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Sun Tzu's Battle for Your Footnotes: The Emergent Role of Libraries in Judicial Warfare

Mark McCary

ARTICLE

Sun Tzu's Battle For Your Footnotes: The Emergent Role Of Libraries In Juridical Warfare

Mark McCary [*]

A wise general makes a point of foraging on the enemy.
—Sun Tzu, The Art of War, Waging War[1]

ABSTRACT

This paper posits that libraries—specifically science and technology libraries—have emerged on the international scene as a critical source of soft power—non-military power.[2] *Public and private entities can leverage a library's digital resources to accelerate*[3] *the development of critical technologies*[4]

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* Attorney, Texas License, 2000; Robert Bosch Foundation Fellow, 2000–2001; J.D., University of Texas at Austin, 1999; B.A., Virginia Military Institute, 1992. Major, U.S.A.F.R., 1992–Present. McCary & McCary, P.C., http://www.m2lawpc.com. Dedicated to those serving in Academia. (Assessments are based on the Author's personal defense related experience and renewables industry related work. Views are not necessarily representative of U.S. Government policy positions.)

[1] SUN TZU, THE ART OF WAR 14 (James Clavell, ed., Delta 1988) (6th Cent. B.C.); see also id. at 9 ("The Art of War is of vital importance to the state. It is a matter of life and death, a road either to safety or to ruin. Hence under no circumstances can it be neglected.").

[2] See JOSEPH S. NYE, JR., SOFT POWER: THE MEANS TO SUCCESS IN WORLD POLITICS 76–77 (2004) (noting research in physics and chemistry, internet websites, patents, and R&D expenditures as potential means of soft power); see also id. at 83–85 (discussing Asian power and stating that it will take some time for China to have the same soft power impact the U.S. enjoys).

[3] See David Kramer, Science Board Details China's Leap in Science and Technology, PHYSICS TODAY, Mar. 2010, at 30 ("If anyone still needs convincing on the speed with which China is ascending as a world science and technology (S&T) leader, the latest edition of Science and Engineering Indicators, the biennial encyclopedia of statistics assembled by the National Science Board (NSB) should suffice."); see also id. at 30 (noting that China's research workforce has nearly tripled from 500,000 in 1995 to nearly 1.4 million in 2007 and its emphasis on investment and education has achieved a dramatic amount of synergy).

[4] From the author's perspective, science and technology libraries provide access to baseline research necessary to accelerating innovation by shorting the time necessary to prepare or accumulate experimental and theoretical knowledge required for technological advancement. Cf. S.J. DEITCHMAN, BEYOND THE THAW: A NEW NATIONAL STRATEGY 193–211 (1991) (discussing aspects of accelerated technology development and arguing there is a need to maintain the edge in such areas as computing hardware and software, materials, aircraft and missiles, fiber optics, superconductivity, directed energy, etc., and noting that if we lose a lead we may never regain it as we face an increasingly uncertain future and pointing out that

through horizon scanning,[5] targeting,[6] early warning[7], alert services[8], digital exploitation,[9] and cross-domain delivery.[10]10 Library resources play a key role in strengthening the research capabilities of public and private entities. However, current library trends threaten cutting-edge proprietary research intended for only very private audiences.

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focusing on civilian technology advancements can pay dividends for military defense strategy).

[5] Horizon Scanning is defined by the author as the electronic survey of available digital information resources, including blogs, social networks, search engines, portals, newsgroups, intranets, to deliver the proper information to the proper customer at the proper time. It is generally accomplished through the use of software tools. *See, e.g.,* Horizon Scanning, AMI ENTERPRISE INTELLIGENCE SOFTWARE, http://www.amisw.co.uk/horizon-scanning-solution.html (last visted Jan. 4, 2012) (defining horizon scanning and offering for sale horizon scanning software).

[6] Targeting is defined by the author as those activities designed to identify and exploit a research and development objective. Military concepts of reconnaissance, surveillance, target identification, and selection have been translated into Competitive Intelligence theories and practices. See JOINT CHIEFS OF STAFF, JOINT PUBLICATION 3-60: JOINT DOCTRINE FOR TARGETING (2007) http://www.bits.de/NRANEU/others/jp-doctrine/jp3_60(02).pdf (discussing the definition, nature, and characteristics of targets and the joint targeting process); U.S. AIR FORCE, AIR FORCE DOCTRINE DOCUMENT 2-1.9: TARGETING (2006), http://www.fas.org/irp/dodd ir/usaf/afdd2-1.9.pdf (establishing "doctrinal guidance for planning, executing, and assessing targeting operations"); U.S. AIR FORCE, AIR FORCE INSTRUCTION 14–117: AIR FORCE TARGETING (2009) http://www.af.mil/shared/media/epubs/AFI14-117.pdf (defining Air Force targeting responsibilities).

[7] *Early Warning* is defined by the author as a system of analysis used to timely determine risks, market shifts, and competitor developments in a particular industry. This system of analysis is augmented by sophisticated software tools that provide web surveillance and reconnaissance. *See, e.g.*, *ICI-32 - Early Warning Systems*, INSTITUTE FOR COMPETITIVE INTELLIGENCE, http://competitiveintelligence.ning.com/events/ici32 early warning systems 2 (last visited Jan. 4, 2012) (discussing the fundamentals for the design of early detection and warning systems); *see also* Adrian Alvarez, *Situational Early Warning*, COMPETITIVE INTELLIGENCE MAG., Jan.–Feb. 2007, at 14–18 (discussing the key steps in situational early warning methodology).

[8] Alert Services are defined by the author as those means used to alert customers to breaking competitive intelligence developments. Alert Services are often combined with Horizon Scanning and Early Warning although each is distinct in nature. See, e.g., CyberAlert Applications, CYBER ALERT, http://www.cyberalert.com/app_competitive_intelligence.html (last visited Jan. 4, 2012) (describing competitive intelligence services offered for purchase).

