The Role of Diffusion Characteristics in Formulating a General Theory of Law and Technology

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Introduction

A general theory of law and technology could provide policy guidelines that improve technology regulators’ decision-making. Opponents of such general theory caution that generalizations might prevent the recognition of technological uniqueness, and that the application of broad and indiscriminate principles could impede the identification and appropriate social accommodation of important and novel technologies. To overcome this objection, a general theory of law and technology should provide fine-tuned policy principles that identify the main characteristics differentiating technologies while still providing a common framework that deals with their common attributes.

In this Article, I suggest that the technological characteristics that influence a technology’s diffusion—its social adoption process—would provide a constructive foundation for formulating fine-tuned policy guidelines. Policy principles based on the identification of the technological characteristics that influence a technology’s diffusion (diffusion characteristics) would not apply narrowly to a specific technology nor would they provide overly broad guidelines relevant to all technologies. Rather, policy guidelines based on diffusion characteristics would be appropriately attuned to both
technological differences and commonalities.

To illustrate my proposal I use case studies of privacy controversies involving two technologies: genetic testing and the Internet. I hope to promote the general theory project by also showing that helpful insights can be derived from the joint study of seemingly very different technologies. The two case studies exhibit paradoxical relationships between privacy protection and technological diffusion. In the case of genetic testing, I focus on genetic discrimination. My analysis of empirical data shows that although genetic discrimination is rare and apparently on the decline, concerns about discrimination preclude individuals from using genetic testing, thereby inhibiting the diffusion of an important new technology. At the same time, my examination of the collection of personal information by commercial entities on the Internet reveals a mirror-image paradox. While use of privacy-threatening devices, such as cookies is on the rise, the increasing privacy threat has not inhibited Internet diffusion.

I suggest that by focusing on diffusion characteristics we could accomplish two goals. First, identification of the diffusion characteristics that made a technology susceptible to the privacy-diffusion paradox could be useful in predicting which technologies are likely to fall prey to a similar paradoxical relationship. Specifically, I argue that genetic testing’s preventive and non-triable qualities and the Internet’s critical-mass-point quality and decentralized nature made them vulnerable to their respective privacy-diffusion paradoxes.

Second, understanding the role of diffusion characteristics in these controversies could serve to formulate policy guidelines to help resolve both the controversies at issue and future techno-privacy disputes involving similar technologies. I propose that where a technology, like genetic testing, exhibits preventive and non-triable diffusion characteristics, an express and clear-cut privacy protecting law is needed, not necessarily to combat the privacy threat itself, but to alleviate individuals’ fears that inhibit them from using the technology. Further, where a technology is centrally diffused, as is genetic testing, efforts to reduce concerns are likely to be most effective when directed at those diffusing the technology, in this case, genetic counselors. I also suggest that when a technology, like the Internet, has a critical mass quality and is decentrally diffused, social norms, in this case non-privacy norms, are quickly entrenched. At that point, both legal and technological
measures become less effective. Consequently, in these instances, timing should become an important factor in regulators’ decision-making process.

The Article proceeds as follows. Part I presents the two privacy-diffusion paradoxes of genetic discrimination and commercial privacy on the Internet. Part II identifies the diffusion characteristics that made genetic testing and the Internet susceptible to their respective paradoxes. Finally, Part III proposes use of diffusion characteristics as a policy tool to resolve techno-privacy controversies.

I. PRIVACY-DIFFUSION PARADOX MODELS

A. GENETIC DISCRIMINATION

The public is greatly concerned about genetic discrimination by employers and insurers.1 The media, governmental organizations, and public interest organizations spread genetic discrimination fears.2 Furthermore, medical professionals, particularly genetic counselors, share these concerns.3 They play a major role in spreading genetic discrimination fears by warning their patients that genetic testing could result in genetic discrimination.4 Consequently,


for many individuals, genetic testing has become synonymous with genetic discrimination.

