, blocked GAM’s access to its API [13] (Foursquare would later go on to alter its API to prevent other app developers from making similar use of their data) [74]. On April 30, 2012, GAM was removed from the Apple iTunes store [62]. The following week, i-Free Innovations, the venture capital foundation that supported the development of GAM, released two public statements. The first was defiant, insisting that the app was not made for stalking and that the GAM developers were fully within their rights to use the data as they had. The second, issued on May 4, was more conciliatory and defensive and signed by the iFree CEO himself:

“[t]he application was developed without any specific gender bias, and its name, as well as the James Bond-style design, were chosen purely for marketing reasons. We now understand that this may have been a misstep, as this has provoked a negative response from some mass media sources and, subsequently, from many people” [38]

On the same day, i-Free announced that funding had been halted for further development of the app, and no further effort would be made to restore it to the Apple iTunes store or regain its Foursquare API privileges. Girls Around Me was effectively dead.

Analysis:

At first glance, the Girls Around Me controversy followed a familiar and increasingly well-worn path. Upstart app designer develops and releases a technology that violates some cultural norm. Bloggers and tech journalists react, and a small but vigorous debate among advocates and critics ensues. When the controversy reaches a certain pitch, actors with larger reputations at stake step in and the app is gutted or removed from circulation. Days to weeks later, a new upstart developer with a new controversial app appears, and the cycle begins again.

As the controversy developed, the public debate quickly came to occupy one of two positions. The more widely accepted one saw this as an app going too far with public data, transforming the public actions of Foursquare users into a template for stalking. The women identified and represented by the app had not signed up to take part in the service, and did not receive any kind of notification that their Foursquare and Facebook information was being presented in this way [11]. In this account, fault rested with design: it was simply inappropriate to reuse the data in this way. And the designers of GAM certainly made things worse: the unfortunate visual iconography and leering sales

pitch made the app easy game for critics who attacked it as a tool catering to and assisting stalkers.

A counter-position (one that the designers of GAM would eventually adopt) saw this as an inevitable and even logical extension of user ignorance around privacy settings in social media: either they *wanted* to be public in which case this is a reasonable extension of that want, or they were unaware of what a public setting meant and had simply screwed up, in which case they should learn to be savvier about their privacy settings. Fault here lay with the users.

Following the contours of this public debate, one could characterize the GAM controversy as a design vs. practice problem. The technology was designed to compile publicly available and location-specific social media data; the practice (as envisioned by critics) was that men would use the information made available to stalk or harass women who didn’t know their information was being packaged and recirculated in this way. Or, from another angle: the designers embedded certain ideas and presumptions about appropriate ways of finding and relating to women into their tool, and users found the implied practices reprehensible. So far, this is a recognizable CSCW story, and speaks richly to the problematic (mis)alignments of design and practice that emergent social computing forms often face or produce. But it’s also a somewhat limited one, leading primarily to the insight that apps designed to enact, imply, or suggest socially problematic behaviors are likely to fall afoul of the public (so don’t do that).

But what happens if we move policy to the center of this story? While not relieving GAM and its developers of responsibility, more proactive attention to the role of policy can highlight the way that policies set by service providers can shape both the design of the tool and its incorporation (problematic or otherwise) into the ongoing flow of practice. It can also open up new questions of agency and responsibility that extend beyond the immediate spheres of practice and design. For example, curiously little of the debate considered the responsibility of Foursquare or Facebook, though both are deeply implicated in the case, having collected the data and devised a way for it to be public. Even less attention was paid to Apple, and none at all to Google Maps, though the two are also obliquely implicated. This is not to imply that they are the responsible parties; the question we have is a different one. Were they in some ways less visible as implicated parties because we focus too little on policy?

