

연구논문

How Does Technical Capture Matter in the Decision Making Process: Three Episodes from an Internet Governance Organization*

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- I . Introduction
- II . Technical vs. Regulatory Capture
- III . The Background of ICANN
- IV . Three Episodes of Technical Capture
- V . Discussion
- VI . Conclusion: Future Research

〈 Abstract 〉

Technical capture refers to preemptive actions that lead to shaping technically legitimate norms, standards, or interpretation by which technical experts define a set of technical requirements that must be considered in the decision making process. In order to understand how technical experts exercise their influences through technical capture in the decision making process in organizations, the paper illustrates three episodes of technical capture from an Internet governance organization, ICANN (the Internet Corporation for Assigned Numbers and Names). ICANN is a vehicle to deliver the notion of technical capture by examining how technical capture matters in the global context of Internet governance decision making process. This paper suggests some research areas to which the notion of technical capture can make contribution.

[Key words: technical capture, technical expert, decision making,
ICANN, Internet Governance]

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I . Introduction

This paper is a conceptual paper. It aims to illustrate the notion of technical capture in the decision making process. In this paper, I suggest technical capture as an organizational phenomenon, which demonstrates how technical experts can make their influences over the decision making process in organizational settings. I refer the notion of technical capture to ‘preemptive’ actions that leads to shaping technically legitimate norms, standards, or interpretation by which technical experts define a set of technical requirements that must be considered in the decision making process. In other words, technical capture is ‘technical rationalization or justification’ through which they can legitimize their technical standards and requirements, and their technical recommendation and advice in the decision making process. Through technical capture, technical experts can exercise their significant roles in the decision making process, giving expertise on what should be technically required. It is hard for people to claim something against technical expertise, because they will be deemed as opposed to technical norms, standards, or interpretation which has been taken for granted among stakeholders in the decision making process. Technical capture is observable, but sometimes unnoticed.

In many organizations, technical experts are allowed to take lead actions to handle technical, probably trivial, matters in which only a few decision makers may have genuine interest. In organizations, few senior managers would pay attention to technical matters, supposing that technical experts will take good care of technical matters for the entire organization. Many believe that technical matters, such as day-to-day operation and standardization, are routine, repetitive, and thus boring subjects full of mysterious jargons. As a result, in many organizations the technical decision-making process – a process in which technical matters are decided – is open to less people and less likely to draw attention from the entire community of the organization than the non-technical decision making process – a process in which technical jargons is avoided, if not prohibited. Those who are unfamiliar with technical jargon and scheme will be hard to find genuine interest in the technical

decision-making process unless something technical goes really wrong. It is likely that technical experts will prevail over the technical decision-making process in terms of technical experience and knowledge. Thus, the community of technical experts is granted a great deal of discretion to make actions that leads to determine technical norms, standards, or interpretation on behalf of the entire community of the organization. Those technical matters are often predetermined and presented as a given fact in the non-technical decision making process. In this sense, the technical decision making process is likely to render preemptive decisions on technical matters prior to the non-technical decision making process. If that is the case, technical experts can easily exercise technical capture over the non-technical decision making process, a process that top decisions are made on behalf of the organization.

However routine, trivial, and mysterious technical matters are to the eyes of ordinary people, the non-technical decision-making process is not free of technical capture. It is important to understand the roles of technical experts and their influence through technical capture over the course of the decision making process in general. This paper takes this mission: to help understand how technical experts exercise their influences through technical capture and how technical capture matters in the decision making process in organizations.

This paper investigates the nature of technical capture, which is problematic to organizational democracy. Preemptive actions that technical experts made are often hidden from the eyes of the public. They are made in closed doors and within technical elite groups, unknown to the whole community in organizations. Technical capture can tacitly shape the overall courses of organizational actions, predefining the underlying values and structures that later dictate organizational governance and performance (Crozier, 1964). In order to help understand how technical experts exercise their influences through technical capture and how technical capture matters in the decision making process in organizations, I illustrate three episodes of technical capture from an Internet governance organization called ICANN (the Internet Corporation for Assigned Numbers and Names). ICANN is a vehicle to

deliver the notion of technical capture and to examine how technical capture matters in the global context of Internet governance.

This paper is organized as following. First, I will compare the notion of technical capture against the notion of regulatory capture. Second, I introduce the background of ICANN to understand the context of three episodes taken from ICANN. Third, I illustrate how technical experts – Internet technology experts – exercise their influences through technical capture and how technical capture matters in the ICANN decision making process. Lastly, I will explore some research areas to which the notion of technical capture can apply.