Nevertheless, a survey I conducted of empirical research on genetic discrimination by insurers and employers revealed that, in fact, genetic discrimination is rare and that despite the growth in the number of available tests, it is on the decline.\(^5\)

The prevalence of fears of discrimination despite the absence of supporting evidence is disconcerting because of its effect on individuals' decisions to undergo genetic testing. Although the decision of whether or not to undergo genetic testing is motivated by additional factors, research has shown that fear of genetic discrimination by insurers and employers is the primary barrier against testing, particularly among presymptomatic adults who could test for adult onset diseases.\(^6\)

The current legal regime provides only partial and inconsistent protection from genetic discrimination.\(^7\) It has not played an important part in preventing genetic discrimination.\(^8\) But, more importantly, it has not alleviated the genetic discrimination concerns of either genetic counselors or those contemplating the use of the technology. Studies have shown no reduction in patients' fears following the enactment

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6. See, e.g., Katherine P. Geer et al., *Factors Influencing Patients’ Decisions to Decline Cancer Genetic Counseling Services*, 10 J. GENETIC COUNSELING 25, 30-31 (2001). For a discussion of the relevant literature, see Bernstein, *supra* note 5, at 263-64. Adult onset diseases are genetic diseases that may develop later in life, such as breast cancer, Alzheimer’s disease or Huntington’s disease.


of genetic discrimination laws.\(^9\)

Hence, the findings point to a privacy-diffusion relationship that gives cause for concern. Genetic discrimination is rare and apparently on the decline. Yet, misperception of the practice of genetic discrimination inhibits the diffusion of genetic testing technology. Genetic discrimination laws provide partial protection at best and contribute to the uncertainty regarding the status of privacy protection. Consequently, the law has not been a major factor in inhibiting genetic discrimination, nor has it been successful in alleviating individuals’ genetic discrimination concerns, thus failing to facilitate broader adoption of the technology.

B. INTERNET PRIVACY

With the advent of the Internet to popular use, web sites and commercial-profiling companies began collecting personal information, through use of cookies, spyware, and the less well-known web bugs. Their goal was to target advertising at Internet users and sometimes to transform Internet sites to match a visitor’s interests and financial ability.\(^10\)

Commercial collection of personal information on the Internet reached public awareness in 1999–2000.\(^11\) Yet, despite mounting public pressure, courts have not found commercial profiling through use of cookies as compromising individuals’ privacy.\(^12\) Further, legislative responses focused only on spyware and the settlements reached between government agencies and collectors of personal information on

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the Internet failed to provide a comprehensive solution. Consequently, the law, in effect, produced a legal pronouncement permitting collection of personal information on the Internet.

Legal regulation was not the only potential mode of regulation for the collection of personal information on the Internet. Two other modes were tried: industry self-regulation and technological solutions. However, neither of these proved effective in containing information collection practices.

Unsurprisingly, the findings of a survey I have conducted of empirical data measuring the use of privacy-threatening Internet technologies revealed that the practice of collecting personal information and commercial profiling is booming. At the same time, it appears that concerns about the privacy threat posed by the Internet have not made any evident impact on the diffusion of the technology. In the period between 2000-2003, when users became increasingly aware of the threat to their Internet privacy, the U.S. online population expanded


15. Id. at 270-2.
from eighty-six million in 2000, to one hundred and twenty-six million in 2003.16

Hence, the collection of personal information on the Internet portrays a mirror image of the privacy-diffusion relationship paradox evidenced in the case of genetic discrimination. The use of privacy-threatening Internet devices that enable the collection and use of personal information on the Internet is constantly increasing. Yet, the diffusion of Internet technology is not affected.

II. USE OF DIFFUSION CHARACTERISTICS TO IDENTIFY TECHNOLOGICAL SUSCEPTIBILITY

Understanding the characteristics that made genetic testing and the Internet susceptible to these privacy-diffusion relationships is a first step toward resolving the privacy paradoxes of genetic discrimination and the Internet. Furthermore, technologies are often not as unique as they appear at first blush. Identifying the technological characteristics that created the genetic testing and Internet privacy-diffusion relationships could inform decision-making regarding other technologies that share the same characteristics. Early identification of these characteristics could serve as an important tool in the hands of those in charge of regulating new technologies.

