When Social Meets Technical: Ethics and the Design of "Social" Technologies*

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Introduction

Traditionally, social concerns such as freedom and privacy have been addressed by complex systems of laws, norms, and cultural beliefs. While the growing use of computers and other technologies has raised serious questions about the future of these civil liberties, so far policymakers have primarily sought answers in terms of legal remedies rather than the technologies themselves. This is due, in part, to the traditional view held by many policymakers, namely that technology develops autonomously. That is, technology is assumed to evolve according to its own internal logic, and thus attempts to bring social and ethical concerns into the actual *design* of technology are doomed to fail.

However, recent work in the field of Science and Technology Studies (STS) challenges this assumption. While popular press reports often portray technology as something beyond human control, careful study of real world technologies show this is seldom the case. Instead, STS scholars argue that human choices are present at every stage of a technology's development and, furthermore, that human values are reflected in the very design of every technology. This suggests that social concerns can and should play a role in the design of technology. Indeed, a growing number of technologists are beginning to take up this challenge, developing products that are meant to explicitly address issues such as freedom and personal privacy.[1] This year's *Computers, Freedom, and Privacy* conference even has a workshop on "Freedom and Privacy by Design," whose goal is to explore "using *technology* to bring about strong protections of civil liberties."[2] Has the use of technology to address social concerns finally come of age?

In this paper I address some of the promises and perils in designing "social" technologies, i.e., technologies that explicitly address social concerns such as freedom and privacy. I begin by examining how traditional views of technology as an "autonomous force" have discouraged the incorporation of social and ethical considerations into design. I then examine the development of a specific technol-

ogy—Highway 407, being built just north of Toronto, Ontario—to show how privacy issues can be addressed early on in the design of a project. Finally, I look at several up-and-coming technologies and offer some cautionary lessons for those seeking to design social technologies. I argue that the bringing in of social and ethical concerns into the design arena is both desirable and problematic, and that for such projects to succeed we will need new, more participatory forms of technological innovation.

Design and Technology: Challenging the Assumptions

For many people, the idea that technology is moving faster than society can adapt seems like common sense. When a 1995 opinion poll asked American consumers whether they agreed with the statement that "technology has almost gotten out of control," an astounding 63 percent of respondents said yes.[3] Media reports reinforce this belief: with few exceptions, the press in America tends to talk about technology as if it were an external force beyond human control. Thus, in a 1994 interview with *Business Week* Andy Grove, chief executive officer of Intel Corporation, suggested that technology is "like a force of nature" and it is counterproductive to even attempt to slow down the pace of change.[4] Such statements frame the relationship between technology and society as a one-way street, viewing humans as passive recipients of technological "impacts."

Are these assumptions correct? Does technology evolve according to a logic of its own or, as Langdon Winner has put it, is technology *autonomous*?[5] Although technologies are clearly human creations, the idea that they are moving beyond our control holds wide currency. And while the idea that "technology drives society" is not new, in recent years techno-determinist thought seems to have reached a feverish pitch. The popular press seems to have embraced determinist theories like never before in a kind of technological hype that Winner calls "the dominant fin-de-siècle myth."[6] In a special issue on technology, for example, the editors of *The New York Times Magazine* ask "What is technology doing to us?" and glibly answer that it "makes us better"; meanwhile, Alvin Toffler, a prominent writer and futurist, claims we are entering a "new wave" where those who cannot adapt to technological change will be left behind forever.[7]

Perhaps it is not surprising that those who are optimistic about the future tend to embrace the idea of autonomous technology. However, even when people are deeply ambivalent about the effects of technology, they often still talk about these effects as if they were inevitable. Thus, a recent issue of *Forbes* magazine suggests that there is "lively debate as to whether surveillance technology will bring on Orwell's *1984*, …or constitute a giant step toward human freedom"; yet, in the very next sentence, the author states "[e]ither way, the damned thing is practically here. Let the chips fall where they may."[8] An article in *PC Computing* puts the message more bluntly: while reviewing the privacy implications of electronic commerce on the Internet, columnists Taylor and Jerome conclude that "[l]ots of entrepreneurs will make more money by selling the cybersouls of their customers than by whatever business their sites purport to be in. Creepy? You bet. *It's also unstoppable.*"[9]

In all of these examples the message is the same: technology is autonomous force and any suggestions that humans could steer technology to address specific social concerns are naïve and unrealistic. The implication is that ethical discussions are largely irrelevant when it comes to technology. This view of technology is thus a *barrier* to ethical design: it implicitly denies the possibility that social and ethical considerations can be built into the design of real world technologies.

