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THE INTERPENETRATION OF TECHNICAL AND LEGAL DECISION-MAKING FOR THE INTERNET

Not long after computer scientists first began working on the technical design of the network that ultimately became known as the Internet, in 1969, they began to document their discussions, information shared, and decisions made in a series of documents known as the Internet requests for comments that is still being used for this purpose 40 years later. A comprehensive inductive reading of these documents reveals that legal and policy issues were often raised or confronted in the course of resolving technical problems. In many of these instances, the technical decisions that resulted had law-like effects in the sense that they constrained or enabled the ways in which users can communicate and can access and use information over the Internet, whether or not such decisions supported or subverted legal decision-making, and whether or not legal decision-makers understood the societal implications of the technical decisions that were being made. This is one of the two ways in which technical and legal decision-making have become interpenetrated. The literature on legal engagement with problems generated by the technical features of the Internet is vast. This article appears within the nascent literature on technical engagement with legal problems. It does so in an effort to contribute to the building of a shared epistemic and decision-making space that involves both the technical and the legal communities.

Keywords e-Government; law; regulation; research methodology; social policy; systems design

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Introduction

One of the many disruptive activities of 1968 was the issuing of a procurement call by the Advanced Research Projects Agency (ARPA) of the US government for the building of a network to link together four institutions that had previously

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received contracts for computer science research: University of California-Los Angeles, University of California-Santa Barbara, Stanford Research Institute, and the University of Utah. Consulting firm Bolt, Baranek & Newman got the contract, and the process of designing 'ARPAnet' and what we now call the Internet began (RFC 1000).[1] We can call this particular procurement contract disruptive because after a few years ARPAnet became DARPAnet, and then, in 1980 – using a term coined in the 1960s before the design process even started – the ever-expanding and ever-more-complex network took on its now-familiar name of the Internet.

For the computer scientists involved, the terms of the project were vague. Neither the uses of the network to be built, nor the steps to be taken to build it, were spelled out. When representatives of the four computing centres – most of whom were graduate students – first met, they focused on visions of what the network could do. They imagined interactive graphics, electronic mail, distributed computing processes, and automatic database query as activities that would be made possible by the network they were to build. They soon recognized, though, that there were many complex issues to be resolved before such visions could be actualized and discussion returned to the myriad low-level issues that were necessary to lay the groundwork for complex applications.

After additional meetings and written correspondence on a variety of technical issues, those working on the network realized that they needed to document their discussions, the information being shared, and the decisions about network design that were being made. One of those involved, Jon Postel, later reported that graduate student fear of offending senior professors influenced the nature of the inter-institutional communication process that was put in place to serve these purposes (RFC 1000). It was out of purported humility, then, that the collection of documents containing these notes was labelled merely 'requests for comments' (RFCs) (RFC 1). RFC 2 emphasized the dialogic rather than assertive nature of the conversation and, famously, RFC 3 laid out the ground rules: anyone was welcome to speak, there were no genre restrictions, minimum required length was one sentence, and any thoughts, however tentative, were welcome.

This article presents preliminary findings from a comprehensive inductive reading of the entire Internet RFCs document series through the lens of law and policy.[2] Legal and policy issues were often raised or confronted in the course of resolving technical problems. In many of these instances, the technical decisions that resulted had law-like effects in the sense that they constrained or enabled the ways in which users can communicate and can access and use information over the Internet, whether or not such decisions supported or subverted legal decision-making, and whether or not legal decision-makers understood the societal implications of the technical decisions that were being made. This is one of the two ways in which technical and legal decision-making have become interpenetrated. The literature on legal engagement with problems generated by the technical features of the Internet is vast. This article appears within the nascent

literature on technical engagement with legal problems. It does so in an effort to contribute to the building of a shared epistemic and decision-making space that involves both the technical and the legal communities.

The article opens with a discussion of this body of documents as a policy discourse. It goes on to map the policy content of this technical document series as it appears in three functional categories: policy-making and analysis, establishment of policy processes, and political thought. It concludes with some thoughts regarding the value of systematically treating technical decision-making as a source of Internet policy that, in its effects if not its source, now interpenetrates legal policy-making to create the communicative and informational environment in which we live.