In this Part, I identify two diffusion characteristics that made genetic testing susceptible to its problematic diffusion-privacy relationship: (i) its preventive nature and (ii) its non-triable quality. I also point to two different diffusion characteristics that made Internet technology vulnerable to its respective privacy-diffusion relationship: (i) its critical mass quality and (ii) its decentralized nature.17


17. Two additional factors may have contributed to the development of the two privacy-diffusion relationships. First, the Internet privacy-diffusion relationship is likely also a result of the invisible nature of Internet monitoring. Individuals cannot see cookies, web bugs, and spyware. Even individuals who are knowledgeable about Internet monitoring are not constantly reminded that commercial entities are monitoring their Internet conduct. Consequently, people are less likely to react to the privacy threat. For a more detailed discussion of the invisible monitoring factor, see, Gaia Bernstein, When New Technologies Are Still New: Windows of Opportunity for Privacy Protection, 51 VILL. L. REV. 921 (2006). Second, the sensitivity of
A. GENETIC TESTING: A PREVENTIVE TECHNOLOGY

Preventive innovations are technologies aimed at avoiding unwanted consequences. The rewards to the individual from adopting a preventive innovation are often delayed in time. The unwanted results may not occur right away or may never occur at all. They are also relatively intangible. Examples of preventive innovations are using car seat belts, adoption of soil conservation practices, being screened for breast cancer, getting inoculations against a disease, flossing one’s teeth, and testing for HIV/AIDS.

Genetic testing is also a preventive technology. The goal of the genetic test is to detect the probability for disease in advance in order to take preventive measures where possible or make informed life decisions. Yet, most genetic diseases are not certain to develop even when an individual carries the genetic mutation. Even if the individual will eventually develop the disease, this could take place well into the future.

Medical information may have contributed to the genetic discrimination privacy-diffusion relationship. Individuals are very sensitive about disclosing their medical information, particularly due to the grave consequences of losing one’s insurance. Yet, it appears that individuals’ reactions to threats on their personal medical information are also context and technology related. Although Internet users express great concern about the collection of their personal health information on the Internet and take some measures not to disclose their personally identifiable information, the majority of Internet users research health issues on the Internet. Furthermore, during the period in which the public became aware of privacy concerns on the Internet the percentage of Internet users that sought health information on the Internet increased from 54% in 2000 to 66% in 2003. See CA. HEALTHCARE FOUND. AND INTERNET HEALTHCARE COALITION, ETHICS SURVEY OF CONSUMER ATTITUDES ABOUT HEALTH WEB SITES 4 (2000), available at http://www.chcf.org/topics/view.cfm?itemID=12493; HEALTH PRIVACY PROJECT, HEALTH PRIVACY POLLING DATA (2004), available at http://www.healthprivacy.org/usr_doc/poling_data.pdf; PEW INTERNET & AM. LIFE PROJECT, HEALTH INFORMATION ONLINE ii, 3, (2005), available at http://www.pew internet.org/pdfs/PIP_Healthtopics_May05.pdf.


19. Id. at 233.

20. For a study focusing on the effects of the preventive nature of genetic testing technology, see generally Katrina Armstrong et al., Early Adoption of BRCA1/2 Testing: Who and Why, 5 GENETICS IN MED. 92, 96 (2003).

21. For example, a woman who carries the genetic mutation for breast cancer (BRCA1 or BRCA2) has a 50% to 85% chance of incurring the disease. Memorial Sloan-Kettering Cancer Ctr., Breast/Ovarian Cancer: BRCA1 & BRCA2, http://www.mskcc.org/mskcc/html/8623.cfm (last visited Apr. 28, 2007).
Such benefits are not tangible and do not provide an immediate reward.

Preventive innovations are characterized by a low diffusion rate—the technology tends to diffuse slowly and relatively few individuals adopt it. Preventive technologies have a lower adoption rate because of their weaker relative advantage. Relative advantage is one of the most important predictors of a technology’s adoption. Relative advantage is comprised of the economic profitability, social prestige, low initial cost, decrease in comfort, savings in time and effort, and the immediacy of the reward. Preventive innovations do not provide an immediate reward, but instead promise rewards that are distant in time and uncertain in nature. Furthermore, it is difficult to perceive the unwanted event because it is a non-event. Since preventive technologies have a weaker relative advantage, people are less likely to adopt them.

The preventive nature of genetic testing technology exacerbates the privacy threats imposed by the technology. Where the technology is preventive and individuals are already disinclined to adopt it, any additional problem including a privacy threat is likely to play a more significant role. Consequently, genetic testing technology was susceptible to the first privacy-diffusion paradox, where diffusion is inhibited despite the absence of an actual privacy threat. Other technologies that share the preventive technology characteristic also have a higher likelihood of being entrapped in this relationship.