II. Technical vs. Regulatory Capture

As the term “capture” signifies, technical capture explains how one organization can be controlled to serve technical -often conservative- interest more than non-technical interest by technical experts in organizations just as other capture theories have taught us: the captured organizations usually serve established or vested interests. However, technical capture is different from political-economic capture phenomena.

〈Table 1〉 Technical vs. Regulatory Capture

	Business Capture	Technical Capture
Mechanism	Revolving door	Preemptive standardization
Visibility	Explicit	Implicit
Exchange	Position, employment	Reputation, referral
Outcome	Conservative policy	Conservative policy

(Source: Lee, 2008)

While a political theory of regulatory capture explains how a regulatory agency failed to regulate the regulated business, technical capture seeks to describe how technical experts influence the decision making process in organizations. Technical

capture is more of an organization theory, focusing on more implicit and technical aspects of the “capture” phenomenon in organizations. Technical capture might be understood as a type of capture that has distinct characteristics from regulatory captures (see Table 1).

III. The Background of ICANN

ICANN is a multiple stakeholder organization whose mission is to manage the Internet Domain Name System operated in the technically complex and politically divided environments. The literature on Internet governance has viewed ICANN as a hybrid (a private entity that performs public mission), representing an emerging self-governance model in the Internet DNS (Hunter, 2003; Klein, 2002; Koppell, 2005).

ICANN has a dual face. On the one hand, it acts like a private technical standardization organization (Klein 2002), but on the other hand it acts like a “political online institution” (Hunter, 2003). Most criticisms of ICANN’s governance and performance have been politically charged. There are two divided - technocratic and institutional - perspectives to interpret how ICANN governs the Internet DNS.

The technocratic perspective was prominent in the early stage of Internet governance. This perspective emphasizes that technology shapes governance institutions (Klein 2002:205-206). Pioneers of Internet technology have viewed the Internet as “a unique electronic frontier” or a “parallel universe” that “steadfastly resists all attempts at governmental control or state-imposed regulation” (Drissel, 2006:105).

In their eyes, the Internet is a new technology, and it thus needs a new governance structure and process distinct from traditional governance institutions such as national or international governments’ control over radio, television, and telephone within or across states. Due to the Internet’s technically idiosyncratic

characteristics (e.g., transnational network), self-governance has been deemed as the best form of Internet governance. This perspective represents local knowledge about or experience of Internet governance among technical engineers who have created the Internet technical community taking lead in daily operation of the Internet.

The technocratic perspective has been influential in shaping ICANN's identity and role in Internet DNS governance. From the technocratic perspective, people believe that although ICANN governs the DNS, it should not act like a quasi-governmental agency regulating the Internet community. Rather ICANN is expected to behave as a private entity focusing on technical standardization, a process in which ICANN is primarily concerned about technical requirements or parameters necessary for the stable and reliable operation of the DNS (e.g., NTIA, 1998). ICANN's role is limited to its narrowly defined technical mission so that it needs to distance itself from "politics" (e.g., government involvement). In the ICANN community, politics is not welcomed. Particularly to the technical expert community, politics often means arbitrary and irrational hindrances to the optimization of Internet development and operation.

However, the institutional perspective also is prominent in more recent studies of Internet governance (Wilson, 2005; Rose, 2005a; Drezner, 2004). This perspective has emphasized that governance institutions shape technology (Keohane & Nye, 1998; Wilson, 2005). Internet governance does not occur in a "vacuum but in political space that is already occupied" (Keohane & Nye, 1998, p. 84). Therefore, extant political institutions (e.g., states, see Drezner 2004; national governments, see Wilson 2005, Collins 2006) still matter in Internet governance.

For example, Collins contends that even though the Internet is an innovative technology, it is "not a distinct new medium but is rather a stage in a continuing process of transformation" in which established media are integrated into a digital network. In his view, Internet governance is not necessarily "new, unprecedented, and distinct from governance of legacy media" (Collins, 2006, p. 355), because "there is no technological imperative that [the Internet] requires self-governance" (Collins,

2006, p.339).

The institutional perspective emphasizes the political, social, and economic aspects of Internet governance beyond the technical idiosyncrasy of the Internet itself. The appropriate form of governance of the Internet is determined by political negotiation among societal actors within extant jurisdictions such as government, the private sector, research and development, and civil society, called the “quad” (Wilson, 2005, p. 36).