The Internet RFCs as a policy discourse

At the time of the writing of this article, in October, 2009, the document series of the Internet RFCs is still being used to think through technical decision-making for the Internet; it now includes over 5,700 items. The vast bulk of these documents describe a technical problem that needs resolution, propose a protocol for resolving that problem, discuss experiences with a protocol under experimentation, present alternatives or alterations to a protocol incorporating what has been learned from experience, or otherwise move the design community towards reaching a consensus on the specifics of a protocol as it becomes the standard required for all Internet communication. The RFCs are not the only place where discussions of Internet-related technical standards take place, but they have been and remain a key site for establishing the technical standards for the Internet even when formal acknowledgment must also be achieved in other venues (Abbate 1999; Mueller 2002).

Buried within the technical documents, and evident from the start in other types of documents included in the series, many additional topics also receive attention. Authors use RFCs to request information from others within the design community on a variety of matters, explore communication theory, describe what happens when naive users try to use the network, present histories and memoirs of the design process, call and report on meetings, complain about administrative requests, and offer humour that both reflects and furthers the interpersonal relations growing among those working together on the difficult problems of network design over many years. Noteworthy RFCs for those who are not technically oriented include the first effort to encourage what we now refer to as open source (RFC 485); the first contribution by Tim Berners-Lee, designer of the World Wide Web (RFC 1630), which described URLs; and articulation of Netiquette (RFC 1855). With RFC 100, Joyce Reynolds began to set up an indexing system for the documents. In time, the index also incorporated a categorization that distinguished among those that

describe official protocols and those that serve other functions such as providing information of value to the network design community, and provide detail on the obsolescence and replacement of RFCs when this is occasioned by further technological innovation and/or technical decisions (RFC 2555). A not insignificant proportion of the document series serve administrative support functions, including, ultimately, the establishment of more formal decision-making procedures and organizational entities that are also now part of the technical decision-making assemblage for the Internet.

Policy issues began to receive attention quite early. Explicit reference to security matters first showed up in 1970 (RFC 49). By 1971, there was a discussion of privacy concerns (RFC 101), the possibility of a malicious environment (RFC 129), and reminders that ultimately the network would become commercialized (RFC 101; RFC 231). The energy cost of networking and computational activities appeared as a problem in 1972, when seasonal power usage increases caused network shutdowns (RFC 374). The need for user authentication (RFC 426) and fear of what we now call spam (RFC 463) were expressed by 1973.

Not all of the policy issues discussed in the RFCs early on were introduced by individuals from the USA; representatives of the Canadian government, for example, drew attention to the importance of ensuring that the benefit of the Internet should be extended to rural areas (RFC 101). Nor were policy analyses by these technical decision-makers, largely computer scientists, unsophisticated. Although much of the discussion about Internet access by social scientists, policy-makers, and advocates on behalf of the public interest treats access as if it is a singular issue, from the beginning those inside the Internet design community viewed access as a bundle of problems, each of which requires separate attention: technical decision-makers from the beginning distinguished among access to Internet decision-making documents (RFC 82), access to the network (RFC 164), access to specific files available through the network (RFC 172), and access to particular computational facilities available through the network (RFC 136), all within the first couple of years of the beginning of the RFC process in 1969.

It was not until the mid-1990s, though, that the need to treat RFCs as policy documents became evident to those in the legal world (Kahin & Keller 1997), and it took even longer for legal scholars to begin to articulate the peculiar characteristics of decision-making for the Internet as policy-making processes (Yu 2004). Some of the legal interest in technical design features of the Internet has been stimulated by awareness that manipulation of design can be used to escape scrutiny by policy-makers and competitors (Mansell 1993) or, on the other hand, to achieve policy goals to which other rules present barriers (Ewers *et al.* 2005). In particular, there is deep concern about the use of Internet design processes to get around rules of legal procedure and constitutional law (Froomkin 2000).

Such concerns assume legal intentionality on the part of those responsible for technical decision-making for the Internet, but often incompatibility in rules put in place by the technical and legal communities is simply an inadvertent artefact

of the lack of mutual knowledge across the two communities of decisions made and of the real-world consequences of those decisions. It is not only that there is next to no conversation between the groups. There are also divergences in meaning between technical and legal definitions of concepts (Burk 2005). Technical rules for information flows may well not be comprehensible to those in government without additional explanation or translation (Reidenberg 1998), and the same is true in the reverse direction (Hampton 2004).

The fact that policy discussions by technical decision-makers in the Internet RFCs often take forms that differ from those familiar in policy-making and public discourse exacerbates the problem from the legal side. Three such characteristics of policy discussions within the Internet RFCs stand out.