[9] Digital Exploitation is defined by the author as those means used to take unfair advantage of a competitor's digitized pre-competitive data.

[10] Cross-Domain Delivery is defined as the assembly of critical technology information from various disciplines that are ultimately associated with one technological innovation for use by a consumer—e.g. stealth technology; *Cf.* Feeding the Dragon: Technology Transfer and the Growing Chinese Threat Before the Joint Economic Committee,105th Cong. (1997) (statement of Peter M. Leitner), available at www.house.gov/jec/hearings/espio nag/leitner.htm (discussing integration of technologies and forecasting a projected loss of technology edge to future adversaries such as China, specifically in the field of stealth technology).

Western authors, who submit for early circulation publications on emerging technology issues, may find their works exploited through deep dive research,[11] citation analysis, unsanctioned access, and networked digital library ("DL") holdings. Separately, Western librarians may find themselves victims of information attack via surreptitious inquiries for unclassified but sensitive materials or cyber penetrations.[12] The end result can be a hostile competitor's reliance on library information systems for unauthorized and competitive development of dual-use (civilian/military) applications.[13] More importantly, these library trends can be used to undercut the legal precepts of newness and innovation necessary to patent law.[14]

This paper draws on China as a case study to help lawyers, businessmen, researchers, and analysts better understand threats and defensive strategies for intellectual property rights. China provides an example of how a competitor state, also characterized as a peer adversary,[15] relies on its National Science Library ("NSL") and Competitive Intelligence strategy to boost research advantage for State-influenced academic, governmental, and military entities.[16] China's LIS marshals soft power through tactical and strategic intelligence collection/analysis,[17] early warning and alert services,[18] and regulatory/patent

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[11] Deep Dive Research is defined by the author as any research activity that goes beyond first-line web searches.

[12] See Joanne Kuzma, European Digital Libraries—Web Security Vulnerabilities, 28 LIBRARY HI TECH 402, 402–13 (2010) (discussing "[s]ecurity problems and breaches" and noting that librarians have "unique security concerns compared to other industries").

[13] See DEITCHMAN, supra note 5, at 193 (defining "dual-use" as advances in materials and electronics that have application in both the military and civilian spheres and which are fundamentally important to both spheres).

[14] *See e.g.,* ARTHUR R. MILLER & MICHAEL H. DAVIS, INTELLECTUAL PROPERTY—PATENTS, TRADEMARKS, AND COPYRIGHT—IN A NUTSHELL 40–66 (2007) (providing a basic overview of the patent law principal of novelty).

[15] Martin C. Libicki, The Next Enemy, STRATEGIC FORUM, Jul. 1995, at 1, 1–2, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA394657 (discussing China as an emergent peer adversary and highlighting future competition in the field of information warfare).

[16] See Zhang Zuozhi George, Competitive Intelligence Development in China, COMPETITIVE INTELLIGENCE MAG., Nov.–Dec. 2008, at 6–11, available at http://www.scip.org/Publications/CIMArticleDetail.cfm (discussing China's developing emphasis on Competitive Intelligence (CI) theories at all levels and specifically noting incorporation of CI programs into academic settings); see also Xinzhou Xie & Xuehui Jin, The Evolution of Competitive Intelligence in China, 1 J. OF INTELLIGENCE STUD. IN BUS. 61–75 (2011) (providing a critical overview of the evolution of CI in China).

[17] See generally Jinxia Huang, Presentation: Information Development & Knowledge Services in National Science Library, The Chinese Academy of Sciences, CORNELL UNIV. LIBR. STAFFWEB (Mar. 15, 2010), http://staffweb.library.cornell.edu/system/files/ChineseAcademyofSciences_JinxiaHuang_March2010_0.pptx (providing background information on the Chinese National Science

lawfare.[19] In doing so, China's LIS is positioned as a force multiplier.[20] It serves as a science and technology-targeting platform[21] to accelerate development of national technology objectives.[22] Ultimately, China's LIS promotes rapidity and surprise in warfare that has no rules.[23] It is a perfectly designed strategic tool for maintaining the technological upper hand amidst the U.S. policy of integration.[24]

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Library and the way that library researchers conduct information analysis).

[18] *Id.*

[19] *Id*.

[20] *See generally* Dale G. Uhler, *Technology—Force Multiplier for Special Operations*, JOINT FORCES Q., 1st QTR 2006, at 54, http://www.dtic.mil/doctrine/jel/jfq_pubs/4012.pdf (discussing generally technology as a force multiplier). In similar vein, libraries provide the platform for which new technologies can be developed. The generally accepted Department of Defense definition for "force multiplier" is "[a] capability that, when added to and employed by a combat force, significantly increases the combat potential of that force." *Force Multiplier Definition*, DOD DICTIONARY OF MILITARY TERMS, http://www.dtic.mil/doctrine/dod_dictionary/?zoom_query=FORCE+MULTIPLIER&zoom_sort=0&zoom_per_page=10&zoom_and=1 (last visited Jan. 4, 2012).

[21] *Cf.* AIR FORCE INSTRUCTION 14-117, *supra* note 7 (discussing targeting).

[22] *See* Liu Xiwen, *Presentation: Policy-Making Oriented Information Services of Scientific and Technological Libraries in China,* TEKNILLINEN KORKEAKOULU (June 18, 2008), http://lib.tkk.fi/ifla/IFLA_Science_Portals/Presentations/Liuxw.pdf (discussing science and technology services of the National Science library, which include analysis of science and technology documents, scientific data and scientific data intelligence, intelligence analysis of science and technology strategy, monitoring of science and technology development trends, and provision of alert services related to certain science and technology fields).