An Alternative View

In contrast to the above view, scholars in the field of STS argue that technology is fundamentally social in nature. Rather than seeing technology as being separate from society, STS scholars have shown how both "social" and "technical" considerations are present in the making of any technology.

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This suggests that social concerns such as freedom and privacy can and should be explicitly addressed during the design of new technologies.

Many different technologies have been studied by scholars in STS, from bicycles to home appliances, and from computer systems to weapons systems.[10]   For example, in their study of the common bicycle, Pinch and Bijker found that a number of different designs were popular at the turn of the century. Furthermore, each design embodied different values: one model was developed with a higher seat so that women would be able to ride the bicycle while wearing the long dresses typical for that time period. Another model was built with a 56 inch front wheel, making the bicycle speedy but also rather unstable. In both cases we can see certain values taking precedence over others: fashion versus comfort in the first, speed versus safety in the second. These values are not separate from the technological artifacts; rather, they are reflected in the very design of the artifacts.[11]

In all of these studies a common theme emerges: technologies do not evolve autonomously, but rather are the product of complex sets of social relations that inevitably bring in "non-technical" considerations such as politics, economics, ethics, and so on. This is not to say that technical considerations aren't important. But it is to say that human values, and not some mysterious "internal logic," are what guide the development of new technologies. If this is the case, why not include freedom and privacy as explicit values to protect in the design of information systems? In the following section I describe one case where this kind of socially-informed design actually happened.

Privacy by Design: The Case of Highway 407

Information systems are usually not conceived with privacy protection as a basic design objective. Instead, other objectives such as interoperability or cost-efficiency are given a higher priority, often at the expense of personal privacy. Consider the use of Social Security Numbers (SSNs) in the United States: although originally intended for government use only, SSNs are now used by many other institutions as a convenient way to identify their clients.[12]   At my university, for example, they double as student ID numbers—this despite the obvious dangers of linking the kinds of sensitive information SSNs were meant to track (e.g., employment status, annual income, taxes owing, etc.) with something as common as a student ID. When I raised this issue with the Registrar's Office they responded by saying it would too expensive to redesign the school's registration system and give students new ID numbers, just in the name of addressing this "small" privacy concern. Yet, this was not an inevitable outcome: the original designers of the registration system could have actively built in privacy protection from the get-go, by making the student ID field have a different form than the 9-digit SSN, for example. Instead, we are stuck with a poorly designed system from which it is hard to "recover" personal privacy.

In contrast, when user concerns are raised early on in the design of a given technology, issues like privacy can often be addressed with a minimum of additional effort and expense. An example of this occurred with the construction of Highway 407, an electronic toll highway being developed just north of Toronto, Ontario. As the first electronic toll highway ever constructed in Canada, the 407 is precedent setting in a number of ways. It is being financed through a private consortium, rather than by government; it charges tolls for drivers, something never before done on a "public" highway in Canada; and it charges these tolls *electronically*, using radio-frequency transponders. Since charges are based on the distance and time of day traveled, the system must keep track of when and where users travel on the highway.[13]

From the viewpoint of privacy, obvious questions arise when one talks about tracking people's movements. Privacy concerns have been raised in a number of European countries regarding the use of smart cards and photo radar on highways. In the case of Highway 407, similar concerns were raised by the Office of the Information and Privacy Commissioner (IPC) of Ontario regarding the highway's

electronic tolling system. The IPC brought these concerns to the attention of the highway's developers and together they negotiated an option for those concerned with privacy: motorists would be able to purchase "anonymous" transponders, provided they paid for them in cash. This would allow users to travel the 407 in exactly the same way as regular motorists, except that their usage of the highway would not be linked to any particular name or address.[14] This solution satisfied the IPC and construction on the highway proceeded.

What can we learn from this example? The first lesson is that ethical issues can and should be addressed during the design of technical systems, rather than being left as an afterthought. Early intervention on the part of Ontario's IPC resulted in an inexpensive solution to legitimate privacy concerns. The second lesson is that social causes need advocates: if Ontario had not had an information and privacy commissioner's office these concerns about the 407's toll system might never have been raised. Indeed, while the IPC did an admirable job in addressing this technology, there seems to have been very little public recognition of the highway's privacy implications.[15] The third lesson is that even privacy advocates can get the story "wrong," or at least incomplete: the 407's tolling system is far from perfect, as those who do not pay for their transponders in cash cannot travel anonymously. While the option of anonymous transponders is a good one, one wonders why all of the transponders were not made anonymous. In order to do so, the system's designers would need to ensure that information used for billing purposes could not be linked to usage statistics from the highway's tracking system—something that is technically feasible.[16] Unfortunately, it seems that both the designers of Highway 407 and Ontario's IPC did not seriously consider how to build in privacy into this electronic tolling system. By default, then, it seems that Highway 407 is designed to *not* protect privacy.