(1) The policy implications of a discussion may be found in the author, not in the text. When an author who is an employee of Mitre mentions the need to know a user's identity, this is a national security discussion even when those words do not appear in the text. This is so because Mitre participated in the RFC conversation since its inception in fulfilment of numerous contracts with the Department of Defense and other federal agencies that required the organization to represent the national security and other interests of the US government. (Mitre's 2009 website (www.mitre.org) describes it as a not-for-profit corporation that partners with government sponsors to support their critical operational missions.)
(2) What policy analysts refer to as policy principles are generally put forward in the Internet RFCs as design criteria. The goal of maximizing possible uses of the Internet and the range of possible users by keeping the interface as simple as possible, for example, appears as a guideline followed in development of the protocol under discussion in numerous RFCs. In a second example, the design criterion of encouraging continued innovation, which appears first in RFC 42, is also, simultaneously, a social policy principle.
(3) Matters that first appear as purely technical often take on a policy dimension during discussion of the advantages and disadvantages of various proposals put forward to resolve the problem and/or of experience after implementing a particular protocol or design feature. In these activities, those responsible for technical design of the Internet might be said to be *naïve* policy-makers in the sense that they are largely thinking through social issues through the narrow lens of the experience of the Internet design community itself; as noted in RFC 33, users will evaluate network functions relative to their own expectations.

Preliminary findings from this study of the Internet RFCs provides a map of the diverse ways in which the document series is a *de facto* policy discourse. This map, with exemplars of RFC documents in each category, includes items that are themselves sources of policy-making or policy analysis, items that formulate policy-making processes, and items that contain political thought pertinent to policy-making.

Policy-making and analysis

The policy functions of the RFCs include explicit policy-making, explicit policy analysis, and implicit policy analysis (insights into policy issues that are not expressly discussed but that can be elicited from the texts through policy analysis). The category of implicit policy-making would include technical decisions that had no apparent legal or policy implication at the time that they were made, but that come to be recognized as the source of, or a contributor to, legal problems later. Implicit policy-making is outside the scope of this study.

Explicit policy-making

A number of what we have historically treated as legal and regulatory issues are addressed in the Internet RFCs, including fraud, generic crime, pornography, censorship, and access. As determined by a search of the RFC database for the word 'privacy', over 12 per cent of the RFCs deal with that topic. Types of problems indigenous to the Internet also receive regular attention, including phishing (fraudulently soliciting personal information), viruses, worms, and malware (damaging software). Not all issues of concern to the legal community are significantly present in the RFCs, however. Libel, for example, is an important liability issue for individuals and Internet service providers, but has not to date been addressed in the RFCs.

RFC documents have been used to announce explicit policy positions. RFC 2458, for example, takes a stance on the definition of Internet telephony services that has numerous regulatory implications that remain the subject of debate. RFC 2804 was an early, ultimately failed, attempt to place consideration of wiretapping concerns outside the scope of the standard-setting process.

Other RFCs are explicit responses to US government law. RFC 799 points out that direct connection paths may not be possible under certain regulatory conditions. Antitrust concerns are highlighted by RFC 1015 and RFC 1192. RFC 3978 articulates the intellectual property rights status of documents in the RFCs. RFC 4096 explains why a mandate by the US Congress to include particular types of information in email subject lines will not effectively defeat spam. RFC 4869 proposes cryptographic interfaces specifically designed to comply with US National Security Agency specifications. RFC 4734, which defines activities carried out by modem, fax, and text telephony signals, responds to power signal regulations. RFC 5066 provides specifications for ethernet interfaces that meet the requirements of spectrum regulation.

Laws of governments outside the USA are also evident. RFC 101 details Canadian government goals for the Internet design process. A number of RFCs, such as RFC 3536, specifically discuss the importance of taking internationalization into account in the design process. RFC 3837 notes that service providers may be in danger of legal threats of which they are not even aware

because so many different jurisdictions are involved. RFC 4237 mentions the need to protect descriptive information about voice messaging because of the privacy concerns of numerous national governments.

Explicit policy analysis

Many RFCs examine the pros and cons of various policy options. RFC 2008 reviews a number of possible Internet address routing and ownership rules with policy implications; RFC 1355 examines privacy and accuracy issues raised by Network Information Center databases; RFC 2227 considers hit-metering and usage-limiting techniques of concern from a censorship perspective; and RFC 2505 looks at a variety of ways of combating spam. Some documents provide evidence that technical decision-makers for the Internet were aware of social policy issues before these matters had come to the attention of the legal community. RFCs 1633, 2430, 2474, and 2475, for example, introduce the issues we now refer to as 'network neutrality' and provide background that is quite valuable for understanding the actual options available.

