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Computer Scientists and China's Participation in Global Internet Governance

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Among the major issues intensively debated in the international relations arena during the last decade, two have emerged as worthy of further exploration: global governance and the resurgence of China. While the two issues may seem irrelevant to each other, they are closely intertwined in the sense that the former is built upon the existing international order whereas the latter challenges, and will most likely reshape, that order. Whereas the realists believe that the rise of China will shake up existing international institutions by provoking confrontation between the old and the new powers, liberals contend that there is room for smooth policy coordination, as new actors gain strength in the interdependent world and major powers are brought closer to each other. The issue of Internet governance, in which a variety of new actors are involved, provides a vivid case in which to observe whether the liberal argument has real validity.

Based upon the liberal framework, this paper explores how Chinese computer scientists have acquired autonomy and a sense of international connectedness and to what extent they are able to influence official policy choices. In tracing the history of the Internet in China, this paper finds that

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a group of computer scientists with distinctive beliefs exist in China and that they contributed greatly to the introduction of the Internet. In turn, the relationship between the views of these scientists and official views varies in different cases. In accounting for this convergence and divergence of views, this paper argues that there is a division of labor between policy-makers and the computer scientists with the former dominating policy decisions and the latter responsible for technical operations. This distinction is well institutionalized so that the two parts do not generally interfere with each other. However, when issues of high political significance are being debated, this distinction becomes more rigid and harder to cross, which in turn seriously reduces the policy impact of the computer scientists.

KEYWORDS: **China; Internet governance; scientist; epistemic community.**

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The first World Summit on the Information Society (WSIS), held in Geneva in 2003, ignited the fierce debate over Internet governance that has continued ever since. The most controversial issue in the debate is what role the Internet Corporation for Assigned Names and Numbers (ICANN) should play in both the developing countries and the developed ones. For developing countries, represented by China among others, the assignment of domain names through ICANN, especially the assignment of Country Code Top-Level Domain (ccTLD), is a severe violation of sovereignty. These countries believe that management of the core facilities of the Internet, a highly influential factor in the world economy, should follow inter-governmental procedures, so that governments can participate in policy discussions.[1] However, since the publication of the white paper by the U.S. Department of Commerce in 1998, there has been a consensus in the United States and many developed countries that the management of Internet core facilities should be left to the private sector. In their eyes, government involvement in Internet core facilities management would be a possible threat to freedom of speech as well as tainting such management with the bureaucratic inefficiency of the United Nations

[1]Adam Peake, "Internet Governance and the World Summit on the Information Society" (Paper prepared for the Association of Progressive Communications, June 2004), http://rights.apc.org/documents/governance.pdf.

system.[2] To the disappointment of many developing countries, the second WSIS held in Tunis in 2005 ended with an agreement to continue with the status quo. However, the developing camp has won some concessions. The United Nations promised to sponsor an annual Internet Governance Forum for the five years following the Tunis meeting (2006-2010), and in September 2006, right before the first Internet Governance Forum was convened, the U.S. government announced that it would relinquish its oversight of ICANN by the end of 2009. All these events indicate that the developing countries are indeed making a difference in the shaping of future Internet governance.

In addition to their impact on the management of Internet resources, the developments at WSIS constituted another landmark in China's rise to importance in global governance. At WSIS, as in other major forums held in the last decade, Sino-U.S. confrontation constituted the main backdrop for negotiations. In the traditional game of power politics, the state is the sole player and thirst for power is the driving force of state behavior. Accordingly, a potential challenger is destined to change the existing arrangement whereas the hegemon struggles to defend it. However, since the concept of complex interdependence first arose during the last century, the individual has been identified as an important actor in international relations. Theoretical attempts with the same line of aspiration further contend that, with individuals holding cosmopolitan ideas added to international politics, cooperation and collaboration can replace power competition, and existing institutions can incorporate new demands.

The Internet undoubtedly provides an opportunity to test if such a proposition has empirical validity. Computer scientists played a vital role in Internet management when the U.S. government created the first Internet project, Advanced Research Projects Agency Network (ARPANET). Even today, the ICANN board of directors is mostly composed of veteran

[2]Audrey N. Selian and Kenneth N. Cukier, "The World vs. the Web: UN's Politicization of the Information Society" (Report presented at the World Summit on the Information Society, Geneva, December 12, 2003), http://www.ksg.harvard.edu/digitalcenter/research/wsis-ncdg-jan04.pdf.

computer scientists that have participated in Internet development since the early days. There is also a group of Chinese computer scientists who have contributed greatly to the introduction of the Internet to China and who sit on numerous important international committees dealing with Internet management. Based on theory, one would predict that with the rapid diffusion of the Internet in China and the country's broad international involvement, these computer scientists would have gained strength and developed a sense of connectedness with their colleagues abroad working in the same international community or in specific institutional settings. The autonomy and international connectedness of this group of computer scientists would in turn cancel out or even alter the policy choices of Internet policymakers in China in a way that would make international cooperation more possible and existing international institutions more robust. However, Chinese participation in global Internet governance seems to tell a different story, with the Chinese government voicing strong demands for a shake-up of the existing framework of international cooperation.

Comparing reality with theory, one cannot help but raise the following questions. How exactly did the Chinese computer scientists develop their autonomy and sense of international connectedness in parallel with the explosive development of the Internet in China? To what extent are they able to influence official policy choices with regard to global Internet management? To answer these questions, this paper traces the individual stories of a group of Chinese computer scientists devoted to Internet development in the early stage when the Internet was introduced to China from foreign research institutes. It also records the involvement of these scientists in the policymaking process in the subsequent stage when the institutional infrastructure for Internet development was being set up. Thereafter, this paper uses two case studies, Chinese domain names and the debate on ICANN's status during WSIS, to explore whether and to what extent the Chinese computer scientists present an opportunity for a different set of policy choices that makes international coordination more possible. It should be noted here that the term "computer scientist" as used in this paper refers to a researcher working in one of a variety of public research institutions, including the Chinese Academy of Sciences (CAS,

中國科學院) and its affiliate institutes, leading universities (e.g., Tsinghua University, 清華大學), and ministry-based research institutions (e.g., Ministry of Weapons Industry, 兵器工業部). While most of them specialized in computer science and networking, there are a few scholars (e.g., Hu Qiheng, 胡啓恆) who are not in the field in a strict sense but, due to their institutional affiliation, have made tremendous efforts in building up the physical and institutional infrastructure for Internet development in China. Before going into detail about the group in question, the following section reviews the recent literature on the role of scientists and how it might fit into the picture of China's Internet development.

Literature Review

As mentioned above, the question this paper asks is how technical experts exert influence over foreign policy with regard to Internet governance. In order to answer it, this paper draws on research literature that provides theoretical observations on the difference that technical experts bring to foreign policy and the conditions under which that difference becomes a real policy outcome. Whereas research on epistemic community in international relations scholarship is qualified for the first purpose, the literature that focuses on Internet development in communications scholarship presents insights that serve the second purpose. Accordingly, this section is divided into two parts. The first part reviews the conceptualization of the role of individual experts in international relations scholarship with regard to facilitating international cooperation. It pays special attention to their participation in international negotiations on communications policies. The second part reviews the literature on China's Internet development to see how the institutional setup provides room for computer scientists to develop autonomy and real influence on policy outcomes. Thus, this section provides a theoretical framework for subsequent analysis.

In international relations scholarship, no other theories elaborate the role of experts in facilitating international policy coordination better than

those in the "epistemic community" camp.[3] The emergence of the concept of an epistemic community in international relations research dates back to the 1970s when John Ruggie defined an epistemic community as "interrelated roles that grow up around an episteme" and applied this concept to explain the formation of behavior rules for the determination of collective response to a new situation.[4] However, the concept of an epistemic community did not attract much attention in international relations scholarship until the publication of a special issue of *International Organization* on this subject in 1992. In that issue, Peter Haas argues that an epistemic community contributes to international policy coordination when policymakers turn to outside experts on occasions when they are dependent on other countries' policy choices or they are facing a high degree of uncertainty. Since members of an epistemic community share a set of normative and principled beliefs, a way of interpreting social and physical processes, relationships, and views on the consequences of potential actions, consultancy provided by them could lead policymakers to identify their national interests in a way that is compatible or convergent with other countries' definitions of national interest.[5]

The influence of epistemic communities in international policymaking in the communications area was observed as early as the 1980s. Before the 1980s, telecommunications regulation was rooted in a widely held belief that the telecommunications industry tends to become a natural monopoly. The International Telecommunications Union, the national regulators' club, served to socialize the monopoly idea and coordinate state policies based on this belief in the early days. New ideas began to emerge when the release of the Huber report marked the beginning of the notion of

[3]For the origin of the concept of an epistemic community, this paper draws on Andreas Antoniades, "Epistemic Communities, Epistemes and the Construction of (World) Politics," *Global Society* 17, no. 1 (January 2003): 21-38.