[23] *See* QIAO LIANG & WANG XIANGSUI, UNRESTRICTED WARFARE 28–32 (Pan Am. Publ'g Co. 2002) (1999) (discussing various strata of the battlespace).

[24] U.S. policy is to fully integrate China into the global rules based economic and trading system and expand exports into Chinese markets in spite of China's advocacy of legal and economic warfare. *See Background Note: China*, U.S. DEPT. OF STATE, www.state.gov/r/pa/ei/bgn/18902.htm (last updated Sept. 6, 2011) (discussing the U.S. approach to relations with China).

I. PROLOGUE

The purpose of this paper is threefold: (1) to stimulate primary collection on the future role of science and technology libraries in pre-competitive research and patent developments; (2) to advise Western researchers that the Chinese National Science Library (NSL) is targeting advanced technology sectors for competitive advantage; and, (3) to raise awareness among the American defense establishment that the Chinese Library Information System (LIS) serves as an enabler for "*juridical warfare*." [25] This paper is based on a thorough survey

[25] *Juridical warfare* is defined by the author as the use/manipulation of law to obtain a military objective. *See* Harvey Rishikof, *Executive Summary—Juridical Warfare: The Neglected Legal Instrument*, JOINT FORCES Q., 1st QTR 2008, at 11, 11–12, http://intelros.ru/pdf/jfq_48/7.pdf (discussing traditional paradigm of instruments of power, reviewing lawfare as a means to manipulate or control public perceptions, and describing Rishikof's preference for the term "juridical warfare," which he defines as legal warfare that touches on any area of the administration of justice, over the narrower concept of "lawfare"). *See generally* Charles J. Dunlap, *Lawfare: A Decisive Element of 21st-Century Conflicts*, JOINT FORCES Q., 3rd QTR 2009, at 34, 35, http://www.ndu.edu/press/lib/images/jfq-54/12.pdf (defining "lawfare" as the

of secondary materials. It is presented with the belief that it will assist legal professionals, businessmen, researchers, and analysts in the protection of trade secrets and development of patent strategies.

II. THE BATTLE SPACE

Make no mistake, the United States is at war with China.[26] Although unnoticed and generally unseen, libraries are on the frontlines.[27] In early January 2011, the Associated Press quoted U.S. Defense Secretary Gates regarding this competitor State. Although Gates did not specifically say that the United States is engaged in open conflict, he did say that "they clearly have potential to put some of our capabilities at risk. We have to pay attention to them, we have to respond appropriately with our own programs."[28] China's development of its stealth jet appears to have outpaced U.S. intelligence

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"strategy of using-or misusing-law as a substitute for traditional military means to achieve an operational objective").

[26] *See* Sy Harding, *Why China is Winning the Economic War—Nation Making Inroads, Even in Areas Where U.S. is Dominant*, FORBES, Aug. 16, 2010, http://www.msnbc.msn.com/id/38726105/ns/business-forbes_com/t/why-china-winning_economic_war/#.Tr2GS2CXtaV (describing China as the true economic powerhouse and discussing China's impressive global inroads and the difficulty of U.S. companies in transporting dominance into the Chinese market and separately noting China's graduating of 500,000 engineering students compared to 150,000 in the U.S., much of which is due to China's massive population about which America can do nothing); Peter Navarro & Greg Autry, *China's War on the U.S. Economy*, SFGATE.COM, Jan. 15, 2010, http://articles.sfgate.com/2010-01-15/opinion/17828392_1_security- review commission china' s internet currency manipulation (noting that China's targeting objective in its war on the U.S. economy was any intellectual property that would give Chinese enterprises the competitive edge – from trade secrets and new technologies to software such as Google's proprietary source code). *Compare* Michael Sirak & Marc Schanz, *Space Arms Race? No,* AIR FORCE MAG., Aug. 2007, at 11–12 (discussing the intent to reduce tensions with China on space issues through dialogue), and Robert S. Dudney, *The China Gap—Editorial*, AIR FORCE MAG., Aug. 2010, at 2 (noting China's military technology advancements and highlighting that only one side is racing), *with* Jan M. Van Tol, et. al., *Chart Page—The Long Reach of China's Weapons*, AIR FORCE MAG., Aug. 2010, at 16 (portraying the ranges of China's missiles and aircraft and highlighting China's "anti-access" barrier strategy). *See generally* Richard Halloran, *China Stands Up*, AIR FORCE MAG., Aug. 2007, at 24–30 (discussing China's existence as a military danger); Richard Halloran *China Turns up the Heat*, AIR FORCE MAG., Apr. 2010, at 34–37 (discussing the Chinese military's hard push into "cyber warfare, anti-access weapons, and other means to blunt U.S. advantages"); John A. Tirpak, *Washington Watch: China Ramps up Offensive . . . to Expand its Military Power,* AIR FORCE MAG., Jan. 2010, at 7–8 (discussing China's increased military capabilities).

[27] *See generally* Libicki, *supra* note 16.

[28] *Gates Says China Moving Fast on New Weapons*, FOXNEWS.COM, Jan. 9, 2011, http://www.foxnews.com/world/2011/01/09/gates-says-china-moving-fast-new-weapons/print.

estimates.[29] Its development of strategic ballistic missiles capable of hitting an aircraft carrier 2,000 miles away or intercepting space targets have also proven worrisome.[30] China's defense minister Liang Guanglie has responded by saying that "the efforts that we place on research and development of weapons systems are by no means targeted at any third country or any other countries in the world, and it will by no means threaten any other country in the world."[31] Both statesmen avoided mentioning China's advocacy of juridical warfare[32] and the critical role libraries play in the development of these programs.[33]

Clauswitz has described the "Art of War" to include all activities that exist for the sake of war.[34] Modern Chinese military theorists have declared that warfare "transcends all boundaries and limits, in short: unrestricted warfare."[35] Amidst this battle-space, libraries and librarians have emerged as precious national resources, with both being useful and vulnerable to warfare in various strata. These strata include: resource warfare (attacking information resources/holdings either directly or indirectly), regulatory warfare (leveraging information resources to develop patent or regulatory barriers to development), trade warfare (using information resources for competitive trade advantage), cyber warfare (applying library resources as an enabler for cyber technology's legal/illegal acquisition of digital resources), and technological development warfare (relying on information resources to make surprise advancements in high technology areas). Although librarians may not be considered spies,[36]

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[29] *Id*.