There are cases in which examination of RFCs can strengthen critique of Internet design. Claims that those with disabilities are forcibly pushed across the digital divide because of network features (e.g. Kaye 2000/2006) can find support in the fact that disabilities are mentioned only twice, both times in discussions of how to meet requirements for access to the Internet in schools. While children are the subject of over 120 RFCs (in response to statutory requirements), the elderly are not mentioned at all.

In other issue areas, however, analysis of the RFCs undermines critique. For example, those concerned about English-language domination of the Internet commonly assert or imply that those who designed the Internet were either oblivious to the problem or actively chose to limit access in this way (e.g. Warschauer 2000) but the RFCs show attention to the character set issues that underlie such language issues from early on. In areas such as this, the RFCs suggest that the matter identified as a policy problem remains so not because of lack of will, a will to power, inattention, or failure to recognize the issue but, rather, because of very real technical difficulties and social forces well beyond decision-makers' control.

Implicit policy analysis

Close reading of the RFCs shows that at least in some areas technical approaches to problem-solving introduce distinctions of policy importance that have not yet, or not successfully, been incorporated into either policy analysis or laws and regulations. The conceptualizations that these yield may be described as a form of implicit policy analysis. The number of dimensions in which refinements to privacy law should be possible that are suggested by RFCs dealing with the

cookies that track user behaviours on the web is illuminating in this regard. Just a few examples: RFC 1004 distinguishes between threat and trust environments, and between securing the sender and receiver as opposed to securing the link. RFC 1094 emphasizes the difference between stateless and stateful files and directories, a distinction related to but usefully different from the notion of accessing data in aggregate as opposed to individually identifiable forms. The notion of cookie destruction, discussed in RFC 2109 and today practiced by many Internet users, could be extrapolated into other privacy-sensitive environments, as could the idea of placing limits on the number of information-collecting transactions should be allowed to take place from the same RFC. Notification of the user when the state of information about the user changes is suggested in RFC 2965.

The entire body of RFCs dealing with cookies from which these exemplars are drawn makes clear that regulations dealing with privacy must be re-examined in response to each technological innovation and standard-setting decision. Decisions by the technical community to reject ideas put forth after experimentation can also be extremely valuable, making it possible to avoid problems such as those identified in RFC 4096's analysis of why a policy put in place by the US Congress would not be effective in achieving its goal of stopping spam.

Policy processes

The RFC document series also includes discussions of policy processes in themselves. These include the establishment of additional decision-making processes for the Internet, programs for implementing Internet protocols, and the provision of a venue for both conflict and conflict resolution.

Design of Internet decision-making processes

The Internet itself was defined through RFCs. Just as Rutkowski (1983) pointed out regarding an earlier set of telecommunications network standards, the Integrated Services Digital Network, the definition of the Internet has several faces which include an ideal conceptualization, specific standards, and actual operating networks. RFC 1602 explicates three such definitions – the Internet as a set of standards, the process of developing the standards, and the physical network itself. Definition of the Internet as a 'network of networks', influential in legal and regulatory circles after its introduction there by Noam (1994), first appeared in RFC 1122 in 1989, authored by Braden.

RFCs are also used to design Internet decision-making processes themselves. RFC 2014, for example, described how the Internet Research Task Force is supposed to work; RFC 2028 specifies each of the organizations to be involved in Internet standard-setting; and RFC 2727 details the procedures by which the Internet Advisory Board and Internet Engineering Steering Group should

nominate and recall committee members. RFC 2350's explanation of what can reasonably be expected from the Computer Security Incident Response organization lists issues and topics to be considered relevant to the security community and specifies the types of information incident response teams should provide. RFC 2418 defines formal relationships among IETF participants and provides guidelines for working procedures. RFC 2850 is the Charter of the Internet Architecture Board.

Other features of technical Internet decision-making are also created by RFCs. RFCs 1122 and 1123 detail how to write proposed standards in the most effective and useful manner. RFC 1602 describes the three stages of Internet standards development. RFC 1652 looks at relationships between RFC e-mail standards and previously unrelated standards for the coding and representation of diverse data types. RFC 1752 sets up a quarterly report system for standards updates. RFC 2026 covers specification review processes and copyright issues. Responding to governmental and civil society complaints that Internet decision-making is non-democratic, RFC 3797 offers a random (algorithmically-driven) selection process for public members of IETF.

Policy implementation programs

Establishing policies and figuring out how to implement them are two different things. Implementation explanations are offered to technical experts in RFC 1359 (issues with which connecting institutions must deal), RFC 1930 (guidelines for creating internal networks), RFC 2050 (rules for the allocation of IP addresses), and RFC 2196 (a handbook on site security).