This perspective represents a broader governance view of the Internet in the traditional governance community (e.g., government). From the institutional perspective, Internet governance is defined as broadly as possible so that most issues involving the Internet – both technical and policy – can be within the purview of existing governance institutions at both the national and the international levels. The institutional perspective also has been influential in defining ICANN’s identity and role. Although ICANN is a private entity, it is expected to take into account broader public policy issues and concerns when it decides something related to the Internet. In this policy capacity, ICANN is forced to behave as a public organization. Although ICANN’s formal role is limited to a technical mission, its decisions have a broad range of public policy implications so that it often needs to embrace politics in its decision-making.

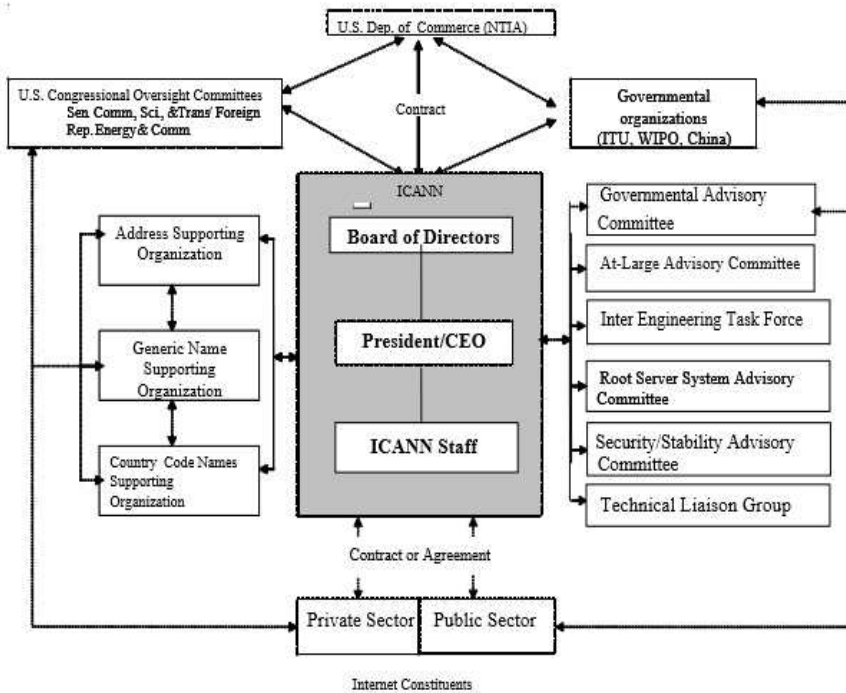
While the technocratic perspective represents the views of ICANN of a more local and technical community, the institutional perspective taps the view of the broader political community. The two perspectives have constituted mixed cultural understandings of ICANN’s identity and role in DNS governance. ICANN has showed “contingent hybridity” (Stolle-McAllister 2003). Contingent on the relevant issues, one perspective prevails over the other in ICANN’s global governance process of the Internet.

IV. Three Episodes of Technical Capture

I propose three episodes of ICANN governance of the DNS management to

demonstrate the notion of technical capture in the ICANN decision making process. To understand the background of three episodes, it is important to understand the overall ICANN's governance structure and its stakeholders involved in ICANN's decision making process. Figure 1 shows a broad picture of ICANN's governance structure in which a multitude of stakeholders plays a certain role in the ICANN governance community. Among many stakeholders, Internet Engineering Task Force played prominent roles through technical capture over the ICANN decision making process.

〈Figure 1〉 ICANN's Governance Structure



(Source: Lee, 2008, p. 33)

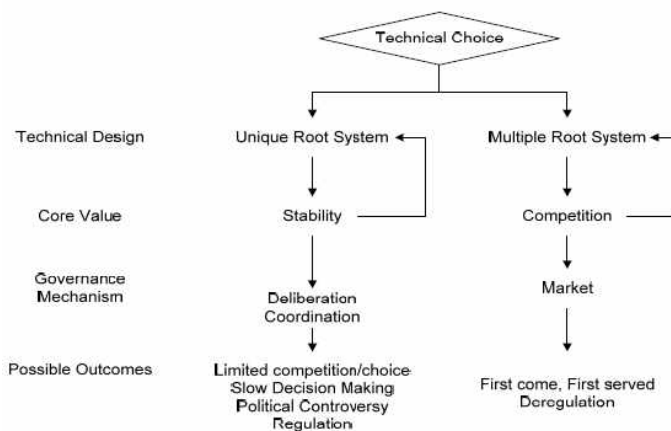
IETF (Internet Engineering Task Force), an organization of technical experts, receives great respect for their technical expertise on the stable operation of the DNS from the ICANN community. IETF exercises significant, but often implicit, influence over the ICANN Board's deliberation and decisions in three episodes. Here

are three episodes how the technical community make their influences over the courses that ICANN took in the decision making process through technical capture