B. GENETIC TESTING: A NON-TRIABLE TECHNOLOGY

The triability of an innovation is the degree to which a user can experiment with a technology on a limited basis. Users perceive triability as important because it reduces risk and uncertainty about the consequences of using an innovation. It provides adopters a risk free way to explore and experiment with the technology. Experimentation increases users’ comfort. Consequently, new ideas that can be divided for

22. ROGERS, supra note 18, at 233–35.
23. Id at 233.
24. Id at 232–34.
25. Id. at 258 (while Rogers refers to the concept as “trialability” I prefer to use the similar term “triability”).
trial are generally adopted faster. Genetic testing, on the other hand, is a non-triable technology—it does not lend itself to limited experimentation. Most potential users of genetic testing are members of families inflicted by a disease who consider testing for the specific disease that is prevalent in their family. Once they test the information, their genetic carrier status is created and can affect self-conceptions or be abused by third-parties. Furthermore, unlike other types of personal information, the created genetic information is immutable. Consequently, users of genetic testing technology are generally first time users or potential adopters. Further, even if an individual would decide to undergo a battery of genetic tests, use of the technology would in most cases still remain a one-time event.

Additionally, there are five typical groups of adopter categories: innovators, early adopters, early majority, late majority, and laggards. Genetic testing, due to its slow diffusion rate, is still in the early-adopter stage. Earlier adopters of an innovation tend to perceive triability as more important than later adopters. Earlier adopters are more affected by the triability of the technology because their use of the technology serves as a kind of vicarious trial for later adopters. Consequently, users of genetic testing technology are particularly affected by the non-triable nature of the technology.

The non-triable nature of genetic testing technology also exacerbates the privacy threat. First, like preventive technologies, non-triable technologies have a slower diffusion rate than comparable technologies. Genetic testing, due to its slow diffusion rate, is still in the early-adopter stage. Earlier adopters of an innovation tend to perceive triability as more important than later adopters. Earlier adopters are more affected by the triability of the technology because their use of the technology serves as a kind of vicarious trial for later adopters. Consequently, users of genetic testing technology are particularly affected by the non-triable nature of the technology.

The non-triable nature of genetic testing technology also exacerbates the privacy threat. First, like preventive technologies, non-triable technologies have a slower diffusion rate than comparable technologies.
rate. Individuals are less likely to adopt a technology that cannot be tried out. The inability to experiment with a technology aggravates any concerns regarding its ramifications, since once it is used the individual has to bear the full brunt of the implications. In the case of genetic testing, an individual considering whether to be tested, fears that by the act of taking the test she may expose herself to the full consequences of genetic discrimination.

Second, potential adopters of a technology are more affected by privacy threats than individuals that already used the technology. Social norms play a greater role when a behavior is new. As the behavior becomes more ritualized, habits begin to exert a stronger influence and the effect of social norms weakens. Thus, experience decreases the influence of social norms. A study that compared pre-adoption and post-adoption behavior found that the social compatibility of a technology affected the decisions of pre-adopters, but did not play a significant role in the decisions of individuals already using the technology. Genetic testing technology cannot be tried on an experimental basis. Its use is usually a one-time event. Consequently, the non-triable nature of the technology affects the type of users: most users of genetic testing are either first time users or potential adopters as opposed to experienced users. Their decisions are, therefore, particularly vulnerable to the privacy threats.

It appears that the non-triable nature of genetic testing technology aggravates the privacy threat. Individuals examining non-triable technologies are extra cautious about the adoption decision. Therefore, genetic testing technology is susceptible to the paradoxical situation evidenced in the case of genetic discrimination where individuals do not adopt the technology despite the actual absence of a privacy threat.

C. INTERNET TECHNOLOGY: A CRITICAL MASS POINT TECHNOLOGY

Network effects exist where the value of the good is

33. See id.
35. Karahanna et al., supra note 26
dependent on the number of individuals who use it. Interactive
technologies, such as the telephone, the fax, or the Internet, are
often characterized by "network effects." The interactive
nature of communication technologies creates interdependence
between adopters in the system. An interactive communication
is of little use to people unless others adopt it. For instance,
the telephone became more desirable once it became more
widespread and there were additional people to call.\textsuperscript{36} Network
effects become prominent as a critical mass of people starts
using a technology.\textsuperscript{37}