Listen carefully, for example, to the way that each of the immediate stakeholders, i-Free Innovations and Foursquare, articulate their positions, both about their responsibilities and obligations and about the app and its cultural harm. The responses read like recitations of policy: either policies that were in place before the controversy broke and thus were constitutive of the GAM app in the first place; or in Foursquare’s case, a subsequent change in policy that

would let Foursquare distance itself from the embarrassing taint of the offending app.

i-Free's primary defense was that they had simply followed Foursquare's API policy: "Girls Around Me shows to the user only the data that is available to him or her through his or her accounts in Foursquare, and gives the user nothing more than Foursquare app can provide itself" [3]. No other data was being collected from third party providers, and subjects' Facebook profiles could only appear if the subjects had linked them to their Foursquare profiles (meaning that compliance with Foursquare is the only issue in question). In addition, "The Girls Around Me user has to be registered in Foursquare and must be logged in this service to be able to see anything in Girls Around Me. The app Girls Around Me does not have access to user login and password, authentication is carried out on the social network side" [3]. The Girls Around Me user is in fact logging into Foursquare and making a query themselves, merely through a third-party interface. Finally, only users with Foursquare accounts themselves can use Girls Around Me, which both offers an identity assurance mechanism, and lets Girls Around Me serve as a proxy login to Foursquare.

The core of i-Free's defense of Girls Around Me was this: Foursquare established in its API policy a set of allowable uses for data that could be publicly queried, and i-Free complied with those terms. But let's turn this around. Foursquare collects data, and makes it available within a policy-constrained set of terms that extend out categories (like public and private), parameters for how their database can be queried and by whom, and obligations for how the data can and cannot be used subsequently that third party operators (who have contractually accepted these terms when they used Foursquare's API). We might think of Foursquare's API policy not as rules, but as an articulated space of possible practices, some prohibited and others implicitly or explicitly left open. Girls Around Me can only come into existence within the parameters established by those policies; it then can fully occupy the space those policies offer, and can look to them as defense when their own service comes under criticism [67]. This policy-bounded terrain of possible practices is one that Girls Around Me happily filled, but might have been filled by other apps in due time.

Foursquare's terse response to the criticism surrounding Girls Around Me also depended on policy to articulate the appropriate interactions between the app and its service, leaning on the authority of policy to re-frame the controversy and restore its reputation as a responsible and good-faith actor vis-à-vis its user base.

"In a statement given exclusively to Cult of Mac, Foursquare's Laura Covington said: 'This is a violation of our API policy, so we've reached out to the developer and shut off their API access.' Asked to clarify with us the section of their API policy that prohibits apps like Girls

Around Me from using their data, Foursquare responded: 'We have a policy against aggregating information across venues using our API, to prevent situations like this where someone would present an inappropriate overview of a series of locations'" [3]

With the advantage of a knot perspective, we might re-order the sequence of events further. Foursquare designed an API policy meant to define the space of possible practices for third-party developers and users. Girls Around Me occupied and took advantage of the space left by Foursquare in that policy, a space either unrecognized by Foursquare, or one that Foursquare was willing to overlook. When hypothetical practices emerged that troubled the design of the app (if you believe the designers), or represented its true intention (if you believe the critics), Foursquare invoked policy, first to exclude GAM from its data through a remarkably open-ended clause in its API platform: "Foursquare may revoke your authentication credentials at any time, for any reason or no reason, with or without notice, and without liability to you or any other person"[30]. Then it redesigned its policy to better constrain the space of possible practices that GAM had exploited. While it would be equally simplistic to say that policy came first and design and practice followed, tracing the strands of controversy by inverting the traditional sequential logic reminds us that policy was a part of the negotiation and constitution of this space from the very start.

Even centering the discussion on GAM and Foursquare may be too limiting however. Facebook also has policies that articulate how user profiles can be linked together, and which aspects of a user profile are made public by decree, by default, or by choice. Apple has policies about the character of the apps it allows, which were either underdeveloped on this issue or were overlooked until the controversy brought the app to public attention. Google Maps has policies about the use of its maps by third parties -- policies designed to fundamentally distance them from any particular use of those maps that might emerge (including presumably, questionable ones like these. When it comes to digital, networked, and social information tools, the engagement between designed artifact and the rights and protections of users and stakeholders is complex and multi-layered. A tiny piece of software may require a mobile platform on which to run, a third-party cloud service on which to store its data, and a partner information service from which to draw information resources. This network of elements means a network of stakeholders, each with its own economic imperatives, legal protections, and contractual obligations.