1. The DNS Architecture Design Choice

The IETF has been known as the pioneer group of technical engineers involved in designing the architecture of the Internet DNS. It has developed technical standards or protocols necessary for the operation of the DNS. Few have challenged the IETF's technical standards or its authority as the technical standardization organization in the Internet community. ICANN has clearly shown great respect for IETF's standards and its technical advice. The IETF's influence has not been confined to technical matters. Rather, its decisions on technical standards and advice to ICANN often have had broader governance and policy implications. The IETF's technical choices not only have defined how the DNS operates technically, but also have shaped ICANN's overall governance decisions in certain directions. James Thomson (1967) argued that organizational design is "guided by the nature of the technology and of the task environment" (p.50) and "the technical parts of the system will not be ignored for they provide a major orientation for the social structure" (p. 52).

〈Figure 2〉 Technical Design Choices and Outcomes



(Source: Lee, 2008)

〈Figure 1〉 illustrates how different technical choices might have led to differences in the underlying value of the DNS architecture, in ICANN's governance mechanisms and in possible performance outcomes. For the basic architecture of the DNS, the IETF's technical choice of the unique root system created hierarchical name spaces that helped make stability the core value of the DNS. To preserve the stability of DNS, ICANN needed to use deliberative coordination governance processes, which led to choose more hierarchical structure. As a result, ICANN produced limited competition and choice in the DNS name space, yielding slow decision making, political controversy, and more regulation. Some critics argued that if the ICANN community could choose a multiple root system instead, the multiple root system would have realized more competition and less regulation (Froomkin & Weinberg, 2001; Mueller, 2002a).

2. The Internationalized Domain Name Introduction Policy

Internationalized Domain Names (IDNs) are domain names represented by local language characters. Such domain names could contain letters or characters from non-ASCII scripts (for example, Arabic or Chinese). The IDN introduction was recognized as important for the Internet to be more accessible to those who do not use the ASCII character set. The IDN introduction received broad support from the Internet community as a whole. The biggest issue was technical stability: how to implement IDNs without disruption to the functioning of the DNS.

It is noteworthy that IETF's technical standards evidently had limited the types of IDN strings that can be used in the DNS. Through the technical standardization process, IETF had predefined the population of possible IDN strings that can be considered in the policy development process. From a technical standpoint, IETF prohibited IDN strings that are "confusingly similar" to other IDN strings. In this sense, we can say that through its preemptive decision of "confusingly similar" in technical standardization process, IETF captured the overall IDN selection process in the ICANN community.

In the early discussion of the IDN implementation process, many thought that technical choices should go along with policy development side by side. In reality, however, there has been a time lag between the technical standardization and policy development processes in ICANN. Mostly, the technical standardization process precedes the corresponding policy development process. The internal IDN working group of the ICANN Board recommended IDN policy issues can not be fully resolved without deployable technical IDN standards. Basically, the Board meant that technical and policy matters may run in parallel, but IDN policy development must not precede technical standardization and test, but rather wait until technical issues are fully examined so as to avoid any risk to the stable and reliable operation of the DNS.

This conservative approach to the relationship between technical and policy development processes represented a dominant perspective in the IDN policy development process. When ICANN's conservative policy development approach gives way to the technical standardization process, the technical community's preemptive actions- such as "confusingly similar" decision - influenced the non-technical policy decisions of ICANN decision making process. Through its preemptive decision of 'confusingly similar' as the sole technical requirement, IETF was able to set a decision making criteria that the ICANN Board adopted to make decisions on which foreign language characters can be used in the DNS - thus the Internet - while other foreign language characters are excluded. This episode shows that IETF can make its influence over the ICANN decision making, by preemptively setting a technical requirement that the ICANN Board refers to for their deliberation and decision. However, 'confusingly similar' is a vague and arbitrary criteria that should not be used as a policy decision criteria to determine international policy affair.