Once the critical mass point is reached, the rate of adoption
accelerates.\textsuperscript{38} Thus, when a technology reaches the critical
mass point, social norms regarding its use become quickly
entrenched.\textsuperscript{39} Moreover, a technology that diffuses rapidly and
is extensively adopted is less likely to be abandoned. The
telephone, for example, has become such an integral part of our
professional and personal lives, that it is practically impossible
for an individual to unilaterally discontinue use of the phone.\textsuperscript{40}

\textsuperscript{36} See Michael Katz & Carl Shapiro, Technology Adoption in the Presence
of Network Externalities, 94 J. POL. ECON. 822, 822–23 (1986); Mark Lemley &
David McGowan, Legal Implications of Network Effects, 86 CAL. L. REV. 479,
481, 483 (1998); M. Lynne Markus, Toward a "Critical Mass" Theory of
Interactive Media, in ORGANIZATIONS AND COMMUNICATION TECHNOLOGY 194

\textsuperscript{37} Technologies characterized by network effects that reach critical mass
also manifest a different demand curve. Demand does not grow as price
decreases, but instead as demand grows the price may increase. See
NICHOLAS ECONOMIDES & CHARLES Himmelberg, CRITICAL MASS AND
NETWORK SIZE WITH APPLICATION TO THE US FAX MARKET 1 (Stern School of

\textsuperscript{38} ROGERS, supra note 18, at 343–45. For example, the fax boom started
in 1983 when the price for faxes was reduced dramatically. Yet, diffusion was
slow until 1987 when the critical mass point was reached. From that point on,
however, diffusion accelerated at a rapid pace. \textit{Id.}

\textsuperscript{39} A social norm regarding use of a technology exists when it is effective
in directing behavior regarding the technology. See Symposium, Decentralized
Law for a Complex Economy: The Structural Approach to Adjudicating the

\textsuperscript{40} Rogers notes that the critical mass effect could theoretically accelerate
discontinuance. He points out that if people would stop responding to emails
others may decide that email is no longer an effective mode of communication.
However, he concludes that such a rejection of email is unlikely today due to
the breadth of its spread. See ROGERS, supra note 18, at 353. For a
comprehensive discussion of the integration of the telephone into American
lives see CLAUDE S. FISCHER, AMERICA CALLING: A SOCIAL HISTORY OF THE
TELEPHONE TO 1940 (1992).
Internet technology is considered a network effects technology. The desirability of the Internet is dependent on the number of people who use it.\textsuperscript{41} Although the Internet existed for decades before it became generally used, once it reached its critical mass point in 1990, its adoption rate accelerated exponentially.\textsuperscript{42} In 1990, about 4 million users used the Internet worldwide, while by 2002, that number had grown to 544 million users worldwide.\textsuperscript{43} Privacy-threatening uses of the Internet became common in the second half of the 1990s, at the time that Internet diffusion was already growing at an exponential pace. Consequently, non-privacy norms were quickly entrenched. Furthermore, at this point, when millions became dependent on email and Internet for every day use, privacy threats, no matter how intensive, were unlikely to cause people to abandon the technology. It became impossible for individuals to unilaterally discontinue use of a communication mode utilized by so many others. Hence, the critical mass point quality made the Internet susceptible to the second problematic privacy-diffusion relationship, where diffusion accelerated despite extensive privacy threats.

D. INTERNET TECHNOLOGY: A DECENTRALIZED TECHNOLOGY

A technology’s diffusion process can be either centralized or decentralized. Innovations that are centrally diffused emerge from an expert source that diffuses the innovation to potential adopters who accept or reject the innovation.\textsuperscript{44} For example, genetic testing is a centrally diffused innovation—the medical profession, primarily genetic counselors who administer the tests, control its diffusion.

Other technologies have decentralized diffusion processes. In these cases, the diffusion emerges horizontally via peer networks—there is no central expert group in charge of coordinating diffusion. Further, diffusion is accompanied by a

\textsuperscript{41} See Mark Lemley, The Law and Economics of Internet Norms, 73 CHI.-KENT. L. REV. 1257, 1281 (1998).

\textsuperscript{42} The Internet was not an overnight success. It was invented long before it reached critical mass. Several potential dates for the “conception” of the Internet include: the 1964 invention of packet switching; the 1969 commencement of operation of the ARPAnet; or 1989 when commercial Internet service providers started offering services to the general public. See Gisle Hannemyr, The Internet as Hyperbole: A Critical Examination of Adoption Rates, 19 INFO. SOC. 111, 114 (2003).