The implications of a socio-technical ensemble like that are not so easy to anticipate, and responsibility may fall on different stakeholders in different ways. Not only, then, is technical design implicated in policies that may affect how it can be constructed and articulated. It also means that designers and firms must not only craft technologies, they

must also craft their firm's legal status, the contractual assurances that partition out responsibility, and their anticipatory defenses in the case that something goes sour. This "symbolic heterogeneous engineering" [5] – or what one of our industry colleagues names more colloquially as "tilling the soil" – is a fundamental and inevitable part of design work writ large, and a powerful reminder of the embedded and 'knotty' character of today's social computing landscape. In this world, policy not only responds to design or practice, it also helps to establish the very terrain on which design and practice can be conceived, articulated, and imagined – and upon which battles of accountability are inevitably waged.

CASE 2: GOOGLE BUZZ

In February 2010, Google introduced a new social networking service known as Google Buzz, promoted as a high-profile competitor to Facebook and Twitter. Like other social networking platforms, Buzz was designed to allow users to "follow" each other and "to be followed." Within Buzz networks, users could post updates, make comments, and share photos, videos, and other information. While described as a new social networking platform, Buzz was deeply integrated into the existing Gmail email platform, and leveraged Gmail's existing personal user data (including first and last names, frequency of contact, and email addresses of people that a user communicates with) to populate and bootstrap the Buzz network.

On the day of the Buzz launch, Gmail users were presented with an announcement that the new service was available, and that with a single click, a pre-populated social network would be automatically established for them. If a user decided to proceed, the user's forty most frequent email contacts were used to pre-fill their Buzz network (with no process of notification or consent). Through this process, Gmail users were configured as "followers" in the Buzz network on the basis of frequency of email or chat interactions [58].

Controversy immediately ensued. Critics charged that Google had in effect publicly exposed private information concerning users' prior communication patterns. Critics noted that email contacts might not represent the kinds of "friends" one wanted made public: one might regularly email a therapist, an ex-spouse, a secret lover, or a political co-conspirator in dangerous situations [56]. They also pointed out that in its initial configuration Google Buzz made it difficult for users to exercise discretion and choice in when and how their patterns of interaction were revealed. For example, if Gmail users later decided to opt out of Buzz, they still appeared as "followers" on the profiles of other users who had once been in their contact list. Google responded by initially defending the service, arguing that its privacy policies and protections matched those of other leading social networking sites (Facebook, Twitter, etc.). But it also apologized and adjusted the service, replacing the automatic, opt-out system with an "auto-suggest," opt-

in approach by which frequent email and messaging contacts were *proposed* as followers, but only revealed publicly in the network when approved by the user [41].

In March 2011, in response to a complaint filed by the Electronic Privacy Information Center [23], the U.S. Federal Trade Commission (FTC) opened an official proceeding against Google for privacy violations in the unveiling of Buzz. In its complaint, the FTC argued that Google had violated the FTC Act and engaged in deceptive trade practices when it repurposed email contacts for the purpose of social networking. Most damningly, the FTC argued that Google had violated its own policies with regard to personal data, noting that Google had previously guaranteed: "[i]f we use this information in a manner different than the purpose for which it was collected, then we will ask for your consent prior to such use" [25]. The filing documented numerous instances of harm stemming from the disclosure, including reports of auto-populated Buzz networks that included individuals against whom users had restraining orders, abusive ex-husbands, clients of mental health professionals, clients of attorneys, job recruiters, and children.

In October 2011, the FTC issued its decision and final order on the Google Buzz case, announcing an unprecedented settlement that barred the company from future privacy misrepresentations, ordered it to implement a comprehensive privacy program, and required it to submit to regular, independent privacy audits for a period of 20 years [26]. The watershed nature of this ruling was noted in an FTC press release: "[t]his is the first time an FTC settlement order has required a company to implement a comprehensive privacy program to protect the privacy of consumers' information. In addition, this is the first time the FTC has alleged violations of the substantive privacy requirements of the U.S.-EU Safe Harbor Framework..." [27]. While targeted at Google, the settlement was also widely regarded as a statement and message to the social networking industry as a whole, and was widely hailed as setting an important new standard by privacy advocates around the world. As predicted by Leslie Harris, President of the Center for Democracy and Technology, "the terms of this agreement will have a far reaching effect on how industry develops and implements new technologies and services that make personal information public," setting "new norms" for any company operating services with the potential to make private information public.