[4]John Gerard Ruggie, "International Responses to Technology: Concepts and Trends," *International Organization* 29, no. 3 (Summer 1975): 570.

[5]Peter M Haas, "Introduction: Epistemic Communities and International Policy Coordination," *International Organization* 46, no. 1 (Winter 1992): 3-4.

telecommunications deregulation in the United States.[6] The U.S. reform further incorporated the ideas of the supporters of free trade to promote the opening of national telecommunications markets, leading to a thorough liberalization of telecommunications services.[7] William J. Drake and Kalypso Nicolaidis observe a two-tiered epistemic community involved in the Uruguay round of negotiations on trade in services and telecommunications in the 1990s. The upper tier consisted of individuals serving in government agencies, international organizations, and private enterprises, all with a direct stake in specific policy options. In the lower tier were scholars, lawyers, industrial experts, and journalists whose interest in specific policy options was motivated by the pure pursuit of knowledge or by professional entrepreneurship. The two groups shared a similar conceptual framework and policy agenda. In addition, the relative independence of the lower tier supported the upper tier's proposals by strengthening their legitimacy in the sense that the assertions and causal beliefs of the lower tier enjoyed substantial authority as policymakers considered them to be scientifically objective and beneficial to international society, rather than representing the partisan interests of certain sectors.[8] Since they belong to an international epistemic community, the Chinese computer scientists should also be distinguished from other players in terms of their normative and principled beliefs.

As a group of knowledge-holding experts, scientists are supposed to have the capacity to influence policy outcomes of international significance. However, the extent to which scientists can influence the identifi-

[6]The Huber report stressed the indivisibility of communications transmission and content manipulation and, as a result, argued that the network must be flexible and hierarchical control over market entry must cease. See Peter W. Huber, *The Geodesic Network 1: 1987 Report on Competition in the Telephone Industry* (Washington, D.C.: U.S. Department of Justice, Anti-Trust Division, 1987).

[7]Peter F. Cowhey, "The International Telecommunications Regime: The Political Roots of Regime for High Technology," *International Organization* 44, no. 2 (Spring 1990): 169, 174.

[8]William J. Drake and Kalypso Nicolaidis, "Ideas, Interests, and Institutionalization: 'Trade in Services' and the Uruguay Round," *International Organization* 46, no. 1 (Winter 1992): 39.

cation of national interest does not derive entirely from the mere existence of a scientific community, but also has to do with scientists' relationship to the state. In this regard, Etel Solingen's seminal work provides a useful starting point. The relations between scientists and the state, as argued by Solingen, can be explained with reference to the internal structures of the political-economic system as well as the nature of the scientists' involvement in the international context.[9] On the one hand, as states exercise considerable control over resource allocation, research topic definition, the stimulation of private investment, and the regulation of scientific exchange with other countries, scientific organization and the politicization of scientific communities reflect prevailing political and economic structures of state forms. On the other hand, a high degree of external conflict may lead to greater investment in military-related scientific research and higher secrecy, whereas greater involvement in the global economy usually comes hand-in-hand with more openness to scientific interdependence.[10] What this scientist-state nexus approach suggests is that state policy does shape state-scientist relations as well as scientists' interaction with the outside world. Nevertheless, these propositions suggest a situation in which the state exerts influence over scientists rather than the other way round and as such do not tell us much about how the relationship between scientists and the state affects the former's influence over the latter. In addition, they cover such a broad area of the state-scientist relationship that further modification is required before they can be applied to a specific policy domain. To mitigate the above deficiency, the following section reviews the literature on the development of the Internet in China in order to see how the important institutional features of Internet policymaking have affected the policy impact of computer scientists.

A number of scholars have made detailed studies of Internet development in China. Basically, their research efforts are focused on two major questions: (1) Why the Internet has spread so rapidly in China; and (2)

[9]Etel Solingen, *Scientists and the State* (Ann Arbor: University of Michigan Press, 1994), 1.
[10]Ibid., 4-5, 10-11.

What has been the impact of the Internet on democratization and how the government and civil society have responded to that potential impact.[11] This section discusses these two questions as they are dealt with in recent research literature and looks to see what could be added to define the uniqueness of Internet development in China and the fundamental change the Internet might bring to international politics.

The Internet has developed at an extraordinary speed in China, from a mere 1 million users in 1997 to 160 million in 2007.[12] There are several factors that account for the swift take-off in Internet usage. One is the appeal of "techno-nationalism." In conventional thinking, techno-nationalism originates from the strong sense of humiliation felt in China for the series of defeats at the hands of foreign powers that China suffered starting with the Opium War of 1842. This makes the Chinese elite thirsty for advanced technologies. This is also the thinking behind the rush for "informatization" that Chinese officials indulged in to achieve the goals of the Four Modernizations in the 1990s.[13] A recent account of techno-nationalism notes that China has adopted an aggressive standards strategy, understood as neo-techno-nationalism, which involves expanding state commitment to technological development but at the same time embracing public-private partnerships, allowing foreign companies to take shares in Chinese firms, and adherence to international rule-making and policy co-ordination.[14] Selected case studies following this line of analysis are on hardware and exportable goods, and thus further elaboration is necessary to show how this notion can be applied to Internet governance where the

[11]Guobin Yang, "The Co-Evolution of the Internet and Civil Society in China," *Asian Survey* 43, no. 3 (May/June 2003): 405-22.

[12]"Internet Usage in Asia," *Internet World Statistics* (Updated September 30, 2007), http://www.internetworldstats.com/stats3.htm#asia.

[13]Jack Linchuan Qiu, "The Internet in China: Data and Issues" (Working paper prepared for Annenberg Research Seminar on International Communication, October 1, 2003), 2-3; and Nina Hachigian, "China's Cyber-Strategy," *Foreign Affairs* 80, no. 2 (March/April 2001): 122.

[14]Richard P. Suttmeier and Xiangkui Yao, "China's Post-WTO Technology Policy: Standards, Software, and the Changing Nature of Techno-Nationalism," *NBR Special Report*, no. 7 (May 2004): 3, 17.

service is mostly non-exportable. In addition to techno-nationalism, the country's determination to achieve sustained economic growth has also contributed to rapid Internet diffusion. State agencies work to utilize the Internet in a variety of economic areas, such as e-commerce and online entertainment, in order to enhance the economic competitiveness of domestic firms and to improve people's living standards.[15]

While techno-nationalism and economic growth reflect the impulses of the Chinese leadership, they implicitly attribute the rapid expansion of the Internet to a strong state apparatus adopting proper policies, which may require some reconsideration if the analytical unit is lowered to a sub-national level. As several scholars point out, there are various institutional players involved in Internet development from central to provincial levels. These players together have succeeded in promoting the Internet through the web presence of government agencies at all levels, lowering access charges, promoting service competition, and creating technology parks.[16] However, their efforts to broaden Internet usage and their involvement in Internet control are to some extent motivated by profit-seeking.[17] The profit-seeking motives of the provincial governments can be credited with facilitating the speedy rollout of Internet projects at the local level that have led to rapid Internet diffusion nationwide.[18] Even censorship initiatives help to create jobs and generate profits as the security apparatus makes alliances with global information technology leaders to introduce the latest technologies and management.[19]

As far as the Internet's democratization impact is concerned, scholars are attracted to the issues of government control and the Internet's role in the rise of civil society. As in many developing countries, it is a need to maintain the political status quo that drives the Chinese government to

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[15]Qiu, "The Internet in China," 3.

[16]Hachigian, "China's Cyber-Strategy," 119-20.

[17]Ibid., 121; and Eric Harwit and Duncan Clark, "Shaping the Internet in China: Evolution of Political Control over Network Infrastructure and Content," *Asian Survey* 41, no. 3 (May/June 2001): 407.

[18]Yang, "The Co-Evolution of Internet and Civil Society in China," 409.

[19]Qiu, "The Internet in China," 12-14.

exert extensive control over the Internet. Another factor is the institutional legacy of the Leninist state that seldom respects freedom of speech or privacy protection.[20] The issue that makes the Chinese situation unique and thus worthy of research is how effective these control measures are and what the prospects for future democratization may be. Some consider that the government has successfully achieved control through self-censorship and self-deterrence.[21] What is also of tremendous help is the adoption of overlapping monitoring initiatives that maximize the scope of control and state-of-the-art surveillance technologies that enhance the effectiveness of control measures.[22]

Nevertheless, for others, it is exactly the overlap of regulatory agencies that makes government control ineffective, as content control implemented by security agencies and Party organs may be in conflict with the interests of the Ministry of Information Industry (MII, 信息產業部), which is more concerned about revenue collection.[23] In addition, police inertia and corruption, as well as central-local confrontation, can all work to increase difficulties in regulation.[24] What further frustrates the control intention is the Internet's unique feature of distributing information in its operating philosophy and technical setup that provides significant counter-blocking and counter-filtering mechanisms.[25] The opposite evaluation of content control is also reflected in scholars' views on the prospects for democratization. While it is hoped that widespread Internet usage will encourage the growth of a more open and democratic society, the early ob-

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[20]Ibid., 10-11.