Lay users are addressed in RFC 1178 (how to name computers), RFC 1635 (how to use FTP), and RFC 1709 (networking guidelines for K-12 education). As mentioned earlier, 'Netiquette' – rules of etiquette for online communication now being regularly taught in schools – was introduced in RFC 1855. RFC 2504 offers a plain language discussion of online risks and how to avoid them, and RFC 2635 does the same for spam.

Conflict and conflict resolution

RFCs are one among many sites for conflicts and conflict resolution among vendors over standards. (Vendors battle each other over standards because of the profit that will come to them if their own technological approach to a problem becomes the global standard.) One example of each: Toshiba (RFC 2098) and Cisco (RFC 2105) used the RFCs as one among several venues for a battle over what we now think of as router architecture standards. On the other hand, stimulated by a Motorola claim that a particular protocol inappropriately involved a company patent, RFC 1915 outlines procedures to be used for dispute resolution in patent fights.

Informal problem-solving efforts, too, appear in RFCs. In one important example, after it had become clear that the original Internet address space would be overwhelmed with demand, two documents propose temporary solutions – RFC 1917 appeals to the Internet community to return unused addresses to the responsible authority, and RFC 1918 encourages use of private addresses to be kept off of the global network.

Political thought

A third category in which the Internet RFC document series can be read as a policy discourse is in the area of political thought. A number of documents include either political analysis or the translation of political ideas into policy principles.

Political analysis

For those studying transformations of the state, the development of global citizenship and civil society, and globalization of the law, RFC discussion of the concepts of citizenship and jurisdiction is useful. Some of the several dozen RFCs that discuss citizenship explore relationships with geopolitically recognized governments, but the majority is concerned instead with the notion of network citizenship. Similarly, the over 70 RFCs that deal with the concept of jurisdiction (the bounding of the space within which specific legal or law-like authorities govern) move back and forth between references to jurisdiction as it is defined geopolitically and as it is defined by Internet domain.

Policy principles

A number of the design criteria articulated early on clearly have civil liberties, democratic practice, and human rights counterparts of high salience to social policy-makers. RFC 1 identified 'stimulating immediate and easy use by a wide class of users' as a goal of those involved in the design process. Reserving decentralized control and ongoing innovation were enunciated as principles in RFC 33. Ensuring that private networking remains possible was another design criterion with social policy implications (RFC 54), as was standardization of conventions so that every interaction will not be subject to unique rules (RFC 33).

Of course, pragmatic features influenced these design criteria as well. Getting the network or a particular function up and running quickly is often mentioned as a design criterion that counterweighed thorough attention to any particular problem or to other policy issues (e.g. RFC 15). Several RFCs mention the need to do so in order to meet deadlines established by the US government in the contracts that accompanies the grant funds supporting the work, a social policy matter only indirectly in the sense that this was a source of urgency generated by the government.

It is commonly recognized by those who study the Internet that email was initially a by-product of the effort to logistically support the Internet design process. What these external descriptions of the history do not offer is a feel for how profoundly the experience of networked communication affected those who experienced it. In this quote from an RFC from year two of the design process, we get a rather touching sense of the dawning of appreciation of human communication among computer engineers, and the acceptance of promoting such communication as a design criterion:

> We have found that, in the process of connecting machines and operating systems together, that a great deal of rapport has been established between personnel at the various network node sites. The resulting mixture of ideas, discussions, disagreements, and resolutions has been highly refreshing and beneficial to all involved, and we regard the human interaction as a valuable byproduct of the main effect.
>
> (RFC 33, p. 2)

Conclusions

It is one thing to state theoretically that governance and governmentality are as important as government during periods of turbulence in state-society-law relations, but another to develop methodologies for actually engaging in policy analysis for these quite different types of decision-making environments. Preliminary analysis of the Internet RFCs as a highly influential decision-making discourse that has also provided a model for other decision-making involving technical matters demonstrates that this will be a fruitful approach for understanding how decisions about technology design and network architecture are, today, *de facto* social policy. This decision-making will not replace that of governments, but will certainly influence and interact with laws and regulations made by geo-politically recognized states. Better understanding the ways in which the technical decision-makers responsible for the design of the Internet think about legal and policy issues will enhance the effectiveness of governmental policy-making, expand the range of policy tools available, and provide a space within which technical and political decision-makers can think together. There has been room here only to provide an overview of the terrain. In-depth analyses of technical treatment of specific social policy issues will have to wait for future work.

Notes

1 For citation purposes, the convention of referring to specific documents by their number in the document series being analysed is used here.

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