\textsuperscript{43} ROGERS, supra note 18, at 343-47.

\textsuperscript{44} Id. at 394–98.
high degree of reinvention of the innovation. Users of the technology, in the process of adopting and implementing the technology, act to change and modify it. Members of the user system have the ability to make sound decisions about how the diffusion system should be managed.45

The Internet is a prime example of an innovation, which has a decentralized diffusion process. From its inception, the Internet was diffused and developed by its users and not controlled by a central group of experts.46 The absence of a controlling group that upholds privacy norms, combined with the ability of any user to transform the Internet’s architecture, led to the development and spread of privacy-infringing tools, such as cookies and spyware. Hence, the decentralized nature of the Internet amplified the effect of its critical mass point quality (and related network effects) in producing a quick entrenchment of commercial non-privacy norms, thereby increasing its susceptibility to the second problematic privacy-diffusion relationship.47

III. DIFFUSION CHARACTERISTICS AS A POLICY TOOL

The two privacy-diffusion paradoxes exhibit a divergence from the general preference for a balance between diffusion and privacy protection. Society generally rejects extensive diffusion and widespread adoption of a new technology that significantly erodes privacy. At the same time, society also disfavors the inhibition of the diffusion of important technologies due to privacy threats.48

In this Part, I assess potential resolutions to the genetic discrimination and Internet privacy-diffusion relationships. My objective goes beyond proposing specific resolutions. Decision-makers dealing with the regulation of new


technologies often assess each new technology in isolation. Yet, there are definite patterns in the co-evolution of technology and society that can be used to identify similar problems confronted by other new technologies. I propose that undertaking a generalized approach that looks beyond a specific technology can be an important tool in improving decision-making regarding the regulation of new technologies. In particular, I suggest that such an approach would be useful in resolving and preventing problematic privacy-diffusion relationships. Other technologies that share the technological diffusion characteristics that made genetic testing and the Internet susceptible to their respective privacy-diffusion relationships may also be entrapped in these relationships. Policy solutions based on the identification of the technological diffusion attributes that made genetic testing and the Internet vulnerable to these suspect relationships can be helpful in preventing other technologies from becoming entrapped in the same situations. At the same time, the conclusions I present here are based on privacy controversies involving only two technologies. Consequently, I seek to provide an initial framework for incorporating technological diffusion attributes into technology-specific legal decision-making that would be refined with further study of additional technologies.

A. REGULATING PREVENTIVE NON-TRIABLE AND CENTRALIZED TECHNOLOGIES

Technologies that are preventive and non-trieable exacerbate privacy threats and are, therefore, prone to the first privacy-diffusion paradox. These technologies are more likely to be entrapped in a situation where, although a privacy threat does not exist, individuals perceive a risk and are consequently reluctant to use the technology.

Where a technology’s diffusion attributes make it likely that the perception of a privacy threat will affect its diffusion, the expressive role of the law in dispelling such misperceptions is of particular importance. The law has an expressive function that is distinguished from its coercive function. The law’s coercive function affects behavior through enforcement by force.

while the law’s expressive function operates by sending a message. It expresses normative principles and symbolizes societal values. These moralizing features affect behavior. The law’s expressive effect publicizes a societal consensus. Where the law publicizes a consensus that a certain behavior is required in order to comply with an abstract internalized norm, the violation of the concrete obligation induces behavioral change by producing guilt.

In the case of genetic discrimination, the law failed to influence the public’s risk assessment. The general public apparently did not perceive enough consensus in the partial and inconsistent legal protection. Concerned genetic counselors specifically pointed to the narrow scope of available legal protections.

Decision-makers charged with the regulation of new technologies make decisions that can be divided into three categories according to their effects on users’ perceptions of risk. The first category includes instances where the law undertakes a clear-cut express restriction on uses of the technology that threaten privacy. The second category includes cases where the law undertakes a hesitant stance that includes inconsistent restrictions on privacy-threatening uses of the technology. In these cases prohibitions are often combined with inaction or even contradictory statements that may be interpreted as a legal endorsement of these privacy-threatening uses. This ambiguous stance produces uncertainty that may inhibit use of the technology. Finally, the third category includes cases where the law may endorse a blanket clear-cut express legal pronouncement not to restrict certain privacy-threatening uses of the technology.