Stepping back from the details of the case, it would once again be easy to frame this controversy in terms of a tension between design and practice, with policy following behind to clean up the mess. Google designs Buzz to automatically turn frequent Gmail contacts into Buzz social contacts. The new service stumbles over subtle differences in the nature and meaning of public and private connections on email vs. social media. The results are sufficiently alarming that users and advocacy organizations turn to regulatory bodies like

the FTC to sanction Google’s actions. Google responds by redesigning its system and accepting a new level of regulatory intervention into its privacy practices going forward. But a policy-centric analysis can go a step further. To begin, as with Foursquare’s API policy in the GAM case, Google’s Gmail privacy policy set out a space of possible practices – which Google itself subsequently violated. The FTC had the institutional power and legitimacy to turn Google from this endeavor and penalize them for having violated their own terms.

The knot approach also helps us to situate these controversies in an institutional and a temporal framework, recognizing that the stakeholders in controversies like these are (a) not interacting only around this one incident, and (b) exist before and after these dust-ups, in an ongoing relationship. It would be easy to imagine, given the nature of the FTC complaint and the settlement, that Google and the FTC were enemy combatants on opposite sides of this issue. Or, after the model of the arms-length regulator, that the FTC’s role was akin to the traffic cop, intervening when clear laws were broken but otherwise staying above and firmly out of the action. But this controversy, and its regulatory conclusion, look different if we think about the ongoing, multi-dimensional, collaborative, and in some ways mutually dependent relationship Google and the FTC have developed over several years.

For instance, even as the Google Buzz controversy was unfolding, the FTC was in the process of developing its own privacy framework through a series of high-profile roundtables and public comment periods designed to source feedback from leading business, trade organizations, legal experts, technology experts, and privacy advocacy organizations. In April 2010 – two months after Google Buzz was launched and almost a year before the FTC issued its formal complaint – Google submitted its letter of commentary to this FTC roundtable, proposing best practices for large platform companies handling significant volumes of personal user data [32]:

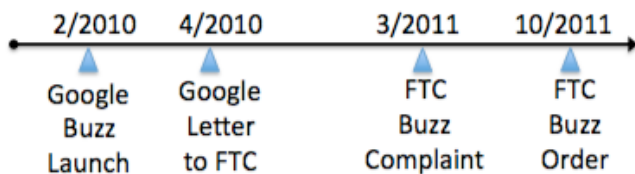


Figure 5: Google and FTC 2010-2011

These two very different interactions, in turn, were part of a much larger and longer set of interactions between Google and the FTC. Turning the clock back three years reveals yet other instances of formal engagement between the company and the FTC.