[21]Michael S. Chase and James C. Mulvenon, *You've Got Dissent! Chinese Dissident Use of the Internet and Beijing's Counter-Strategies* (Santa Monica, Calif.: RAND, 2002), 49-63, 86-87; and Taylor C. Boas, "Weaving the Authoritarian Web: The Control of Internet Use in Non-Democratic Regimes," in *How Revolutionary Was the Digital Revolution? National Responses, Market Transitions, and Global Technology*, ed. John Zysman and Abraham Newman (Stanford, Calif.: Stanford Business Books, 2006), 362-63.

[22]Boas, "Weaving the Authoritarian Web," 387-89.

[23]Harwit and Clark, "Shaping the Internet in China," 392-94.

[24]Jason Lacharite, "Electronic Decentralisation in China: A Critical Analysis of Internet Filtering Policies in the People's Republic of China," *Australian Journal of Political Science* 37, no. 2 (July 2002): 335-37.

[25]Ibid., 339.

servations seem to encourage caution. The reasons for such reservations include a still low penetration rate, the increased legitimacy of the existing government due to Internet-stimulated economic growth, and the government's ability to retard and deter heterogeneous content.[26] However, with the explosive growth in the Internet user population, a more optimistic view seems to have taken hold.[27] Guobin Yang describes the growth of civil society in parallel with Internet diffusion as a "co-evolution" of the Internet and civil society that vividly catches the interdependent relationship between the two.[28]

To the extent that the above literature points to a wide range of actors involved in both promoting Internet usage and conducting Internet control, it also implies that these players have different interests or different ways of identifying their interests in how the Internet should be managed in China. As shown above, profit-seeking is one reason why the MII and local governments go all-out to promote the Internet while at the same time passively complying with rather than actively implementing content control. The motive of preventing negative content is clearly applicable to the security establishment. Whereas the content control requirement constitutes a latent frame, different players struggle to maximize their private gain within the confinement of this frame. The MII, local governments, and the security establishment are all endowed with on-the-ground powers to implement their wills. Thus, with or without the content control frame, the MII and local governments can still find ways to expand their business. In other words, the institutional setup in which each player entrenches itself within an independent domain in order to achieve private enrichment and political censorship works in favor of rapid Internet diffusion. The role of computer scientists has to be understood with reference to this institutional setup. On the one hand, the extent to which the computer scientists are incorporated into government agencies equipped with far-reaching admin-

[26]Hachigian, "China's Cyber-Strategy," 118, 122.
[27]Zixue Tai, *Internet in China: Cyberspace and Civil Society* (London: Routledge, 2006).
[28]Yang, "The Co-Evolution of the Internet and Civil Society in China," 405.

istrative arms and substantial profit sources properly reflects their policy impact. On the other hand, the actions of computer scientists that are institutionally incorporated into the policy process could also be understood in terms of the profit-generation purpose.

Based on clues from recent literature, this paper takes a historical approach in tracing the formation of a group of Chinese computer scientists with distinct principled beliefs, and it explores how this group is positioned in the institutional setup of Internet policy. The next section focuses on the contribution of the Chinese computer scientists to the early development of the Internet and the following one describes their positioning in the domestic institutional setup for Internet policymaking.

The Contribution of Computer Scientists to the Internet's Early Development

The computer scientists have contributed to China's Internet development in three ways: by introducing Internet usage, managing technical operations, and negotiating the building of international connections for domestic networks. It is through the efforts of computer scientists that the Internet got started in China. In the early 1980s, a World Bank-sponsored program, Chinese University Development Project II (中國大學發展計劃 2), granted the Chinese government substantial funding to import Siemens computers from Germany with a BS 2000 mainframe operating system platform. In the post-procurement technology transfer stage, Werner Zorn joined Wang Yunfeng (王運豐), the then vice president of the Scientific Research Institute at the Fifth Ministry of Machine Industry (FMMI, 第五機械工業部科學研究院副院長),[29] in setting up connections between computers in Zorn's affiliated institution, the University of Karlsruhe, and those in the Institute for Computer Application (ICA, 兵器工業計算機應

[29]Wang Yunfeng himself had studied in Germany and was in charge of Sino-German scientific cooperation in the early 1980s.

用研究所) under FMMI.[30] The second breakthrough came from Tsinghua University, where Hu Daoyuan (胡道元), then director of the Computer and Information Center, set up an email system based on the X 400 protocol introduced from the University of British Columbia (UBC) in Canada. It was through this protocol that Tsinghua's email system was linked to UBC. Hu Daoyuan was one of the Chinese scholars dispatched to foreign universities in the early 1980s and upon his return from the University of California Los Angeles (UCLA) he helped Tsinghua to build up its campus network, of which the famous bulletin board system (BBS) Shuimu Tsinghua (水木清華) is a part.[31]

Another attempt to introduce the Internet emerged out of research collaboration between the Institute of High Energy Physics (IHEP, 高能物理研究所) of CAS and the Apparatus for Large Electron-Positron Collider Physics (ALEPH) project, an experiment sponsored by the European Center for Nuclear Research (CERN). This Sino-European research collaboration is one result of a decade-long national campaign for research excellence in high energy physics that was promoted by the overseas Chinese Nobel laureate Tsung-Dao Lee (李政道) as political turmoil subsided in China in the 1970s. This campaign had particular significance as it stimulated Sino-American scientific cooperation in high energy physics, which began with the dispatch of scholars and students to three laboratories[32] and major universities in the United States, as well as to CERN in Western Europe, and later developed into a formal institution, the Sino-American Joint Commission on High Energy Physics.[33] The fact that Deng Xiaoping

[30]Li Nanjun, "Zhongguo jieru hulianwang de zaoqi gongzuo huigu" (Overview of China's efforts to get connected to international computer network in the early stage), *Xinhua Net*, New Media Channel, November 21, 2006. http://news.xinhuanet.com/newmedia/2006-11/21/content_5358804.htm.

[31]Yang Chen, "Xinxi anquan de kaituozhe" (The pioneer of information security: portraying the information and Internet security expert Hu Daoyuan), *Xinxi wangluo anquan* (Netinfo Security), 2004, no. 2:10.

[32]Brookhaven National Laboratory (BNL), Fermi National Accelerator Laboratory (FNAL), and Stanford Linear Accelerator Laboratory (SLAC).

[33]Tsung-Dao Lee, "Wei gaoneng wuli jin weibo zhi li" (Personal devotion to high energy physics in China), *Kexue shibao* (Science Times), November 23, 2006; also available on the CAS website, http://www.cas.cn/html/Dir/2006/11/23/14/52/73.htm.

(鄧小平) himself convened the ground-breaking ceremony for the Beijing Electron Positron Collider (BEPC, 北京正負電子對撞機) indicates the high priority given to high energy physics by the Chinese leadership, which in a way pushed the IHEP to pioneer the Internet in China in order to facilitate its communication with colleagues overseas.[34]

The second contribution made by computer scientists has been their taking charge of the technical operation of computer networks installed by international organizations during the initial years. The earliest large-scale attempt was the National Computing and Networking Facility of China (NCFC, 中國國家計算與網絡設施), sponsored by the World Bank with a fund of US$200 million. The Chinese partners included the State Planning Commission (SPC, 國家計劃委員會), State Education Commission (SEC, 國家教育委員會), National Natural Science Foundation (國家自然科學基金委員會), and CAS. The aim of the NCFC was to build "backbones" linking networks within Beijing University (北京大學), Tsinghua University, and CAS, with CAS as the coordinating institution.[35] It is in the process of network buildup and subsequent operation that some of the computer scientists accumulated experience and later became important figures in China's Internet governance. For example, Qian Hualin (錢華林), who later became vice chairman of the China Internet Network Information Center (CNNIC,中國互聯網絡信息中心) steering committee, took part in NCFC development and served as the deputy director of the NCFC's computer network center when the project was completed in 1993.[36] Among other prominent individuals who were also active in the NCFC project are Wu Jianping (吳建平), director of both the network center and the technical board of the China Education and Research Network (CERNET, 中國教育

[34]Ibid.

[35]Since the three institutions are all located in the Zhongguancun (中關村) area, NCFC is also known as the Zhongguancun Educational and Scientific Research Exemplary Network (中關村地區教育與科研示範網絡).

[36]Zhu Qiang, "Latest Development of Internet in Mainland China" (Paper presented at the Chinese American Librarians Association 1995 Annual Conference, Chicago, June 23-27, 1995), http://www.lib.ku.edu/eastasia/paper01.shtml.