[30] Anne Gearan, *US, China Defense Chiefs Mend Frayed Military Ties,* WASH. TIMES, Jan. 10, 2011, http://www.washingtontimes.com/news/2011/jan/10/us-china-defense-chiefs-mend-frayed-military-ties; *see also* SHIRLEY KAN, CONG. RESEARCH SERV., 110TH CONG., REPORT ON CHINA'S ANTI-SATELLITE WEAPON TEST, RS22652 (Apr. 23, 2007), *available at* http://www.fas.org/sgp/crs/row/RS22652.pdf (providing a governmental perspective on China's anti-satellite test); *As China's Army Flexes Its Muscles, a Missile is Intercepted in Space*, THE ECONOMIST, Jan. 14, 2010, *available at* http://www.economist.com/node/15271130/print (discussing China's openly bold testing of anti-satellite capabilities).

[31] Ben Blanchard & Chris Buckley, *China's Defense Minister Says Military Hardware Drive No Threat*, REUTERS, Jan. 10, 2011, http://www.reuters.com/article/2011/01/10/us-china-usa-defence-idUSTRE7090Z620110110.

[32] *See generally* Rishikof, *supra* note 2 (discussing traditional paradigm of instruments of power, reviewing lawfare as a means to manipulate or control public perceptions, and noting a preference for the term juridical warfare over lawfare, defining the concept more broadly as warfare that touches on any area of the administration of justice).

[33] *See generally* Jinxia Huang, *supra* note 18.

[34] CARL VON CLAUSWITZ, ON WAR 176 (Michael Howard & Peter Paret eds. & trans., 1976).

[35] QIAO LIANG & WANG XIANGSUI, *supra* note 24, at 12.

[36] *See generally* David Cho & Ariana Eunjung Cha, *Chinese Spying is a Threat Panel Says*, WASH. POST, Nov. 16, 2007, at A09 (discussing the bipartisan U.S.-China Economic and Security Review Commission and its conclusions that Chinese spying in the United States was the

libraries and librarians are no longer just sources of propaganda during the time of warfare.[37] They are now involved, both wittingly and unwittingly, in the full scope of knowledge management (KM)[38] necessary to science and technology collection and development.[39]

III. JURIDICAL WARFARE STRATEGY

One would be remiss not to think that China includes its National Science Library's (NSL) (LIS) in its strategic warfare plan. Indeed, senior officials from the NSL have made open international presentations indicating that their libraries play a critical strategic role in the information and intelligence arena.[40] Doctrinally, China's LIS development falls in line with its "Three Warfares" strategy[41] (*Zhong Zhanfa*) approved by the Communist Central

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biggest threat to keeping American technology secrets and noting that advances by the Chinese military are catching U.S. intelligence officials by surprise).

[37] *See generally* Ashley M. Smith, American Libraries in Wartime: The Role of Propaganda (Apr. 2007) (Master's Paper, University of North Carolina at Chapel Hill), *available at* http://etd.ils.unc.edu/dspace/bitstream/1901/363/1/ashleysmith.pdf (examining the spread of propaganda through public libraries during several periods of military conflict in American history).

[38] *Knowledge Management* is arguably broader in scope than traditional Competitive Intelligence practices, which are generally used to describe business-to-business collection and analysis. *See* France Bouthillier & Tao Jin, *CI Professionals and Their Interactions with CI Technology: A Research Agenda*, 3 J. OF COMPETITIVE INTELLIGENCE & MGMT. 41, 43 (2005) (discussing the rapid development of Competitive Intelligence software packages and the scope of Knowledge Management).

[39] As of 2010, China has had librarian representation at Strategic Competitive Intelligence Professionals (SCIP) annual meetings and other Competitive Intelligence conferences. *See, e.g.*, *Schedule,* SECOND INT'L FORUM ON TECHNOLOGICAL INNOVATION & COMPETITIVE TECHNICAL INTELLIGENCE, http://www.bjstinfo.com.cn/iticti08/content/list79.htm (last visited Nov. 11, 2011) (providing an overview of numerous Chinese attendees from library and information management fields at a forum that was designed to demonstrate specific applications and best practices of competitive technical intelligence in kinds of industries and enterprises). From attendance, clearly, Chinese libraries are seeking to implement the same tools.

[40] *See, e.g.*, Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (both presentations discussing the intelligence role of Chinese science and technology libraries).