Ethics and Design: Some Cautionary Lessons

The preceding discussion illustrates some of the problems that can arise from poorly designed information systems. It also illustrates the dangers of separating social and ethical concerns from design. As many scholars have noted, trying to draw a boundary between "social" and "technical" is a problematic exercise, yet this is precisely what computer professionals try to do.[17] If, on the other hand, we admit that the two are usually intertwined in technical systems, we are motivated to tackle a different question: how to ensure that social considerations are *explicitly* discussed during the design process?

One way to further this project would be to promote early collaboration between ethicists and designers.[18] Perhaps designers should take more ethics courses, especially ones that stress the social aspects of technological design. Or perhaps design teams should hire ethicists to speak on behalf of those who are excluded from a particular design environment. If we take for granted that design teams are well aware of certain values (e.g., the need to make a system that is cost-effective, marketable, or durable) but less cognizant of others, perhaps the most important thing ethicists can do is draw attention to those values that might otherwise be neglected.

Another strategy would be to make design processes more open and transparent to the public. In doing so, one would hope to increase citizen participation in technological decision making, so that the design of technology became more democratic. This strategy contrasts sharply with the message usually put forth in the media, which asks people to "sit back and take your technology quietly." A suitable name for this strategy might be *participatory design*. As a social movement, participatory design (PD) traces its roots to Scandinavia, where it grew out of a desire to make computer systems more responsive to user needs. The movement is now gaining momentum in many different countries. As Schuler and Namioka explain, PD represents "a new approach towards computer systems design in which the people destined to *use* the systems play a critical role in *designing* it."[19] PD differs from traditional models of design in several ways: it views users as "experts" and their needs as being paramount; it assumes that user perceptions are at least as important to success as any "technical"

considerations; and it considers the design of technical systems within the broader social context. In short, PD views the development of technical systems as a process, not just the creation of a product. Within this process, user needs can be addressed in new and innovative ways, in part because PD accepts the importance of ethics and social values to systems development.

While this approach sounds fine in theory, it has yet to be put into practice in any systematic way. Indeed, our normal mode of technological development goes against most of the ideals of PD. Of the many social technologies currently under development, most are being developed by private organizations far away from the view of the public. For example, Zero-Knowledge Systems' much anticipated Freedom™ technology promises to revolutionize privacy protection on the Internet, but its development has occurred primarily within the "closed world" of private enterprise than the "open world" of public debate and critique. Similarly, the World Wide Web Consortium's (W3C) P3P™ specifications have been developed behind the closed doors of that organization, where members of the public are not allowed to sit.[20] My point in mentioning these two cases is not to besmirch the work of those two organizations. I do not believe that the people working for either Zero-Knowledge Systems or W3C are being malicious in their work; indeed, I think they are doing good and important work in their quest to design technologies that will protect people's online privacy. However, the fact that *their* values—the values of designers and developers at these organizations—will come to define what levels of privacy people have on the Internet is disturbing. After all, the Net is used by millions of people; the fact that technologies which may soon set the standard for personal privacy have been developed without much public input or debate is worrisome to anyone who believes in principles of democracy.

Closing Remarks

In this paper I have argued that the popular conception of technology as an autonomous force is a barrier to the design of "social" technologies. This is because such a conception places technology at the center of social change and relegates human choices to the margins. If technology were truly autonomous there would be no point in discussing how to steer technology towards any particular social or ethical goals, since we could never alter our (digital) destiny anyway. While the idea of runaway technology has received much fanfare in the popular press, it does not accurately reflect the complexity of real life. Scholars in the field of STS have shown that the development of science and technology always involves choices. This insight opens the door to including social and ethical considerations early on in the *design phase* of technological invention. Rather than waiting for technology to "arrive" and then worrying about its implications for society, citizens need to collaborate with designers to ensure that social values are taken into consideration from the very beginnings of a product's development.