The law regulating genetic discrimination reflects the


51. See McAdams, supra note 50, at 400–09.

52. See Hall & Rich, supra note 4, at 252–53.

53. Complex privacy balancing schemes and legal efforts to regulate indirectly, for example, through changing market incentives, also fall under this category.

54. The collection of personal information on the Internet evidenced this type of legal reaction. In this case, the law expressly proclaimed that this use of the Internet does not constitute a privacy threat.
second approach; the patchwork of state laws and weak federal protections produces a hesitant and contradictory approach. This creates an uncertainty that inhibits the use of genetic testing technology.

Rules in the first category—those providing clear-cut and express restrictions—are more likely to influence individuals’ risk perceptions regarding the use of technologies that are preventive and non-triable. Imposing a legal rule that sends a clearer message and clarifies an emerging norm consensus is important in engaging with potential users’ risk assessment.\(^{55}\) The expressive function of the law plays a significant role in regulating technology. The mere exercise of centralized control can allay public fears regarding potential threatening uses of a new technology. Individuals are often afraid of the unknown and, therefore, are put at ease when legal principles are exercised to govern new technologies. People are reassured by the mere existence of limits that the technology is under control.\(^{56}\)

The law’s expressive function plays a particularly important role when dealing with preventive technologies. A study on AIDS testing, another preventive technology, stressed the importance of addressing not only the threat itself but also the perception of risk, that is, the attitudes and beliefs about the threat among those who are potential users. It acknowledged that reducing the actual level of risk would not necessarily reduce the perceived risk.\(^{57}\)

The need to influence the public perception of risk is, therefore, particularly crucial in the case of preventive and non-triable technologies, such as genetic testing. A clear legal message, in lieu of a partial and inconsistent one, would help to alleviate public fears.\(^{58}\) Specifically, the failure of the current


\(^{58}\) Commentators generally advocate that legal regulation is more effective in the form of “gentle nudges” over “hard shoves.” See generally Dan M. Kahan, *Gentle Nudges vs. Hard Shoves: Solving the Sticky Norms Problem*, 67 U. CHI. L. REV. 607 (2000); Sarah E. Waldeck, *Using Male Circumcision to Understand Social Norms as Multipliers*, 72 U. CIN. L. REV. 455 (2003). Yet, the change advocated here is not targeted at coercing the behavior of those who impose a threat. It does not propose stricter sanctions. It is aimed at
patchwork of state and federal laws to allay individuals’ public fears points to the need for a comprehensive federal statute. The clear message embodied in such a statute would alleviate public fears and misperceptions that are currently impeding the diffusion of genetic testing technology.  

A third distinctive diffusion attribute of genetic testing technology is its centralized diffusion process. The medical profession, particularly genetic counselors, serves as the gatekeeper of the technology. It has enormous influence on the diffusion of the technology. Consequently, when a technology is centrally diffused, intervention measures should target the group that controls the diffusion process. Intervention measures seeking to dispel a misperception of risk should follow a similar course. Education regarding the scope of legal protection measures and the actual risk should be focused at that group.

This insight can be applied to the case of genetic discrimination. Genetic professionals currently play a major role in spreading fears and concerns regarding genetic discrimination. Their knowledge about the law is limited and their distrust is broad. When questioned about their concerns, genetic counselors repeatedly pointed to the desirability of a federal law to replace the current anxiety-provoking patchwork of state laws. Consequently, intervention efforts should focus on promoting awareness among genetic professionals. These efforts should involve: (i) education regarding the relevant those who should feel protected by the laws by sending a clearer message of the social consensus.

59. See Geer et al., supra note 6, at 30–31. See also Henry T. Greely, Genotype Discrimination: The Complex Case for Some Legislative Protection, 149 U. Pa. L. Rev. 1483 (2001); Hall & Rich, supra note 4, at 252–53. Rothstein and Hornung warn that discrimination would take place once more individuals learn that they are at a genetically increased risk of serious illness and purchase additional life insurance. See generally Mark A. Rothstein & Carlton A. Hornung, Public Attitudes, in GENETICS AND LIFE INSURANCE: MEDICAL UNDERWRITING AND SOCIAL POLICY 1 (Mark A. Rothstein ed., 2004). One should not rule out the possibility that a federal statute’s success in resolving the immediate problem of under-utilization of genetic testing technology might prompt insurers to discriminate. However, the existence of a comprehensive federal statute would be effective in resolving the problem of discrimination as well.


laws, in particular should a comprehensive genetic discrimination federal law be enacted; and (ii) dispelling the disinformation regarding current practices of genetic discrimination. Since genetic testing technology is centrally diffused, concentrating resources on the group that controls diffusion is likely to prove particularly effective.