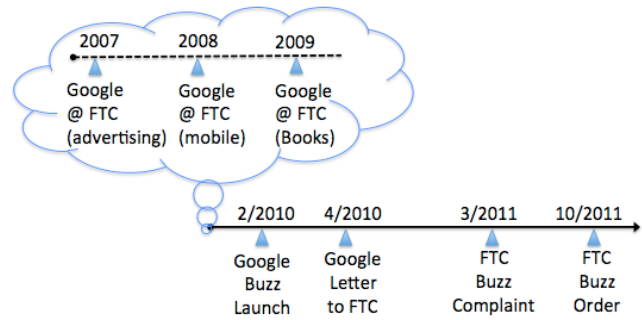


Figure 6. Google and FTC Expanded Timeline

In 2007 Google established a formal policy office in Washington, and contributed comments to an FTC Town Hall meeting on the topic of behavioral advertising – the same year that Google was under scrutiny by the FTC and federal antitrust regulators for its acquisition of rival online ad service DoubleClick [15,20]. In 2008, Google participated in an FTC Town Hall focused on the “mobile marketplace,” at which Google’s manager for mobile platforms argued that open platforms (such as Google’s Android) would result in more innovation and consumer choice [16]. In 2009, Google addressed the FTC regarding appropriate privacy policies for its new Google Books platform, with Google’s Global Privacy Counsel acknowledging that the eventual policy was “legally enforceable by the FTC,” and that the process of FTC engagement had “helped us clarify our practices and policies” [37]. More generally, over the past half decade – and in contrast to the scrappy start-up image it still sometimes likes to project – Google has established itself as a major policy player in Washington, deeply engaged with Congressional and regulatory authorities around key policy issues including net neutrality, intellectual property, online privacy, security, and freedom of expression [10,33]. In the process, it has joined the rarefied group of telecommunication firms and major equipment manufacturers who maintain an active presence and lobbying effort around the ongoing shape and direction of U.S. technology policy.

In 2012, the FTC issued its landmark “Privacy By Design” report, proposing a new privacy framework designed to “enhance trust and stimulate commerce” [28]. In the report, the FTC urged companies to adopt and implement best practices in accordance with a set of guiding principles that include “considering privacy at every stage of design” (p. 22), “providing simplified choice for customers” (p. 35), and “ensuring greater transparency” (p. 60). While the FTC sanctioned Google in 2011 for Buzz, and launched a nineteen-month antitrust investigation into their mobile and search practices that same year, Google was still engaged with the FTC in a constructive dialog on privacy policy in 2012, and used its letter to highlight its commitment to user empowerment and industry self-regulation.

Our understanding of Google's design choices and the way they intersect with user practices changes if we situate individual design interventions like Buzz amidst the ongoing process of building, maintaining, and negotiating relationships with a complex set of regulatory actors like the FTC, the U.S. Congress, the European Commission, and countless other policy entities. The interactions between companies like Google and the FTC might be viewed as a dance between a regulatory agency and commercial stakeholders. This dance is deeply "knotted" with the tools Google pursues, the design choices they make, the practices they anticipate; the way users respond to or reject these technologies, frame their understanding of them in publicly available terms (like "privacy violation"), and turn to policy actors to counter or challenge them. Whether we should see Google's array of letters, testimonies, lobbying efforts, and policy statements as (a) efforts to ingratiate itself with regulators in anticipation of later inquiries, (b) efforts to frame the debate about current and future policy concerns in ways that will open up future business opportunities, (c) a genuine desire to contribute their expertise to those who are setting important information policy standards, or (d) all of the above, is an empirical question. But it is one that should be within CSCW's intellectual purview to address.

CONCLUSION:

This paper has argued for the importance of new and creative attention to policy as a key third factor alongside CSCW's more traditional orientations to design and practice. It has also advocated a particular framework for conceptualizing this relationship: namely, the understanding of design, practice, and policy as linked in complex knots whose interconnections (rather than any one strand in isolation) constitute new and emerging sociotechnical forms. This general approach goes against both a division of labor argument (in which policy concerns are best left to other fields and scholars), and a priority in time argument, in which policy is regarded as necessarily trailing or chasing after the "true" origin of computational novelty and innovation in design or practice. Such positions we believe misstate the nature of change and innovation in social computing today, which come to us in forms inextricably bound and tangled, with no universal sequencing or priority among them. They also place important questions of policy and governance beyond the reach of CSCW scholarship.

The knot described here functions as a heuristic rather than a simple blueprint, roadmap, or recipe for action. Nor is it primarily oriented to generating the kinds of immediate "implications for design" [18] sometimes looked for in CSCW scholarship. It describes a set of *potential* relations among forces at play in the social computing landscape, but cannot produce global predictions as to how these will play out. In some moments and cases, some factors may be more in dominance than others, with policy driving design, or design determining practice, etc. But these are "effects" of the knot we've described, rather than stable and universal truths that stand outside of it: properties of the particular

configurations of design, practice and policy at play in a given circumstance rather than necessary or universal properties of their interrelation. Under such conditions, "structure" is often yet to be established, and the nature of the relationship between various actors or elements in the story (here, design, practice, and policy) is precisely what is to be worked out. An approach that names these elements – but holds their precise nature and the relationship between them open – has important advantages.