3. The VeriSign Wildcard Service

VeriSign is an important stakeholder in the ICANN process. It has contributed to

ICANN's activities by being a stable source of funding and of technical and policy expertise. It is a major registry - dot com, dot org, and dot net - through which all "consensus" policies developed in the ICANN process must be implemented.

On December 30, 2001, VeriSign announced the introduction of a "wait-listing service" (WLS) as part of its ".com" and ".net" registry services. In March 2002, VeriSign officially requested that it be able to conduct a twelve month trial of a wait-listing service through accredited .com and .net registrars. In August 2002, the ICANN Board approved VeriSign's WLS proposal, but also imposed six additional conditions for the implementation of the WLS registry service. In October 2002, VeriSign requested reconsideration of the conditions, complaining that with the conditions, the WLS proposal was impossible to implement commercially. In June 2003, the ICANN Board granted some of VeriSign's requests.

In September 15, 2003, VeriSign introduced a wildcard service - "Site Finder" - in the ".com" and ".net" name zones. When Internet users typed a domain name address that did not exist into ".com" and ".net" domain name space, Site Finder produced a synthesized address record pointing to a VeriSign "redirection server" equipped with a commercial search engine website rather than displaying a "page not found" message. Before long, a group of engineers reported that the wildcard service could interfere with the stability of the Internet DNS. One month later, ICANN ordered VeriSign to immediately shut down the wildcard service by the next day. In response, VeriSign criticized ICANN's demand as a violation of the Registry Agreement and an anti-competitive interference with VeriSign's business. However, as ICANN demanded, VeriSign suspended Site Finder temporarily.

ICANN's Security & Stability Advisory Committee held a series of special workshops about VeriSign's wildcard and reported to the ICANN Board on July 9, 2004, indicating that "[t]here exist shortcomings in the specification of DNS wildcards and their usage." The SSAC report recommended to the Board that the IETF's technical standard be examined to clarify the use of synthesized (or wildcard) responses in DNS protocol and to provide additional guidance on the use of wildcard services in the DNS hierarchy. The Board directed ICANN staff to confirm with the

IETF's interpretation regarding the technical standards for wildcards function in the DNS and to prohibit new applications of wildcard service until IETF's interpretation was confirmed. Even though acknowledging that wildcard records were part of the base DNS protocol, the IAB generally did not recommend the use of wildcards. It proposed a guideline: "If you want to use wildcards in your zone and understand the risks, go ahead, but only do so with the informed consent of the entities that are delegated within your zone" (IAB, 2003 September).

Beginning in February 2004, VeriSign filed a series of lawsuits against ICANN in both federal and state courts in the U.S., claiming that ICANN violated the anti-trust provisions of the Sherman Act and its contractual obligations in the .com and .net registry agreements. In March 2006, ICANN signed a series of agreements including a new ".com" registry agreement to settle the long-standing and burdensome legal fight with VeriSign.

Board members expressed their concerns about DNS technical stability in the VeriSign settlement process. It is certain that technical stability of the DNS was a defining value in handling the settlement with VeriSign. With the settlement, ICANN succeeded in stopping the use of wildcards at a top level domain zone as a questionable service with negative impact on technical stability.

The role of IETF was significant in the VeriSign settlement process. First, by defining technical standards, the IETF increased technical certainty. Few challenged IETF's interpretation of the technical risks involved in the use of wildcards. IETF's interpretation helped the ICANN community to reach a consensus on the use of wildcards. One can argue that since IETF exercised such great authority in defining the relevant standard for a given technical issue, IETF is the consensus maker on technical matters in the ICANN community. What IETF labels "standard" becomes standard without serious challenges from the ICANN community. Michael Froomkin noted regarding the IAB commentary on VeriSign's wildcard service that "[t]he critical thing about the IAB's conclusions, however, is that Sitefinder is bad because it breaks long-settled expectations, not that it is bad per se, or that it formally violates standards set out in RFC's." He argued that "[s]itefinder -- though

dangerous, highly problematic, and inconsistent with the operational stability of the applications which depend on the DNS - nonetheless did not in any way violate the DNS specifications themselves. So it's real hard to argue that VeriSign is violating the registry agreements on that basis" (Froomkin, 2003a).⁹⁵ From his view, the IAB comment was not made based on technical facts, but rather on long-standing expectation in the technical community.