和科研計算機網),[37] and Mao Wei (毛偉), director-general of CNNIC.[38]

In addition to network buildup, computer scientists also played a major role in the establishment of the local domain name system in cooperation with the then global domain name distributor, Inter-NIC. As well as local scientists, their foreign partners were also involved in setting up China's ccTLD. In October 1990, Werner Zorn applied to Inter-NIC for registration of China's ccTLD, naming Qian Tianbai (錢天白) as administrative contact and Zorn himself as technical contact. At that time, the name server for ".cn" was also located in Karlsruhe.[39] Upon China's accession into the Internet, the ".cn" name server was transferred back to CAS and Qian Hualin was appointed as the technical contact.

Thirdly, computer scientists assisted in getting China's domestic networks connected to networks in other countries through connection to U.S. NSFNet. In the mid-1980s when China was having its initial taste of email service, it was temporary permission from the U.S. Computer Science Network (CSNET) that enabled the international connection of these experimental services. Behind the temporary permission was a tedious series of communications between Karlsruhe's Zorn and the CSNET Executive Committee's Larry Landweber.[40] With Stephen Wolff[41] from the U.S. National Science Foundation (NSF) confirming CSNET's offer, the connection between ICA and CSNET as well as BITNET—both subnets of the NSF—was set in a stable status connecting researchers in China and those in the West.[42] The ICA-CSNET connection was limited to research facili-

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[37]Liu Wanyong, "Wu Jianping: Jiangou quanshijie zuixianjin de hulianwang" (Wu Jianping: Establishing the most advanced Internet in the world), *Keji ribao* (Science and Technology Daily), March 30, 2005. http://news.51zaobao.cn/big5/stdaily/2005-03/30/content_371169.htm.

[38]"Introduction of CNNIC Steering Committee," CNNIC website, http://www.cnnic.net.cn/html/Dir/2007/01/23/4416.htm.

[39]See note 30 above.

[40]Seen in a letter from Werner Zorn written on May 21, 2004, to celebrate the tenth anniversary of Internet operation in China. CNNIC website, http://www.cnnic.cn/html/Dir/2004/05/27/2301.htm.

[41]Wolff was at that time director of the division of networking and communications research and infrastructure.

[42]The confirmation was issued in November 1987, two months after the first email, and sent

ties. In 1991 when CSNET was retired, China's computer network was left without any international linkage, which was a matter of serious concern.

The early breakthrough came from IHEP, which was connected to the Stanford Linear Accelerator Laboratory and the Lawrence Livermore National Laboratory on the basis of the DECNET protocol it had used to connect to researchers in Western Europe in the 1980s. Later, the IHEP leased a satellite-based dedicated line to connect to the Stanford Linear Accelerator Laboratory, which, to China's disappointment, was confined to the Energy Science Network (ESnet).[43] Nevertheless, getting China connected to an Internet that was U.S.-centered and under U.S. domination ultimately depended on a formal governmental agreement between China and the United States. Chinese computer scientists began to lobby for China's connection to the Internet at various international conferences and meetings. Qian Hualin is one of the most important figures in this regard. At the 1992 annual conference of the Internet Society (INET'92) held in Kobe,[44] Qian discussed the issue with representatives from the U.S. National Science Foundation in charge of the Internet. At INET'93 and the conference of the Coordinating Committee for Intercontinental Research Networking (CCIRN), both held in San Francisco the following year, Qian raised this issue again and obtained support from a number of Western scientists in persuading the NSF.[45] At the end of 1993, the NSF expressed its approval for China's entry into the Internet, which was formalized in 1994 when the Sino-U.S. Joint Commission on Scientific and Techno-

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to the Chinese delegate Chuquan Yang at the International Academic Network Workshop held at Princeton University. See note 30 above.

[43]CNNIC, "Zhongguo hulianwang fazhan dashiji" (Milestones of Internet development in China), *Xinhua Net*, January 11, 2007, http://big5.xinhuanet.com/gate/big5/news.xinhuanet.com/hlw/2007-01/11/content_5594011.htm.

[44]This was the first annual conference of the society since its formation in 1991. At that time it was normal to have a training session for network engineers and technicians from developing countries, lasting from a few days to one week, before the formal conference started.

[45]Tang Xiaolin, "Qian Hualin: Zhongguo hulianwang de jianzhengren" (Qian Hualin: the witness of Internet in China), *Huliamwang zhoukan* (China Internet Weekly), no. 235 (July 28, 2003): 61.

logical Cooperation met in Washington, D.C.[46] The head of the Chinese delegation was Hu Qiheng, then vice president of CAS and later chair of the CNNIC steering committee. Based on this formal agreement, the Zhongguancun-based NCFC took Sprint's dedicated line to connect to the Internet on April 20, 1994, and a month later the name server of ".cn" was moved back to CAS.[47] Since then, China has been incorporated into the Internet and considered to be a member of the international Internet community.

The Formation of Internet Institutions and the Retreat of Computer Scientists

Despite their vital role in the initial stage, the Chinese computer scientists have retreated from the main scene of Internet development since the mid-1990s. Instead, bureaucratic initiatives have taken the lead through a process of large-scale, nationwide network buildup. The fact that the establishment of the main institutional setup of the Internet took place in parallel with network buildup during this period makes the way in which networks are constructed critical to China's Internet development in the subsequent stages.

The earliest of the various network buildup projects was the "Three Golden" program (三金工程), which consisted of three separate projects: the Golden Bridge (金橋工程), Golden Gate (金關工程), and Golden Card (金卡工程).[48] The Golden Bridge project was to build the national information infrastructure. As proposed by then Vice Premier Zhu Rongji (朱鎔基), the "Three Golden" program consisted of constructing scalable exemplary projects to test and evaluate the technology, standards, and

[46]See note 30 above.

[47]See note 44 above.

[48]The purpose of the Golden Bridge project is to build up an information superhighway; the Golden Gate project is to undertake informatization of internationally trading firms to achieve paperless trade; and the Gold Card project is to encourage the holding of electronic currency and credit or cash cards and to modernize business financing services.

interface functionality required to build backbones as well to cultivate managerial talent and form operational models and related institutions. The following networks, part of the Golden Bridge project launched in September 1993, were completed by 1996: a set of frame relay networks through satellite channels linking Beijing, Shanghai, Guangzhou (廣州), and Wuhan (武漢); the Golden Bridge Satellite Network serving twenty-four provinces and cities; access network facilities using PSDN, DDN, and X.25; the China Golden Bridge Network (中國金橋信息網); and the Golden Bridge Network Information Center.[49] The government rolled out backbones and major networks in parallel with the Golden Bridge project. Among these were CERNET established by the SPC and SEC, the China Science and Technology Network (CSTNET, 中國科技網) established by CAS, and the China Public Computer Network (CHINANET, 中國公用計算機互聯網) set up by China Telecom. It can be said that the commercial operation of Internet services got started in 1996 when the above networks went into commercial operation.[50]

At the same time as China was deploying and diffusing its Internet infrastructure, it was also establishing the institutions of Internet management. While the Internet's original purpose of facilitating academic research placed CAS in a position to take the lead in the initial stage, the buildup of a large-scale backbone and network shifted the center of gravity of decision-making authority toward the Ministry of Post and Telecommunications (MPT, 郵電部) and the Ministry of Electronics Industry (MEI, 電子工業部). MPT got involved in network construction as early as 1989 when it built the experimental, X.25-based CNPAC,[51] with required technology transfer from a French company, S.E.S.A.[52] In the 1990s, it was

[49]"Golden Bridge Project," *Zhongguo wang* (China Net), China Internet Information Center, http://www.china.org.cn/chinese/zhuanti/283721.htm.

[50]"Hulianwang jinru Zhongguo shiwu zhounian de huigu yu fansi" (Review and reflection on the fifteen-year history of Internet development in China), Center of Internet Studies, Shanghai Academy of Social Sciences, http://www.sasscis.org/internettime/1.htm.

[51]In 1993, the MPT expanded and upgraded CNPAC to become China Public Packet Switched Network (CHINAPAC).

[52]S.E.S.A. was acquired by Capgemini in 1987.

China Telecom under the MPT that implemented the Sino-American agreement on connecting Chinese networks to the Internet and provided network service to the general public through CHINANET. The other powerful stakeholder, MEI, also took part in Internet development quite early on as many of its affiliated research institutions were connected to the German Research Network (Deutsches Forschungsnetz, DFN) in the 1980s. Despite its lack of a preexisting telephone network to spread its Internet service, MEI obtained strong backing from the State Council (國務院) as revealed from the formation of a cross-agency policy coordination apparatus and the implementation of the "Three Golden" program. The first cross-agency apparatus, the State Economic Informatization Joint Conference (國家經濟信息化聯席會議), was established in December 1993 with the mission of providing project planning and policy coordination functions between all ministries and provinces involved in the "Three Golden" program. To implement these functions effectively, the Joint Conference was headed by a vice premier and included vice ministers from SPC, MPT, the State Economic and Trade Commission (SETC, 國家經濟貿易委員會), and the People's Bank of China (PBC, 人民銀行) as its vice chairs. However, the major responsibility fell to MEI as the MEI minister Hu Qili (胡啓立) held the executive vice chairmanship of the Joint Conference and one MEI vice minister, Lu Xinkui (呂新奎), served as the director of its operating office. In the implementation stage of the "Three Golden" program, the government contracted Jitong (吉通公司), an MEI subordinate company, to conduct the construction work and, upon its completion, to take up the operation responsibilities.[53] The fact that the planning and implementation stages were tightly combined through the appointment of Jitong's CEO Lu Shouqun (陸首群) as deputy director of the Joint Conference's operating office also illustrated the weight of the MEI in decision-making.