Nor do the three elements called out above – design, practice, and policy – exhaust the space of explanatory interest. Implicit in the stories above are different explanatory possibilities: institutional analyses of firms, markets and the state, political economy, and other approaches emphasizing the formative influence of various kinds of structure. We believe the framework proposed here is friendly to these approaches, and may provide other ways of getting at the processes through which such structures are achieved and express themselves. It is also the case that other scholars have pursued a similarly integrative agenda, including recent lines of scholarship in the innovation, intellectual property, and privacy spaces that have shaped and influenced our own analyses [22,59,60,66]. Finally, we are not at the end of the day hung up on knots in particular (though we think the metaphor carries well many of the points of connection and entanglement we wish to make). Other languages and metaphors that point to the constitutive interrelation of the three elements named here may perform broadly similar and equally welcome work.

Such disclaimers aside, we believe that our model has distinct and important affordances, perhaps especially for fields like CSCW that straddle the line between technical and social and in light of the emergent conditions that characterize the social computing landscape today.

First, while the knot cannot definitively settle how design, practice, and policy interact at the local level, it is also emphatically *not* an invitation to throw up our hands and say "well, it's all interconnected." While we cannot (and would not) make a statement about determinism at a meta-level, examining socio-technical controversies with the knot in mind can indeed highlight local determinisms. We know from both research and experience that particular technological forms can have significant consequences for the social and policy arrangements that follow. Likewise, while policy does not always determine what tools are built and how they are used and understood, particular policies can have real ramifications on both. And though the ways users take up a technology does not always determine its ultimate social course, in a specific instances, unanticipated uses can turn both design and policy on their head. These and myriad other examples teach us that while it is certainly true that technology does not always drive practice or policy (or vice versa), it is just as certainly true that, in some instances, it *does*. Calling attention to the ways in which these elements are brought together may help us to

understand how these effects are formed, casting much-needed light on the local mechanics of determinism.

Second, taking knots seriously may suggest more immediate tactics of use to CSCW researchers and practitioners. Two stand out here as worth highlighting. The first concerns the powerful temporal assumptions surrounding the relationship between design, practice and policy, and in particular the widespread tendency to place policy at the end of a temporal chain that begins in design and practice. To counter this, we encourage researchers to practice reversing this temporal sequence, if only as an analytical move. What policy frameworks existed before the controversy emerged, before even the technology in question was designed? How did such frameworks limit but also enable the kinds of technologies could be designed and imagined? How did these policy frameworks leave space for, prepare, or otherwise anticipate the design innovations that followed? Such inversions can extend our temporal imagination and help unearth new connections and responsibilities across the intertwined worlds of policy, practice and design.

Another pervasive assumption places policy and innovation in opposition, with policy at best irrelevant to the process of technical invention, and at worst a force that hampers and undercuts it. There are no doubt instances in which this description holds true (and designers and firms may get important mileage out of telling it to discourage forms of regulation they don't want). But try once again inverting this assumption, even if only as analytic tactic. In the case at hand, where has policy been innovative, and technological design constraining? And where have they worked together, producing innovation *through* the interaction rather than despite it? Recognition of the potentially creative and generative interplay of design, practice, and policy can help to correct and rebalance what are too often our single-point stories of change and innovation. It can also help remind us that the nature of work and invention in social computing is complex and multi-faceted, with room for strategic and meaningful action across any and all of the spheres named here.

We have argued that the knot model and more explicit attention to policy have timely and important things to offer CSCW scholarship and practice, especially where it meets the unsettled landscapes of new and emergent computing forms. In such contexts, better understanding of knots can help us go beyond monocausal or deterministic understandings of change by which power and responsibility are mistakenly assigned to one side or element of what is in fact a complex and deeply entangled relationship. It can expand the reach and scope of CSCW analysis, adding sites and processes of policy formation that may turn out to be decisive for the long-term evolution of the social computing field. And it provides one useful way of getting from the particular to the whole without falling back on the shibboleths of structure or scale: the “web of

computing,” as described by Kling and an earlier generation of CSCW scholars, is nothing more (or less!) than a series of just such knots, progressively wound and rewound through time.

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