B. REGULATING CRITICAL MASS AND DECENTRALIZED TECHNOLOGIES

Technologies that are characterized by a critical mass point (and related network effects) and decentralized diffusion are prone to the second suspect privacy-diffusion paradox where diffusion accelerates despite an extensive privacy threat.

Where decision-makers view technologies that are characterized by a critical mass point and decentralized diffusion as entrapped in a problematic privacy-diffusion relationship, the timing of the intervention is of the essence. Decision-makers generally have two main intervention options: early intervention at the outset of diffusion or the adoption of a wait-and-see approach to evaluate the effects of the technology before regulating.

The early intervention approach carries with it the obvious hazards of regulating the unknown—groping in the dark before informed decisions can be made. Consequently, in many instances the wait-and-see approach is the preferred choice.
Social norms related to the use of technologies that are characterized by a critical mass point and decentralized diffusion process tend to become quickly entrenched. Law and social norms literature demonstrates that a legal rule is less likely to be effective where it departs substantially from the prevailing norm. For example, a compulsory attendance statute that required school attendance until age twenty-one is likely to be ineffective in influencing parental commitment norms. The law tends to be more effective in influencing social norms when a new rule is consistent with community expectations.

Recent attempts to regulate social norms in the area of intellectual property underscore these insights. Studies showed that laws criminalizing the misappropriation of various forms of intellectual property are ineffective. Despite prohibitive laws, the unauthorized use of software and taping of music CDs and videotapes continues on a large scale. It appears that people do not conceive this behavior as immoral. The disparity between social norms of morality and the law affects the law’s legitimacy and reduces its effectiveness.

In the case of new technologies, the cost of the lost opportunity to intervene is particularly high because of the additional flexibility available when a new technology first enters society. New technologies, especially those enveloped in a revolutionary aura, tend to enter society with a relatively clean slate. An initial time period exists in which uses and social norms surrounding the innovation are in flux. However, after a certain point they stabilize and reach a certain closure. From that point onward, change is less likely.

Consequently, express legal prohibitions on uses of a technology that threaten privacy are less effective once social norms related to those uses become entrenched.


norms are entrenched. Decision-makers considering regulation to restrict uses of technologies that have a critical mass point and decentralized diffusion process need to particularly focus on the issue of timing. Yet, early intervention should not be promoted across the board. The uncertainties accompanying early intervention suggest that such a course should be pursued infrequently. I suggest, however, that where technologies manifest the characteristics of critical mass point and decentralized diffusion, decision-makers should include timing as an important factor in their decision-making.69

Non-privacy norms became entrenched, in the case of the Internet, after the critical mass point. While the critical mass point was reached in 1990, non-privacy norms emerged around the mid-1990s. Many academics and policy-makers advocated resorting to self-regulation and market resolutions.70 Yet, with the benefit of hindsight these efforts have failed.71 Decision-makers have not, to this point, restricted commercial profilers’ or employers’ ability to use privacy-threatening Internet devices. As discussed, such measures are likely to be less effective now due to the current entrenchment of non-privacy norms.72 Had decision-makers been aware of the sensitivity of the timing decision due to the critical mass point quality and the decentralized diffusion process, they may have elected a different route. This emphasizes the need to identify the relevant diffusion attributes at an earlier stage when the problematic privacy-diffusion relationship can be more effectively resolved.

IV. CONCLUSION

In this Article, I have used two techno-privacy controversies to show that diffusion characteristics could be

69. Others have suggested manipulation of the underlying social norms. See, e.g., Depoorter et al., supra note 67, at 13–14.


72. See Bernstein, supra note 17 (comparing the effectiveness of children Internet privacy regulation and spam regulation).
useful as a policy tool in the resolution and potential prevention of future controversies involving technologies that share the same diffusion characteristics. This Article is based on limited case studies and, therefore, can offer only an initial formulation for the use of diffusion characteristics. My hope is that I have demonstrated that a middle-ground exists between treating each technology as unique and therefore deserving special treatment and the formulation of overly broad principles that bluntly erode the very novelty we want to promote.