[53]"Benkan zhuanfang: Jinqiao gongcheng fangtan" (本刊專訪: 金橋工程訪談, Special report: Interview with the Golden Bridge project manager), *jisuanji xitong yingyong* (計算機系統應用, Computer System Application), 1995, no. 4:2.

With the rapid expansion of network buildup and institutional setup, the computer scientists seem to shy away from the center of Internet policymaking. Computer scientists are not well represented in the main policymaking arenas. Five of the nineteen members of the Joint Conference were either from the science and technology community or responsible for scientific research in some ministry or other, but none of the five was a member of the group of computer scientists that contributed to the initial introduction of the Internet to China in the 1980s.[54] The situation remained much the same two years later when the Joint Conference was transformed into the Steering Group on Informatization of the State Council (國務院信息化工作領導小組), in which MEI and MPT ministers as well as vice ministers from SPC, State Science and Technology Commission (SSTC, 國家科學技術委員會), SETC, and PBC all served as vice chairs and the vice president of CAS as well as vice ministers from a number of other ministries, state agencies, and the military constituted its membership.[55] This situation remained the same after 2001, when the Steering Group established the Advisory Committee for State Informatization (ACSI, 國家信息化專家諮詢委員會) to include experts from a variety of disciplines such as economics, technology, public management, and law. Of the thirty-eight members of the commencing committee, twenty-one were researchers or chief engineers in computer science, telecommunications, or information technology in general. Five of these had been involved in the introduction and management of the Internet[56] and three

[54]The five members from the broadly-defined science and technology community were Zhou Guangzhao (周光召), affiliated to CAS, specializing in physics; Wei Yu (韋鈺), affiliated to Nanjing University (南京大學), specializing in wireless communications; Li Runsen (李潤森), affiliated to the Ministry of Public Security (公安部), specializing in information security; Li Maoming (黎懋明), affiliated to the SSTC; Xia Guohong (夏國洪), affiliated to the China Aerospace Science & Industry Corp. (中國航天科工集團公司), specializing in systematic control; and Hao Weimin (郝爲民), affiliated to MPT, serving as a telecommunications engineer.

[55]State Council, "Guowuyuan banngongting guanyu chengli guowuyuan xinxihua gongzuo lingdao xiaozu de tongzhi" (國務院辦公廳關於成立國務院信息化工作領小組的通知, State Council notice on the establishment of the Steering Group on Informatization), Guobanfa (1996) no. 15 (April 16, 1996).

[56]They are Hu Qiheng, Zhao Xiaofan (趙小凡), Wu Jianping, Qu Chengyi (曲成義), and He Dequan (何德全).

others were from CAS.[57] The ACSI director convenes a plenary session of the committee only twice a year and there is no institutional linkage between the committee and the real decision-making arena.

The only place where the computer scientists play a leading role is in the managing institution for domain names and IP addresses, CNNIC, which was established within CAS's network information center. Led by Hu Qiheng in its early years, the CNNIC Working Committee, like its predecessor the CNNIC expert group, is mostly composed of computer scientists, including Qian Tianbai and Qian Hualin. In addition, the computer scientists' connections with the international community provide an important foundation for Internet operation in China, as the needed resources are distributed through the layered international institutions (ICANN, regional Internet registries, and regional domain name associations) where most elected members are computer scientists from member countries. In other words, the role of computer scientists is by and large confined to the technical operation of the Internet and, in that capacity, to representing their country in international organizations. The peculiar positioning of computer scientists in China's Internet policymaking institutions has important implications for their policy preferences as well as for their impact on China's participation in WSIS.

Convergence and Divergence with Policymakers

With the above review in mind, this paper now returns to the question raised at the beginning: to what extent do computer scientists influence China's policy toward global Internet governance, an area that clearly requires policy coordination among sovereign states. For this purpose, two case studies are presented that illustrate the computer scientists' convergence with and divergence from Chinese policymakers on the matter of identifying national interest. One case is that of Chinese domain

[57] They are Feng Dengguo (冯登国), Li Guojie (李国杰), and Wang Xinggang (王行刚).

names[58] and the other is the status of ICANN—the former because it illustrates convergence and the latter because it is an example of divergence.

China entered the arena of international Internet affairs in 1999 when the idea of developing Chinese domain names first obtained international recognition. In June 1999, three bodies, the Asia-Pacific Networking Group (APNG), a Singaporean company BioInformatrix Pte, the National University of Singapore, and the Center for Internet Research, jointly developed a test bed for multilingual Internet domain names applicable nationwide in Singapore. This attempt used a technology called Internationalized Domain Name System (iDNS) and chose the Chinese domain name as its pioneer project.[59] The Singaporeans tried to acquire international endorsement in two ways: one was to secure funding from the International Development Research Center of Canada via APNG to explore the application of multilingual domain names in IPv6; the other was to obtain approval for its iDNS project from the Asia-Pacific Top-Level Domain Association (APTLD) as the steering project for multilingual domain names in the Asia-Pacific region.[60] CNNIC reacted fiercely to this move by labeling the failure to prevent APTLD from voting for the Singaporean case as a national humiliation. After CNNIC's public protest and its campaign for support among members in private, APTLD overruled its previous resolution.[61] Singapore's almost-successful attempt stimulated the Chinese government to speed up the development of Chinese domain names.

Computer scientists were deeply involved in the research and development of domain names and other Internet messages that use Chinese characters. As early as 1996, a Tsinghua-based team of computer scientists led by Hu Daoyuan had filed an international standard on Chinese character

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[58]This means using Chinese characters as the identifier in domain naming.

[59]"Singapore to Test Chinese Domain Name," June 2, 1999, *Internetnews.com*, http://www.internetnews.com/bus-news/article.php/130121.

[60]Ibid.

[61]Wang Ling, "Zhongguo daxiang hulianwang 'zhuquan' 'baoweizhan'" (China made a strike back in defense of Internet sovereignty), *Qianlong xinwen wang* (Qianlong News Network), June 10, 2002, http://www.21dnn.com/3050/2002-6-10/98@279798.htm.

encoding for Internet messages with the Internet Engineering Task Force (IETF), which was later approved as RFC (Request for Comments) 1922. This was the first RFC that China contributed to Internet standards. In 1998, a year before the Singapore initiative, CNNIC began to conduct technical research on a Chinese domain name system.[62] However, this did not come into operation until after the APTLD's 1999 conference. On January 18, 2000, CNNIC launched an experimental service to register Chinese domain names and four months later it joined the Taiwan Network Information Center (TWNIC),[63] the Hong Kong Domain Name Registration Company (HKDNR),[64] and the Macao Domain Name Registration Service (MONIC)[65] to form the Chinese Domain Name Consortium (CDNC), with the CNNIC working committee deputy director Qian Hualin as president. CDNC contains three working groups—a registration policy group, technical work group, and cooperation business group—of which the former two are mainly composed of computer scientists, engineers, and technicians from member NICs (network information centers). It is hardly surprising that the promotion of the Chinese domain name system, including the domain naming structure, conversion from traditional to simplified characters, compatibility, and customer-end technology, was by and large a product of Taiwan-China cooperation. In July 2000, CNNIC, TWNIC, the Japan Network Information Center (JPNIC), and the Korean Network Information Center (KRNIC)[66] formed the Joint Engineering Team (JET) to develop technical solutions for a Chinese domain name system.[67] Despite the fact that it was a country that used Chinese char-

[62]CNNIC, "Zhongwen yuming fazhan dashiji" (中文域名發展大事記, Milestone in Chinese domain name development), http://cnnic.cn/html/Dir/2003/09/22/0495.htm.

[63]Taiwan began research into Chinese domain names in October 1999 through the iDNS project at Academia Sinica (中央研究院). The plan was to launch an online registration service for Chinese domain names and individual domains on May 1, 2000. See Milestone in Internet Development, "Internet Development in Taiwan" project, http://www.nethistory.org.tw/html/events_3.htm.

[64]The ccTLD manager in Hong Kong.

[65]The ccTLD manager in Macao.

[66]Now incorporated into the National Internet Development Agency of Korea.