[41] *See generally* Timothy Walton, *Treble Spyglass, Treble Spear: China's "Three Warfares,"* 4 DEFENSE CONCEPTS 49–60 (2009) (discussing Chinese Communist Party (CPC) Central Committee and the Central Military Commission (CMC) 2003 approved concept of "Three Warfares" and noting that the concept is developed for both military and non- military operations); *id.* at 60–61 (discussing *Legal Warfare*). Although Chinese doctrine of legal warfare appears to be directed primarily at political ends, the strategy cannot be separated from its science and technology developments when sovereignty of its actions is at play. Information warfare has assumed a central role in Chinese military writings in the psychological, media, and legal realms. *Id.*

Party.[42] Chinese libraries are viewed as a scientific discipline.[43] Its "Science of Military Strategy" describes an active defense as taking the initiative to annihilate the enemy.[44] Comparatively, these libraries are designed to gain strategic advantage in the juridical warfare arena after a competitor has promulgated an innovation. By design, they will be used to seize, database, and exploit breaking information resources through overt, legal, precise, and low profile Offensive Research Techniques (ORT).[45] Their purpose is to rely on both domestic and international laws to indigenously obtain, maintain, and defend patents and new technology developments.[46,47] The key means of

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[42] *See* OFFICE OF THE SEC'Y OF DEF., 111TH CONG., ANNUAL REPORT ON THE MILITARY POWER OF THE PEOPLE'S REPUBLIC OF CHINA 2009 [hereinafter MILITARY POWER 2009], http://www.defense.gov/pubs/pdfs/China_Military_Power_Report_2009.pdf (last visited Jan. 7, 2012) (discussing in the *Executive Summary* the impact of Chinese capabilities that allow this Competitor State to project power to ensure access to resources or enforce claims to disputed territories); *see also* OFFICE OF THE SEC'Y OF DEF., 111TH CONG., ANNUAL REPORT ON THE MILITARY AND SECURITY DEVELOPMENTS INVOLVING CHINA 2010, http://www.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf (last visited Jan. 7, 2012) (providing an update on China's power projection).

[43] *See* GONG YITAI & G.E. GORMAN, LIBRARIES AND INFORMATION SERVICES IN CHINA 42 (2000) ("In the specialized research environment of CAS, library and information services are regarded as an integral part of scientific research and development."); Xiaoqing Ding et al., *Document Digitization Technology and Its Application for Digital Library in China*, *in* PROCEEDINGS OF THE FIRST INTERNATIONAL WORKSHOP ON DOCUMENT IMAGE ANALYSIS FOR LIBRARIES (2004) (providing an example of the type of focused literature on the scientific and technical engineering of library structures for efficiency and performance).

[44] *See* MILITARY POWER 2009, *supra* note 43, at 10–11 (discussing China's "Active Defense").

[45] *Compare Intellectual Property Theft in China and Russia: Hearing Before the Subcomm. on Courts, the Internet, and Intell. Prop.,* 109th Cong. (2005), http://www.access.gpo.gov/congress/house/pdf/109hrg/21217.pdf (focusing primarily on the illicit nature of China's counterfeiting and piracy of intellectual property and failing to discuss the legal tools in place for fostering China's indigenous innovation), *with China's Intellectual Property Rights and Indigenous Innovation Policy: Hearing Before the U.S.-China Econ. & Sec. Rev. Comm.,* 112th Cong. (2011), http://www.uscc.gov/hearings/2011hearings/transcripts/11_05_04_trans/11_05_04_final_transcript.pdf (most hearings do not address the underlying causes/methods of intellectual property theft and therefore discuss solutions in only broad terms).

[46] Chinese lawyers are well prepared to tackle juridical warfare issues. *See, e.g.,* Professor Claude Bruderlein, Comments at the Texas International Law Journal Symposium: The Air and Missile Warfare Manual: A Critical Analysis (Feb. 10–11, 2011) (noting that People's Republic of China lawyers, specifically, People's Liberation Army lawyers, were actively engaged in the dialogue over The Air and Missile Warfare Manual and also noting that an early circulation of a Chinese language draft unexpectedly presented itself in meetings and Chinese PLA lawyers showed themselves well versed in topics at hand) (on file with author).

[47] *See President Hu Stresses Significance of Sci-Tech Innovation in Global Competition*, ENGLISH.XINHUANET.COM, Mar. 15, 2011, http://news.xinhuanet.com/english2010/china/2011-03/15/c_13780034.htm (providing an

their effectiveness are advanced software tools and collaboration.[48]

Today a Competitor State can leverage Library Information Systems for both political purposes and technology development.[49] This includes harvesting resources for the implementation of strategic national programs, (be they civil or military), leadership analysis for state decision making, and, profiling for targeting purposes.[50] For purposes of this paper, "targeting" in the science and technology context is the identification and aggressive pursuit of pre-competitive data at its most nascent stages. China's NSL appears to fill all three roles. Its identified intelligence purpose is to implement national development programs from cradle to grave.[51] It is also designed to support state decision making, and more tactically oriented exploitation of information for Chinese project implementation.[52] For this Competitor State, there's virtually no grammatical or legal distinction between *Qingbao*—intelligence; and, *Ziliao*—data, information, material.[53]

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overview of Chinese leadership perspective on what is driving China's indigenous innovation policy and quoting Chinese President Hu Jintao that "enhancing the country's sci-tech innovation capacity is the key to accomplishing the tasks of the 12th Five-Year Program and taking the initiative in global competition"); *see also China's Indigenous Innovation Policy: Hearings Before the U.S. China Econ. & Sec. Review Comm'n,* 112th Cong. (2011) (testimony of Alan Wm. Wolff, Dewey & LeBoeuf LLP), http://www.uscc.gov/hearings/2011hearings/written_testimonies/11_05_04_wrt/11_05_04_wollf_testimony.pdf (outlining the development of China's indigenous innovation policies by citing various Chinese officials and specifically highlighting regional policy tools by quoting the Shanghai Municipal Government Announcement of Sep. 14, 2004: "[We shall] actively promote the formulation and implementation of technical standards with self owned intellectual property rights and translate that technological advantage into a marketplace advantage to maximize the benefits of intellectual property rights. [We shall] actively take part in the formulation of international standards, and drive the transferring of domestic technological standards to international standards . . . ").

[48] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (both discussing the use of networks and collaborations between China's national science and technology libraries and universities).

[49] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (both discussing the political decision making role played by China's National Science Library).

[50] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (both discussing the use of networks and collaborations between China's national science and technology libraries and universities).