Second, when IETF defined or interpreted what the standard is in a given technical issue, its recommendation often went beyond technical concern for the ICANN community and ICANN Board's deliberation and decisions. IETF recommended that if VeriSign wanted to use wildcards in its zone, it needed to do so "with the informed consent of the entities" depending on VeriSign's DNS (IAB, 2003 September). Basically, IETF did not recommend "a flat prohibition" against VeriSign wildcards, but strongly suggested that VeriSign first demonstrate that its wildcards would not pose a threat to the stable operation of the DNS for applications and users (IAB, 2003 September). IETF's recommendation was not based purely on technical judgment, but rather reflected its conservative policy approach to technical matters.

In conclusion, one may argue that IETF is a technical regulator seeking to conservatively maintain the basic architecture of the DNS developed in the early days of the Internet. From the IETF's perspective, preserving the basic DNS architecture is important to keep running the Internet stable. In the ICANN process, by listing all possible problems and risks involved in a certain issue, IAB technically captures ICANN and its community and pushes them to consider policy formation and implementation involving that issue within a given box - the fundamental technical architecture of the DNS. Furthermore, using its highly respected technical authority, IAB sought to steer ICANN's deliberation and decisions in a certain direction by recommending something irrelevant to or beyond technical requirements and concerns. Since the line is blurred between technical and policy matters, IAB's technical capture of ICANN has broadly affected ICANN's policy deliberation and decisions on a broad range of issues including the VeriSign settlement agreement.

V. Discussion

Technical capture performed by IETF takes a variety of forms depending on the nature of the ICANN governance processes that three episodes illustrated. In none of the instances, however, did the IETF use money or power to influence ICANN's policy decisions. Rather, the IETF's influence has been subtle and implicit.

In the DNS architecture design, IETF was a master mind to design the architecture of the DNS. It established the foundation of the DNS under which ICANN is operating. The architecture design defined the overall course of the DNS operation. In many cases, IETF has expertise and reputation to establish *de facto* authority to set up and interpret what technical standards and requirements should be for the stable operation of the DNS. Their decisions are rarely challenged in the decision making process. Their technical consideration seems to lead to not only choosing a technical design alternative, but also defining the overall outcomes from the technical choice.

Historically, IETF has designed and supported a unique root system as best fitting the needs of the DNS architecture, which was taken for granted in the Internet community without challenge. The idea of unique root system has become a dominant paradigm in the DNS architecture and domain name registration market. Unlike other market standardization process (CDMA vs GPS, VHS vs Gammar), technical decisions under a unique root system is thus simpler compared to those under a multiple root system (alternative to a unique root system).

Under a unique root system, stability is a defining value among other values considered in the technical standardization process. Stability is the driving force to shape the course of decision making process in ICANN. Other substantive (competition) and procedural/organizational values (bottom-up and representation) become marginalized as a set of secondary values in the ICANN process.

ICANN and its community have accepted not only the IETF's technical standards under the grand architecture of a unique root DNS but its underlying value, stability, as given. The Board has formulated its technical policy in a way to make sure that

they do not contravene the IETF’s technical requirements. Often, public policies implicated from its technical decisions are shaped within technical imperatives mostly derived from stability principle. ICANN and its community are technically captured by a given technical architecture and standards of a unique root system.

In the IDN policy, its technical standardization process preemptively shaped ICANN’s IDN policy development process, as the IETF standard requirement - “confusingly similar” - influenced ICANN’s decisions on the range of language characters that can be used in the DNS. Even though the technical process may not always precede the policy development process, it is hard to find an instance where the policy development process proceeds without prior technical consideration of the issue in question. In the VeriSign settlement, IETF interpreted appropriate technical standards for the wildcard service of the DNS. The IETF’s advice on VeriSign’s wildcard service went beyond technical concern or boundary.

〈Table 2〉 compares these episodes of technical capture. In general, the IETF’s technical capture led ICANN to take a more conservative policy approach to ensure the stable operation of the DNS at the expense of competition, internationalization, and legal fight.