[67]See note 62 above.

acters, Singapore was not included in the transnational research project on a Chinese domain name system until July 2005, when the Singapore Network Information Center (SGNIC) joined the CDNC.

After the establishment of the CDNC, China launched an all-out effort to promote Chinese domain name registration. On November 7, 2000, the Ministry of Information Industry promulgated the "Notice on Management of Chinese Internet Domain Names" (關於互聯網中文域名管理的通告) to regulate the registration and management of Chinese domain names in China, and CNNIC was appointed the supervising agency. Meanwhile, CNNIC upgraded the domestic domain name system to include a registration service for domains with the suffix ".cn," such as ".中國" (dot Zhongguo), ".公司" (dot gongsi), and ".網路" (dot wanglu). While commercial services for Chinese domain names were soon rolled out, some technical issues arose that could not be overcome without international collaboration. One major issue is that of conversion between traditional and simplified characters in Chinese domain names and the scope of the rights that go along with registration; that is, whether registration of a name in traditional characters implies the right to the same domain name in simplified characters, and vice versa. Initially, the two sides adopted a buy-one-get-one-free approach to prevent potential legal disputes. In March 2003, the IETF IDN Working Group announced three RFCs on standard protocols for internationalized domain names, IDNA-NAMEPREP-PUNYCODE. These are RFC 3490, RFC 3491, and RFC 3492. However, this move did not resolve the difference between the two versions; neither did it prevent confusion resulting from variants of Chinese characters. As a result, JET and the CDNC announced the IDN Administration Guidelines and the CDN Administration Guidelines, which provided general principles and a comparison list between normal characters and variants.[68] In April 2004, the JET-produced "Standard for Multilingual Registration in Chinese, Japanese, and Korean" was accepted by IETF as RFC 3743. De-

[68]TWNIC, Chinese.tw, Internationalized Domain Name Standard, http://xn--fiq228c.tw/index.htm.

spite the contribution by three experts from JPNIC, TWNIC, and the Korea-based PeaceNet,[69] RFC 3743 was hailed by CNNIC as the second standard protocol that China has contributed to IETF and a great breakthrough in China's participation in international standard setting.[70] In October 2006, technical experts from CNNIC and TWNIC filed another document, the Registration and Administration Recommendations for Chinese Domain Names, and this was approved by IETF as RFC 4713.

The Chinese domain name case is one of concerted action taken by MII policymakers and computer scientists. The convergence between them is revealed in two instances. First, MII promulgated the regulation on Chinese domain name registration right after CNNIC had prepared its registration service. The timing was particularly vital for CNNIC as its competitor NSI/VeriSign was at that time pushing very hard to deliver a Chinese domain name service, and CNNIC had to denounce the applicability of VeriSign products just two weeks before the MII-CNNIC joint action.[71] Second, MII did not open up any space for private operators to challenge CNNIC's monopoly on Chinese domain name business, despite the fact that it had the power to do so legally.[72]

While in the case of Chinese domain names MII policymakers took sides with the computer scientists, the debate on ICANN's status presents a different story. Generally speaking, the group of computer scientists is more inclined to support ICANN. Their view can be illustrated quite well

[69]The authors of RFC 3743 are Kazunori Konishi (JPNIC), Kenny Huang (TWNIC), Qian Huanlin (CNNIC), and Y. Ko (PeaceNet).

[70]"Mao Wei: Jinru biaozhun, ranhou zhiding biaozhun" (Going to the standards first and then setting up our own standards), Sohu/IT Channel, July 26, 2005, http://it.sohu.com/20050726/n240195929_3.shtml.

[71]CNNIC, "CNNIC guanyu NSI tigong Zhongwen yuming fuwu de gongkai shengming" (CDNC 關于 NSI 提供中文域名服務的公開聲明, CNNIC public statement on NSI-provided Chinese domain name service), http://www.cnnic.net/html/Dir/2000/10/22/0486.htm.

[72]The MII's taking sides with CNNIC is illustrated in the case of real name service (a keyword search and redirecting service). Despite the fact that the pioneering company for this new service, 3721.com, keeps blaming CNNIC for market distortions, MII has not changed its policy of allowing CNNIC to keep its monopoly as the Chinese domain name registry. See Liu Ren, *Zhishi yingxiong 2.0: Zhongguo keji doushi* (Knowledge heroes 2.0: Chinese technology fighters) (Taipei: OurLinX, 2002), 191-94.

by the following quotation from Qian Hualin: "ICANN is a transparent and open organization that only conducts its business within a clearly defined domain." In response to worries that the U.S. government might cease to resolve domain name requests from countries hostile to the United States, Qian added that that had never happened.[73] For those who take that line, the best response to the various challenges facing ICANN is to transform ICANN into an independent institution, accommodating Internet service providers (ISPs), network operators, and netizens in its decision-making process.[74] As long as the United States relinquishes its control over ICANN and governments, enterprises, and civil groups are all entitled to hold ICANN to account, the current situation of inequality among sovereign states due to the fact that ICANN is accountable only to the United States will be substantially ameliorated.[75] Once concerns over ICANN are resolved, the question of who runs the Internet will not be an issue.[76] However, the proposals of the computer scientists concerning Internet governance are substantially different from those adopted by the Chinese government. At the opening session of the 2005 WSIS in Tunis, Huang Ju (黄菊), a vice premier and chair of the Chinese delegation, asserted that Internet governance should be government-led, multilateral, democratic, transparent, and effective.[77] The difference between the computer sci-

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[73]Wang Zheng, "Shei caokong hulianwang shijie? Meiguoren?" (Who controls Internet? The Americans?), *Jingji* (Economics), March 2004, 30-31.

[74]Shen Yang, "ICANN de jiaose yinggai jiaqiang" (The role of ICANN should be strengthened), *Dianzi shangwu shijie* (Electronic Commerce World), August 2005, no. 8:17.

[75]Li Baojin, "Hulianwang zhili sanchongmen: fang Zhongguo kexie fuzhuxi, Zhongguo hulianwang xiehui lishizhang Hu Qiheng yuanshi" (Three barriers in Internet governance: interview with fellow Hu Qiheng, vice president of the China Science and Technology Association and president of the China Internet Association), *Zhongguo jiaoyu wangluo* (China Educational Network), July 2005, no. 7:5-6.

[76]See note 70 above.

[77]The original statement is as follows: "We should follow the principles of government guidance, multi-player involvement, democratic decision-making, transparency, and efficiency in Internet governance. We should build an effective mechanism for communication and coordination, enhance cooperation in this field among various countries, international organizations, and NGOs, and prevent and crack down on criminal activities like economic fraud, violence, terrorism, and those endangering national security with the use of information technologies and resources, so as to ensure sound development of the information society." See "Statement by Vice Premier Huang Ju, the State Council of the People's

entists' view and the official position becomes even more evident in view of opinions voiced by other Chinese commentators during this period.

At the height of the worldwide debate over Internet governance, members of the telecommunications establishment also made known their views on how the Internet should be governed in several Chinese journals and magazines.[78] While admitting that China has benefited from the current Internet governance system, they argued that there is an urgent need for China to enhance its discourse power and exert substantial influence in global Internet governance for the sake of defending China's national interest and promoting its cultural values. With regard to public policies related to the Internet, they contended that China should insist on four basic principles: governments taking the lead; multilateral participation; democratic decision-making; and transparency and effectiveness. In addition, they asserted that it would be in the best interests of China and other developing countries for a legitimate and authoritative Internet governance system to be founded on the UN institutional framework.[79] Apart from the computer scientists and the telecommunications people, some members of the foreign policy community also participated in the domestic debate and took an even tougher view.[80] They argued that unilateral control by the U.S. government causes unease among other Internet-using countries, whose netizens constitute the majority of the Internet population. ICANN's control over the Internet is different from the International Telecommunication Union's (ITU) control over telephony in the sense that national governments cannot retain sovereignty, rule-making power, and licensing author-

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Republic of China, Second Phase of WSIS, Tunis, November 17, 2005," http://www.itu.int/wsis/tunis/statements/docs/g-china/1.doc.

[78]Identified as part of the telecommunications establishment are officials responsible for telecommunications management within MII, such as Yan Hongqiang (閻宏強) and Han Xia (韓夏), both from the Telecom Management Bureau of MII.

[79]Yan Hongqiang and Han Xia, "Hulianwang guoji zhili wenti zongshu" (A general account of international governance of the Internet), *Dianxinwang jishu* (Telecommunications Network Technology), October 2005, no. 10:19.