The lessons I have drawn are meant to serve as guideposts and warnings for designers of technical systems. On the one hand, consciously designing values into technologies is a desirable turn: it recognizes that values are *always* involved in the design of technology and that we have the ability to develop technologies that will protect, rather than undermine, values such as freedom and privacy. At same time, the act of designing values into a technology is a dangerous one: a world with technology X may be achievable, but at what cost? This, too, is a question with which thoughtful designers must grapple. Ideally, designers should not only recognize that their creations are value-laden, but be willing to open up their creations to public scrutiny, so that a wide range of people could debate the value(s) of that particular technology.

Above all, I would like to urge designers of technology to be humble in their work: realizing that you can design values into technology is not enough; you should also recognize the political consequences of your work. This is not to say that we should not design technologies that address social issues—on the contrary, from my vantage point we cannot afford *not* to! However, if we are not humble

as designers, we risk substituting our values for those of the general public and embedding them into technological infrastructures that may be difficult to change later on. In short, we risk pre-empting open, public debate about what kind of values should be guiding our society's technological development. And that is a road I hope we do not take.

References

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[1] For example, look at the Freedom™ system being developed by Zero-Knowledge Systems or the Platform for Privacy Preferences Project (P3P™) being developed by the World Wide Web Consortium.

[2] See the CFP2000 "Call for Participation" at: http://www.cfp2000.org/workshop/.

[3] The 1995 Equifax-Harris mid-decade consumer privacy survey, online at: http://www.equifax.com/consumer/parchive/svry95/survy95a.html.

[4] "The World According to Andy Grove," Business Week: The Information Revolution (1994 Special Issue), pp. 76-8.

[5] Langdon Winner, *Autonomous technology: Technics out-of-control as a theme in political thought* (MIT Press, 1977).

[6] Langdon Winner, "How technomania is overtaking the millennium," *Newsday,* November 23, 1997, p. B6.

[7] *New York Times Magazine* editorial, "Technology makes us better," September 28, 1997, p. 45; Alvin Toffler, *Powershift: Knowledge, wealth, and violence at the edge of the 21st Century* (Bantam Books, 1991).

[8] Ann Marsh, "No place to hide," *Forbes,* September 22, 1997, pp. 226-34.

[9] Taylor and Jerome, "We know where you live," *PC Computing,* October 1997, p. 91 (emphasis added).

[10] To give just a sample of the work that has been done in this field, see Wiebe Bijker *et al.* (eds.), *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (MIT Press, 1987); Ruth Schwarz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (Basic Books, 1983); Batya Friedman (ed.), *Human Values and the Design of Computer Technology* (Cambridge University Press, 1997); Donald MacKenzie, *Inventing Accuracy: A Historical Sociology of Nuclear Missile Guidance* (MIT Press, 1990).

[11] Trevor Pinch and Wiebe Bijker, "The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," in *The Social Construction of Technological Systems,* Bijker *et al.* (eds.), pp. 17-50.

[12] For more information see Chris Hibbert, "Some Frequently Asked Questions on SSNs," online at: http://www.cpsr.org/cpsr/privacy/ssn/ssn.faq.html

[13] General background on the Highway 407 story can be found at: http://www.407etr.com/stor/.

[14] See "407 Express Toll Route: How You Can Travel This Road Anonymously" at: http://www.ipc.on.ca/web_site.eng/matters/sum_pap/PAPERS/407.htm

[15] I found only one newspaper article during the entire 407 construction period that reported on these privacy issues. See Mary Gooderham, "Privacy at risk in toll systems, drivers told," *The Globe and Mail,* March 18, 1995, p. A4.

[16] See, for example, "Privacy-Enhancing Technologies: The Path to Anonymity," a joint report of the Information and Privacy Commissioner of Ontario and the *Registratiekamer* of The Netherlands (1995). The irony is that the findings of this report, which Ontario's IPC helped produce, were never fully applied to the Highway 407 case.

[17] See, for example, Brian Bloomfield and Theo Vurdubakis, "Boundary disputes: Negotiating the boundary between the technical and the social in the development of IT systems," *Information Technology & People,* 7(1): 9-24 (1997).

[18] I use the term "ethicists" here as shorthand for anyone with social and ethical concerns relevant to the design of technology, including philosophers, scientists, religious leaders, social critics, and "ordinary citizens."

[19] Douglas Schuler and Aki Namioka (eds.), *Participatory design: Principles and practices,* (Lawrence Erlbaum Associates, 1993), p. xi.

[20] See Karen Coyle's FAQ, "Some Frequently Asked Questions About Data Privacy and P3P," online at: http://www.cpsr.org/program/privacy/p3p-faq.html.