[51] *See* Liu Xiwen, *supra* note 23, at Slide 7 (discussing the process of China's libraries data collection, project identification, project decision making, strategy planning, and project implementation of science and technology programs).

[52] *Id.*

[53] Huo Zhongwen &Wang Zongxiao, *Sources and Techniques of Obtaining National Defense Science and Technology Intelligence*, FED'N OF AM. SCIENTISTS, http://www.fas.org/irp/world/china/docs/sources.html#comment (last visited Jan. 11, 2011) (providing an explanation of Chinese interpretation of intelligence and information in the

Although China's NSL appears to be a benign establishment, secondary research shows it emerging as a critical enabler for technological advancement.[54] It is, however, a low profile[55] collector, (the activities of its staff and customers are low visibility).[56] China's NSL does not appear to attract much outside attention—there were only forty-six visitors to its website in early January 2011.[57] Still, it appears to be gaining influence and prestige both internally and on the international scene.[58] Librarians of the People's Republic are relishing in their new roles as information warriors.[59] China understands that whoever has the better library has both the wartime and peacetime advantage.[60] The NSL's mission and architecture are purposed to deliver

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Editor's Comment).

[54] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (both discussing the use of networks and collaborations between China's national science and technology libraries and universities).

[55] *Low-Profile* is defined as "a deliberately inconspicuous, almost unnoticeable form." THE RANDOM HOUSE COLLEGE DICTIONARY 795 (Rev. ed.1984); *accord* WEBSTER'S NEW WORLD DICTIONARY 802 (3d college ed. 1991) (providing an alternative definition of "an unobtrusive, barely noticeable presence, concealed, inconspicuous activity"). The author is relying on the plain English meaning of Low Profile. This is a term frequently utilized in law enforcement and intelligence circles to mean not drawing attention to plans, activities, or discussions. Activities of librarians are by their very nature low-profile, they would not otherwise be suspected of clandestine government associations.

[56] *See generally Low-Visibility Operations Definition,* DOD DICTIONARY OF MILITARY TERMS, http://www.dtic.mil/doctrine/dod_dictionary/?zoom_query=low+visibility&zoom_sort=0&zoom_per_page=10&zoom_and=1 (last visited Jan. 11, 2012). The author acknowledges that foreign governments may use librarians and library information systems to conduct low visibility operations – otherwise sensitive collection operations wherein the political-military restrictions inherent in covert and clandestine operations are either not necessary or not feasible; actions are taken as required to limit exposure of those involved and/or their activities. Execution of these operations is undertaken with the knowledge that the action and/or sponsorship of the operation may preclude plausible denial by the initiating power. Traditionally, libraries are not viewed as an implement of modern warfare. *See generally* Michael Howard, *Afterword to* TOOLS OF WAR 238–246 (John A. Lynn ed., 1990) (discussing the traditional "concepts and technology" of war).

[57] See NAT'L SCI. LIBR., CHINESE ACAD. OF SCI., http://english.las.cas.cn (last visited Jan. 11, 2012), for access to the NSL website.

[58] *See* Jinxia Huang, *supra* at note 18; Liu Xiwen, *supra* note 23 (demonstrating the global reach of Chinese library officials).

[59] *See* Elizabeth Graham & Roberta Sparks*, Libraries as a Catalyst for Economic Growth and Community Development: A Mayor's Summit on Public Libraries*, 86 TEX. LIB. J., 30, 30 (2010) (noting China's participation in the event).

[60] *See* SUN TZU, *supra* note 1, at 15 ("To fight and conquer in all your battles is not supreme excellence; supreme excellence consists in breaking the enemy's resistance without fighting. In the practical art of war, the best thing of all is to take the enemy's country whole and intact; to shatter and destroy it is not so good. So, too, it is better to capture an army entire than to destroy it, to capture a regiment, a detachment or a company entire than destroy them.").

information resources to the customer with rapidity. It is designed to produce surprise "out-of-the blue" developments in high-end technology fields.[61] Both rapidity and surprise are components of Sun Tzu's philosophy in The Art of War.[62] What we might call good espionage, the Chinese simply refer to as excellent information management.[63]

IV. The Emerging Library Model—S&T Targeting Centers

By popular definition, a library is a collection of sources, resources, and services.[64] Historically, the American concept of a library has been an institution with rows upon stacks upon books. With the emergence of the World Wide Web, images of researchers in dusty parlors have given way to views of academics downloading digital information resources from global access points at local cafes. China itself has a long library tradition that dates back to its ruling dynasties of Imperial China, from 221 to 206 BC.[65],[66]

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[61] *Cf.* DEITCHMAN, *supra* note 5, at 201 (discussing how new technology developments appear "out-of-the-blue," but in actuality have long backgrounds of experimental and theoretical accumulation of knowledge).

[62] *See* SUN TZU, *supra* note 1, at 26 ("He who is skilled in attack flashes forth from the topmost heights of heaven, making it impossible for the enemy to guard against him. This being so, the places that he shall attack are precisely those that the enemy cannot defend."); *cf.* Cho & Cha, *supra* note 36 (discussing technology advancements catching U.S. intelligence personnel by surprise).

[63] *See generally* Huo Zhongwen & Wang Zongxiao, *supra* note 53 (discussing Chinese information management strategy).

[64] *See generally* THE NEW ENCYCLOPAEDIA BRITANNICA 947–63 (15th ed. 2010) (discussing modern definition of library and noting the rapid development in computers, telecommunications, and other technologies trending toward digital and virtual libraries).