[80]The foreign policy community is identified as scholars and reporters working with the Foreign Affairs Ministry, such as Yu Xiaoqiu (俞曉秋), a research fellow at the China Institute of Contemporary International Relations, and Wang Jinyan (王晉燕), a Xinhua News Agency reporter.

ity in the former as much as they can in the latter.[81] Furthermore, these commentators see the United States reserving numerous privileges for itself as rule-maker, overseer, and beneficiary combined, and using these to defend its economic, diplomatic, and security interests as well as those in the information technology field.[82]

In comparison to the other two voices, that of the computer scientists is closest to civil society groups in the United States and to ICANN itself. Ever since its establishment in 1998, ICANN has endured criticism and challenge from various angles. While the Europeans complain that ICANN is U.S.-dominated, civil society groups, most of them U.S.-based, often question its legitimacy and accountability, and hold that it could be improved through denationalization. Denationalization here refers to an institutional solution through the establishment of a nongovernmental, multi-stakeholder regime with limited national government participation. Chief among those who endorse this solution are Computer Professionals for Social Responsibility (CPSR) and the Internet Governance Project (IGP). Most importantly, ICANN itself endorses the idea of an independent institution as the best response to both the challenge from other sovereign state governments and the accountability critique from civil society groups.[83] The background of these groups seems to provide some hint of the similarity of their positions. Both CPSR and IGP are led by people from the computer science community. By the same token, ICANN, which is by and large the descendant of the early managing institutions of the Internet, has many Internet pioneers playing important roles in its operation to this day. It is fair to contend that the Chinese computer scientists embrace similar values and a similar philosophy concerning how the Internet

[81]Wang Jinyan, "Meiguo zhangkong hulianwang beihou de yexin" (The U.S. intention behind its control over the Internet), *Dang'an guanli* (Archive Management), 2006, no. 3: 90-91.

[82]Yu Xiaoqiu, "Sheilai zhangkong hulianwang" (Who controls the Internet), *Shijie zhishi* (World Affairs), 2005, no. 24:40-41.

[83]ICANN, "Address of the President and CEO of ICANN to the Working Group for Internet Governance" (June 14, 2005, Fourth Meeting of Working Group on Internet Governance, Geneva). http://www.wgig.org/docs/StatementJune-ICANN.pdf.

should be managed and place a high premium on their connectedness with international colleagues in the same scientific community.

On the ICANN question, the computer scientists are involved in a latent dispute with the MII establishment, who pushed very hard for a change in the status quo of Internet governance. The implications of this divergence in views for institutional choice unfold in two ways. On the one hand, the participation of the computer scientists in ICANN seems to be unaffected by the policymakers' distrust of ICANN. While the MII withdrew its delegate from ICANN's Governmental Advisory Committee in November 2001 to press for change in Taiwan's membership, CNNIC continued its involvement by hosting the 2002 ICANN meeting in Shanghai and had one of its key figures, Qian Hualin, elected to the ICANN Board of Directors in December 2003. On the other hand, faced with the tough stand of the Chinese policymakers, the computer scientists simply shy away from touching upon the ICANN issue. They not only disappeared from domestic public debate on Internet governance when the controversy exploded and the official position became clear,[84] but they also kept silent on WSIS-related occasions.[85]

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[84]Some computer scientists agreed to media interviews to express their opinion with regard to the ICANN question in July 2005. They rarely made such statements on public occasions, especially as the second WSIS was approaching. One good illustration of this is the China Internet Conference of September 2005, when the director of the MII Telecom Management Bureau stressed the importance of voicing China's unique position in international contexts whereas Hu Qiheng, China's representative in the UN's Working Group on Internet Governance, was silent on the international dimension of Internet governance. See Yang Linhua, "ICANN dongshi Qian Hualin: .cm han .net yuming dou buanquan" (ICANN board member Qian Hualin: .com and .net were both insecure), *Ershiyi shiji jingji baodao* (21st Century Business Herald), July 11, 2005, *Xinhuanet*, http://news.xinhuanet.com/ec/2005-07/11/content_3203582_1.htm; Su Jinsheng, "Xinchanbu Dianxin guanliju juzhang Su Jinsheng zuo zhuti baogao" (Keynote speech by Su Jinsheng, director of the MII Telecom Management Bureau, September 1, 2005), CNII website (Zhongguo xinxi chanye wang), http://www.cnii.com.cn/20050801/ca312953.htm; and Hu Qiheng, "Zhongguo hulianwang xiehui lishizhang Hu Qiheng zhici" (Remark by Hu Qiheng, president of the China Internet Association, September 1, 2005), CNII website, http://www.cnii.com.cn/20050801/ca312883.htm.

[85]Yang Linhua, "Tunis zhengyi sanqu hulianwang guanxiaquan Zhongguo gongxian" (Dissolving of the Tunis dispute and China's contribution to Internet jurisdiction), *Ershiyi shiji jingji baodao*, November 26, 2005, Tom Group website, http://tech.tom.com/2005-11-26/0039/34369793.html.

Ideas and Influence: Origin, Formation, and Policy Impact

While the career paths and personal experiences of these computer scientists are diverse, their grouping together is based on the idea of an ideational commonality, that is, a strong urge to pursue technological independence and a sense of belonging to an international community. Being involved in and devoted to Internet diffusion, the Chinese computer scientists have a goal of technological independence for China, which is often termed "techno-nationalism." In the 1980s, achieving such independence meant overcoming technical barriers to acquiring Internet equipment and facilities through local learning and self-reliance. This strong impulse to pursue technological independence has led the Chinese Internet experts to place a high premium on technological breakthroughs. For them, success in registering Internet standards (measured by RFC approval) is considered to be such a breakthrough and the three Chinese-filed RFCs are widely praised. Moreover, the three RFCs have special meanings in that they were designed to expand the usage of Chinese characters on the Internet, which both signifies a technological breakthrough and satisfies the demands of Chinese nationalism. However, techno-nationalism is not a concept that can be defined in any concrete way. Instead, it has different, even contradictory, meanings for different groups in different cases. For computer scientists, techno-nationalism could in some cases mean developing indigenous technologies,[86] but in others mean having the Chinese government or a government-sanctioned entity control the technology no matter where it was developed.[87] Similarly, for MII policymakers, techno-nationalism sometimes requires cultivating domestic firms with substantial technological capabilities no matter whether these firms may at times work in partnership with foreign competitors.[88] At other times MII opposes resorting to foreign suppliers to ensure the security of domestic infrastruc-

[86]See note 70 above.
[87]Liu, *Zhishi yingxiong 2.0*, 184-85, 194-95.
[88]Ibid., 188.

ture.[89] Hence, as in the two cases examined above, techno-nationalism is more of a communicative language than a guiding principle. While parties may disagree with each other on what serves nationalist demands best, the real policy proposal each party brings to the table may not contain many elements of techno-nationalism.

Aside from this nationalist element, these computer scientists developed a sense of belonging to an international community of computer scientists and networking engineers when it was still in its formative stage. This sense of belonging had its roots in a two-way interaction between the Chinese Internet experts and their Western colleagues, including participation by Chinese experts in transnational collaborative research projects and international conferences on networking research as well as the provision of technical assistance by Western experts and their efforts to persuade U.S. science officials to permit China's connection to the Internet. The sense of belonging to an inclusive international community makes these computer scientists uneasy about a confrontation with ICANN. As one senior official recalled, one important purpose behind the formation of CNNIC was to represent the Chinese Internet community in international Internet organizations, thereby improving the previous chaotic situation where Chinese representatives came from different ministries with conflicting agendas.[90] For the computer scientists, the existing international Internet institution constitutes a foundation of legitimacy underpinning their position in the domestic Internet community. Deep in their minds is the recognition that the current international institution, ICANN, has provided ample opportunities for the Chinese to achieve technological independence and even to play an important role. Thus, they are accustomed to taking the existing institutional route to achieve their goals. As the director of CNNIC Mao Wei emphasized, "to be in the game is the precondition for playing the game in China's own favor."[91] More important than

[89]Ibid., 195.
[90]Ibid., 150, 165-66.
[91]See note 70 above.

resorting to institutional reform is concentrating on technology catch-up, control over core technologies, and participation in standard setting,[92] for which the current institutions provide a productive framework.

Nevertheless, the official stand does not always ignore the perspective of the computer scientists. The issue of Chinese domain names is precisely the kind of case where the MII conforms to what computer scientists demand. The revenue-generating effect may be one thing that unites the CNNIC-based computer scientists and at the same time keeps MII officials from inserting a different policy formula into the Chinese domain name service. It is true that Chinese computer scientists give high priority to technological breakthroughs, and there are few examples that represent a breakthrough more than the creation of Chinese domain name standards. However, creating a Chinese domain name system also provides lucrative opportunities for domain businesses, and as a result CNNIC not only argues that there should be a Chinese domain system but also insists that this system be developed and operated by itself rather than by the Singaporean company or VeriSign, the only registrar for ".com." The revenue that CNNIC creates from this is believed to constitute one of the major revenue sources of its host institution, the Chinese Academy of Sciences.[93] The revenue implication provides a strong incentive for computer scientists to work together to expand domain business through standard breakthroughs and market dominance, but at the same time, CNNIC's market position depends on the regulatory policy of MII, which, while placed above CNNIC in the government hierarchy, is no higher in status than CAS. Without comparable knowledge or experience in the domain name business, MII is in most cases inclined to respect CNNIC's demands.[94]

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[92]Liu Shu, "Wu Jianping: Zhangwou hexin jishu caineng yongyou huayuquan" (Wu Jianping: Control over core technologies is the key to the right to speak), *Keji ribao*, December 19, 2006, http://www.stdaily.com/big5/zoujin863/2006-12/19/content_608978.htm.