〈Table 2〉 Types of Technical Capture

Episodes	DNS Architecture Design	IDN Introduction Policy	VeriSign Wildcard Service
IETF’s Role	Designing the architecture of DNS	Setting technical requirement of IDN	Interpreting technical standard for Wild Card
IETF’s Influence	Choosing unique vs. multi root system for DNS	Deciding usable foreign characters in the DNS	Prohibiting Wildcard Service in the DNS
IETF’s technical capture	Preemptive action to select unique Root System in DNS	Proposing “confusingly similar” as the sole decision criteria	Warning possible risks of Wildcard Service to DNS stability
Outcomes	Hierarchical structure to serve more stability and less competition	Some foreign characters are excluded for the stable operation of DNS	ICANN’s legal fight and settlement with VeriSign

(Source: Lee, 2008)

Technical capture is a significant phenomenon that affects ICANN's global governance of the Internet. Policy decision makers in ICANN, however, also might use technical capture to select a more favorable policy choice. In other words, to avoid controversial issues, policy makers in ICANN can strategically rely on technical rationalization or justification provided by technical experts, although they know that the issues have broader policy implications. Whenever ICANN face a complicated policy issue, it tends to frame it into a technical issue. Once it succeeds to frame a policy issue into a technical one, it is easier to make a decision for the technical matter. Technical decisions involve less polarity in the ICANN process. It is because people recognize IETF as the authority of Internet standardization. IETF's technical decision receives full support from the Internet community. Nobody has challenged the technical standards of the Internet generated by IETF and its standardization process.

VI. Conclusion and Future Research

The notion of technical capture is found in science and technologies studies on, e.g., the impact of E-technology on organizational form and function (Dewett & Jones, 2001; Tassabehji, Wallace, & Cornelius, 2007) and in regulatory policy study on, e.g. standardization (Brunsson & Jacobsson, 2000).

However, the notion of technical capture receives little attention in the fields of public administration and organization studies. Several research areas may benefit from the development and application of the notion of technical capture. Technical capture brings our attention to less visible but significant influence of technical experts over the policy-making process in organizations. Technical capture helps us to better understand bureaucratic phenomena (e.g., routines) in both public and private organizations. Here are some research areas to which the notion of technical capture can be applied.

First, the concept of technical capture can be applied to many public

organizations. Technical capture will help one better understand how public organizations whose technical tasks define their primary missions exercise influence over the broader policy development process. Technical capture also can be applied to public organizations whose organizational subunits are involved in developing technical standards or policies. For example, the U.S. Department of Commerce has several technical units such as the National Telecommunications and Information Agency (NTIA) and the National Institute of Standards and Technology (NIST). NTIA is involved in allocating, e.g., radio frequencies; NIST develops national standards for industries. The technical capture perspective helps one understand how technical units (e.g., NTIA) or technical advisors (e.g., chief information officers) influence overall policy development (e.g., E-governmnet) in public organizations.

Second, technical capture also will be useful in examining the influence of international technical standardization organizations (e.g., IETF) on broader international governance. More research is needed to take a closer look at the technical standardization process (e.g., IETF's RFC process) to see whether and how technical experts have significant influence on the public policy-making process. It might be interesting, for example, to compare ICANN to the International Standard Organization (ISO). Although both play a significant role in international self-regulation by developing standards, in contrast to the ISO, ICANN focuses more on technological standardization.

Third, technical capture can contribute to developing a general theory of organization that emphasizes the increasing power of technical experts (e.g., financial, technological, legal, and accounting) in public and private organizations. Crozier (1964) argued that although technical specialists have power as "agent[s] of scientific progress" in organizations, "the experts' success is constantly self-defeating." He predicted that technical experts' power will disappear as their scientific innovations are translated into rules and programs in society as a whole (p.165). From his perspective, technical experts' power is temporary: "experts have power only on the front line of progress" (p.165). However, the dissertation found that the technical community continually exercised its influence over ICANN's policy

development, not only by setting standards (e.g., IDN standards) in the first place, but also by interpreting those standards (on, e.g., wildcard) later on. Given the increasing significance of technology in organizational management, technological experts have advanced their roles and responsibilities in organizational structures and processes (as, e.g., CIOs).

Lastly, the phenomenon of technical capture might be observed more often in technical organizations like ICANN whose technical tasks justify the existence of the organizations. However, it also might have broader application to a wide range of organizations with specialized or professional units such as law and accounting. As legal and accounting expertise become important “core technologies” in many organizations (Thompson, 1967), for example, the concept of technical capture might help us to better understand how experts in these areas influence organizational governance and performance. Like other professionals, technical experts in the ICANN process generate and control new “technological standards” that ordinary people can not easily understand. How does technical capture compare to the theories of professional autonomy drawn from the professions literature? One might examine whether technological professions are complementary or contradictory to other professional areas such as law, medicine, and accounting.

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