[65] See GONG YITAI & G.E. GORMAN, *supra* note 43, at 1–84, for background and history on Chinese libraries. A system of writing and collection of works began to appear at the earliest stages of Chinese culture under the Shang Dynasty 1700–1600 B.C. *Id.* at 3. China's earliest collections were organized as official archives by the government and private institutions or wealthy families. *Id.* By the Qin Dynasty 221–206 B.C. the government had introduced a system of scripts for the collection and preservation of records by the central government. *Id.* at 5. The Han Dynasty followed in 206 B.C.–220 A.D. and was notable for "importing ideas and practices from foreign civilizations" and early collections were accompanied by the government's establishment of the Office of Secret Records responsible for managing records, analyzing their content, and undertaking comparative studies. *Id.* at 6. By contrast, China's earliest written records appeared on wod, stone, pottery, leather, bone, tortoiseshell, and metals, but from the beginning written records were held as highly important to Chinese civilization. *Id.* at 3.

[66] See SHARON CHIEN LIN, LIBRARIES AND LIBRARIANSHIP IN CHINA 119–31, 180–81, 185–211(1998), for background and history on Chinese Special Libraries. As of 1998, research China's research activities were concentrated in the Chinese Academy of Sciences, consisting of over 143 research institutes and laboratories spread through China, and a staff of over 82,326. *Id.* at 118. Chinese libraries have been recognized as catalysts for the advancement of science and technology, and are found in private businesses, industrial organizations and professional

While China's original written holdings were written on bones and tortoise shells,[67] now its primary focus is on digital library (DL) resources.[68] The NSL's DL resources and applications are designed to be collaborative in nature.[69] Collaborative, however, is a relative term, as the NSL is designed to connect holdings within China through library consortia,[70] and not necessarily share them with foreign partners or researchers.[71]

Today, China's National Science Library is pioneering new concepts of library research through computational methodologies, [72] scientometrics,[73] bibliometrics,[74] citation and co-author analysis,[75] and visualization research.[76]

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societies. *Id.* at 122. These Document Information Centers (DIC) and Science and Technology Information Centers (STI), are supported and maintained by government agencies and institutions. *Id.* Among its missions, the CAS Library Information System is to "collect, process, exploit, and provide Chinese and foreign sci-tech literature in accordance with the research orientation and responsibilities of CAS." *Id.* at 126. It is also "to carry out analysis and study of foreign and domestic sci-tech information and provide information services catering to the needs of CAS (formulating developmental strategies, policies, and plans, and organizing major research projects)." *Id.*

[67] GONG YITAI & G.E. GORMAN, *supra* note 43, at 3.

[68] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (both presentations discussing the use of networks and collaborations between China's national science and technology libraries and universities).

[69] *Id.*

[70] *See generally* Elaine Xiaofen Dong & Tim Jiping Zou, *Library Consortia in China*, 19 LIBR. & INFO. SCI. RES. ELECTRONIC J. 1, 1–10 (2009), http://libres.curtin.edu.au/libres19n1/Dong_Essay_Op.pdf (discussing library consortia in China and the fact that most; stating also that Chinese libraries are partially or fully supported by the government and that national library consortia began to emerge in the late 1980s. Some larger consortia include reciprocal programs with foreign library systems).

[71] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (both presentations discussing the intelligence role of Chinese science and technology libraries).

[72] *See* Interview with Susan Ardis, Head, Eng'g & Sci. Libraries Div., Univ. of Tex. at Austin (Feb. 10, 2011) (noting that Chinese libraries such as Tsinghua University may have some limited interlibrary loan services, however, technical, linguistic, and cultural barriers still preclude full transparency as to holdings).

[73] *See generally* VIRGIL DIODATO, DICTIONARY OF BIBLIOMETRICS viii–x (1994) (discussing Bibliometrics and Scientometrics). Biblioemtrics and Scientometrics utilize mathematical and statistical modeling to determine what areas of research are being pursued in any given field. *Id.* Scientometrics focuses on citation analysis in the field of science and technology while Bibliometrics is more general in nature. *Id.*

[74] *See generally* NICOLA DE BELLIS, BIBLIOMETRICS AND CITATION ANALYSIS xi–xiii (2009) (noting that Bibliometrics is the quantitative analysis and measurement of literature while Scientometrics focuses on the measurement of change in science and technology innovation as presented in science literature).

[75] Rulmin Ma et al., *An Author Co-Citation Analysis of Information Science in China with Chinese Google Scholar Search Engine, 2004–2006*, 81 SCIENTOMETRICS 33, 33–46, *available at* http://www.springerlink.com/content/f2wg100412467351/ (last visited Jan. 11, 2012)

The library network is designed to *harvest*[77] breaking information at the earliest stages of open research.[78] Collection centers are instituted to generate synergy and collaboration among State influenced academic and commercial entities.[79] The State-directed acquisition of this research creates a competitive advantage for Chinese researchers.[80] LIS services cover the entire spectrum of an intelligence collection cycle—targeting, direction, collection, processing, analysis, and exploitation.[81]

China's use of a "novelty search" provides a perfect example of its use of intelligence tools as a means to advance science and technology research.[82] The Scientific and Technological Project Search Service offered by the Chinese Academy of Science Library Information System provides "comprehensive information searches to meet the background needs of a

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(providing an abstract on author co-citation analysis).

[76] Sophie L. Rovner, *Measured by Patent Applications or Journal Articles, Growth in Chinese Scientific Output is Stupendous*, 88 CHINA ASCENDANT 35–37 *available at* http://pubs.acs.org/cen/science/88/8802sci1.html?featured=1(last visited Jan. 11, 2012) (providing an example of visualization and horizon mapping in Chinese patents and stating that the tremendous growth in Chinese chemical patenting and publishing is being driven by the combination of economic development and awareness of the strategic importance of intellectual property protection, and also quoting Sunny Wang, 2009 president of the Tri-State chapter of the Chinese American Chemical Society).

[77] "Harvest" s defined by the author as not only collecting information, but being able to efficiently cultivate resources for predatory exploitation against a competitor.