[93]Interview with a previous Asia-Pacific Network Information Center (APNIC) observer on June 3, 2008.

[94]Another issue similar to that of Chinese domain names is ".cn". On a variety of occasions, the Chinese computer scientists have promoted the registration of ".cn" instead of ".com" or any other suffix registered in foreign countries. In support of the expansion of ".cn" business, MII even relaxed regulations on domain name registration in 2002.

However, the impact of these computer scientists seems to have been quite limited where the debate on ICANN's status during the second WSIS process was concerned. Most members of China's official delegation to WSIS (including the preparation process) are from MII, with the director of the MII Telecom Management Bureau (電信管理局) taking the lead, which indicates that MII is in charge of China's official position with regard to WSIS.[95] As mentioned above, the argument presented by high-level MII officials was word-for-word taken from a public statement made by Vice Premier Huang Ju at the Tunis WSIS. MII clearly bet on the dissolution of ICANN, given that as early as 2001, it recalled from the ICANN Governmental Advisory Committee (GAC) China's official representative, who had sat on that committee since 1999.[96] However, participation in ICANN by computer scientists in general and CNNIC in particular continued. In some senses, the difference between MII and CNNIC can be seen as similar to the attitude the Chinese government adopts in dealing with ICANN. However, it also reflects a division of labor, or a hierarchy of authority, in China's foreign Internet policymaking between the MII establishment and the CNNIC-based computer scientists.

The hierarchy of authority whereby the telecommunications establishment is in charge of policy decisions and the computer scientists are responsible for technical operations may be connected with the latter's lack of proper institutional linkages to the policymaking circle, which has the Steering Group on Informatization at the core and MII as the policy-design and implementation body. In addition, in the pre-MII period, the other ministries involved, MPT and MEI, both had business branches that gave them an entrenched interest in certain policy stands. With the formation of MII, the two blocs of business groups joined together under MII's umbrella.

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[95] List of participants for PrepCom-1, PrepCom-2, and PrepCom-3, http://www.itu.int/wsis/documents/doc_multi.asp?lang=en&id=1263|1264; http://www.itu.int/wsis/documents/doc_multi.asp?lang=en&id=1428|0; and http://www.itu.int/wsis/documents/doc_multi.asp?lang=en&id=1910|0.

[96] MII first sent a delegate to the GAC in 1999. At that time, the official delegate was Chen Yin (陳因), then deputy director of the Telecom Management Bureau, who is also the leader of the WSIS delegation.

Lacking MPT's or MEI's far-reaching business arms, the CNNIC-based computer scientists could not mount a serious challenge to MII's Internet policymaking, notwithstanding their forming a separate Internet policy body. Moreover, in contrast to the epistemic community theory prediction that technical experts are sought out by policymakers to cross the policy-technical dividing line in times of uncertainty, this line has become more defined and harder to cross when uncertainty comes hand-in-hand with a rise in political significance. The U.S. government's politicization of Internet governance through the manipulation of human rights discourse before the Tunis summit illustrated such a scenario. Washington voiced concern over the implications for human rights of the abuse of government control over the Internet at PrepCom-3 in September 2005, and the issue was widely discussed and debated in the international media until the conclusion of the Tunis summit. This development not only caused the computer scientists to shy away from public discourse but also drove them away from the major policymaking arena. Right after the Tunis summit, public discussion on Internet governance was dominated by the fight against U.S. dominance, while views endorsing ICANN disappeared. In addition, the government appointed a foreign-service officer to the IGF advisory group during the WSIS follow-up process. The equivalent of this group in the second WSIS process was the Working Group on Internet Governance (WGIG) where the Chinese appointee was Hu Qiheng, a prominent figure in the computer scientist camp. The replacement of a scientist by a diplomat indicates a change in the relative importance of the two groups. In other words, the domestic institutional setup and the international environment both constrain the computer scientists from playing a decisive role in China's policy toward global Internet governance.

Conclusion

Since the concept of complex interdependence was raised in the last century, individuals have been identified as important actors in international relations. However, concept-loaded attempts to theorize how in-

dividuals change the dynamics of international politics have been quite limited in number. The epistemic community school represents one such attempt, and it provides insightful arguments in favor of attaching individuals to the center of international cooperation and policy coordination. Following the same line of logic, this paper focuses on the unit level to see whether such an epistemic community in the form of a group of scientists with distinct beliefs and a sense of belonging to an international community actually exists, and if so, what role it plays in China's policy toward global Internet governance.

In tracing the history of Internet development, this paper identifies such a group of computer scientists and finds that its members played a pivotal role in introducing the Internet to China in the early stages. It was also in the early stages that these scientists developed a strong impulse to achieve technological independence and a sense of belonging to an international community of computer scientists, many of whom made significant efforts to help their Chinese colleagues incorporate Chinese networks into the Internet. The combination of the pursuit of technological independence and belonging to an international community constitutes the foundation for these computer scientists to act as a group. Observing the cases of Chinese domain names and the WSIS debate on ICANN, this paper finds that, with regard to participating in global Internet governance, there is a division of labor between computer scientists and the MII establishment, with the former responsible for technical operation and the latter for policy decisions. There are two implications of the distinction between the technical and policy aspects. First, the fact that computer scientists are confined to a technical role has its origins in China's unique trajectory of Internet development where the inter-bureaucracy race for profit-generation drove rapid Internet diffusion. This trajectory means that the distinction is very much institutionalized to the extent that the policy formulation process does not interfere with technical operation as much as vice versa. Second, the distinction reveals a hierarchy of authority where the policy top is better connected to the policy formulation process at higher levels than to the technical bottom. When particular international events increase the political significance of the issues in debate, the policy

top turns out to be more assertive and the technical bottom more restrained about blurring the distinction. It is in the above finding that this paper presents a story that is at odds with what might be expected from epistemic community theory.

Despite the frustration experienced by the scientists, there is one thing that may encourage scholars to take the epistemic community theory seriously. The existence of a group of computer scientists that embraces distinct beliefs and a sense of belonging to an international community itself provides some clues about future changes in global Internet governance. Even though these scientists are institutionally disempowered, the MII officials may gradually learn to appreciate the value of the status quo, especially when the international political confrontation eases. In addition, with the industrial structure continuing to evolve and the incongruence between industrial dynamics and government-led regulation continuing to enlarge, a new way of managing Internet resources will emerge that takes into consideration the ideas of these scientists. Through observation of Chinese computer scientists, we are able to move forward to theorize about future changes in China's position on global Internet governance.

ACRONYMS:

APNG: Asia-Pacific Networking Group
APTLD: Asia-Pacific Top-Level Domain Association
ARPANET: Advanced Research Projects Agency Network
ACSI: Advisory Committee for State Informatization (國家信息化專家諮詢委員會)
CAS: Chinese Academy of Sciences (中國科學院)
ccTLD: Country Code Top-Level Domain
CDNC: Chinese Domain Name Consortium
CERN: European Center for Nuclear Research
CERNET: China Education and Research Network (中國教育和科研計算機網)
CHINANET: China Public Computer Network (中國公用計算機互聯網)
CNNIC: China Internet Network Information Center (中國互聯網絡信息中心)
CPSR: Computer Professionals for Social Responsibility
CSNET: Computer Science Network (United States)
FMMI: Fifth Ministry of Machine Industry (第五機械工業部)

ICA: Institute for Computer Application (兵器工業計算機應用研究所)
ICANN: Internet Corporation for Assigned Names and Numbers
iDNS: Internationalized Domain Name System
IETF: Internet Engineering Task Force
IGP: Internet Governance Project
IHEP: Institute of High Energy Physics (高能物理研究所)
JET: Joint Engineering Team
JPNIC: Japan Network Information Center
MEI: Ministry of Electronics Industry (電子工業部)
MII: Ministry of Information Industry (信息產業部)
MPT: Ministry of Post and Telecommunications (郵電部)
NCFC: National Computing and Networking Facility of China (中國國家計算與網絡設施)
NSF: National Science Foundation (United States)
PBC: People's Bank of China (人民銀行)
RFC: Request for Comments
SEC: State Education Commission (國家教育委員會)
SETC: State Economic and Trade Commission (國家經濟貿易委員會)
SPC: State Planning Commission (國家計劃委員會)
TWNIC: Taiwan Network Information Center
WSIS: World Summit on the Information Society

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