[78] Jinxia Huang, *supra* note 18; *See also* Liu Xiwen, *supra* note 23 (both presentations discussing China's use of alert services).

[79] *See generally* PRISCILLA C. YU, CHINESE ACADEMIC AND RESEARCH LIBRARIES: ACQUISITIONS, COLLECTIONS, AND ORGANIZATIONS, 149 (1996) (highlighting the collaborative nature of Chinese libraries and noting that the "largest and most complex database for the Chinese Academy of Sciences, Chengdu, ist he national patent file" and ist technical holdings contain 50% foreign journals). *Cf.* Conference Report, Int'l Fed'n of Library Ass'n & Inst., Wu Jianzhong, Transition to an e-and-globalised age: Shanghai Library's Practice of Change (Aug. 13–18, 2011), http://conference.ifla.org/past/ifla77/123 jianzhong-en.pdf ("[M]odern librar[ies] should not only actively participate in the knowledge dissemination and innovation for the general public, but also actively participate in the government decision making and policy consultation, the research and innovation of research groups, as well as the industrial development for corporations and freelandes.").

[80] *See* Hu Junping*, Special Libraries in China: Present and Future*, WHITE CLOUDS, LLC (Feb.17, 2011), http://www.white-clouds.com/iclc/cliej/cl1huj.htm (discussing China's 3700 libraries and national direction of its Special Library system).

[81] Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (both presentations discussing the intelligence role of Chinese science and technology libraries).

[82] *See* Jing Liu & Yiliang Song, *The Impact of Technology of Chinese Library Collections and Services*, *in* THE IMPACT OF TECHNOLOGOGY ON ASIAN, AFRICAN, AND MIDDLE EASTERN LIBRARY COLLECTIONS, LIBRARIES AND LIBRARIANSHIP 76 (R.N. Sharma ed., 2006) (providing a detailed look at new information technologies in China's library operations).

particular project."[83] By design, this service scours electronic science and technology holdings, print materials, and research banks to determine the "state of the art of a particular research field to determine whether a particular project has been done, what has been done, how it has been done, and how many research articles or other materials are related to the subject."[83] By design, this service scours electronic science and technology holdings, print materials, and research banks to determine the "state of the art of a particular research field to determine whether a particular project has been done, what has been done, how it has been done, and how many research articles or other materials are related to the subject."[84] As of 2006, at least forty-three academic libraries had been given the authority to implement novelty searches.[85] "Scientists or researchers who apply for research funding, grants, patent registration, or academic awards are requested to submit their application with a Scientific and Technological Project Search Service Report."[86] The use of these services provides Chinese scientists and researchers with state-supported situational awareness necessary to remain competitive in high-tech fields.

NSL implements its collaborative approach with leading universities and institutions throughout China to harness resources for exponential gains across multiple disciplines.[87],[88] As a "Targeting Center"[89] for emerging and breaking technology, the NSL has essentially developed a science and technology wellspring from which Chinese innovators can obtains leads for creative implementation of State goals. Once an emerging technology or innovation is

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[83] *Id.* at 86.
[84] *Id.*
[85] *Id.*
[86] *Id.*
[87] Ben Gu, *Chinese Resource Development in the National Library of China* (Feb. 26, 2009), http://www.varastokirjasto.fi/beijing/GU_ben.pdf; *see also Development of Science and Technology in China, EMBASSY OF THE PEOPLE'S REPUBLIC OF CHINA IN THE HELLENIC REPUBLIC (Aug. 3, 2004), http://gr.chinaembassy.org/eng/kxjs/zgkj/t146165.htm (noting that Chinese higher education institutions are an active contingent in China's scientific and technological front and providing only statistics from 1998 that Chinese universities were associated with close to 1,500 research and development institutions).*
[88] While many scholars focus on the positive aspects of Collaborative Research, few have focused on the dangers of pre-patent technology theft, which may arise from collaborative international research. *See, e.g.*, Robert M. Hayes, *Comparative Research*, *in* AREAS OF COOPERATION IN LIBRARY DEVELOPMENT IN ASIA AND PACIFIC REGIONS 16, 16–18 (Sally C. Tseng et al. eds., 1985) (discussing the value of collaborative international research but failing to mention pre-patent technology theft).
[89] "Targeting Center" is defined by the author as any public or private institution designed to increase the precision of collection of pre-competitive science and technology data for exploitation by either civil or military researchers.

identified, the LIS architecture and NSL research tools allow the full weight of a research team to be quickly assembled and brought to bear upon breaking information. That research team then receives full support from this Competitor State's collection apparatus including resources and advisement of subject- matter librarians. The ultimate goal is indigenous innovation.[90]

V. THE TARGET—NEWNESS AND INNOVATION

Chinese libraries are integrated directly into its Chinese patent strategy. Separate studies have shown that China is building a "Great Wall of Patents" to protect its development of high-technology.[91] The process is simple. The Chinese are filing for patents in China on the patents they are copying.[92] China's strategy has been to review digital patent applications posted on foreign websites then file and obtain patents on early stage technologies inside China to propel key technology development.[93] As Chinese companies have strong ties to the national government, their use of American patent information can easily blur the lines between civil and military applications.[94] Additionally, China's patent strategy costs American businesses an estimated $50 billion per year in lost revenues as companies defend their innovations.[95]

China's NSL provides an additional advantage for Chinese companies. The LIS collection of breaking science and technology information at its earliest stages combined with the availability of online patent filings and electronic research tools, allows Chinese developers to attack the legal precepts

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[90] *See The Long Arm of the State—Government's Role in Industry—Innovation by All Means*, THE ECONOMIST, June 25, 2011, at 15 (discussing the Chinese government's support for development of indigenous Chinese innovation and impact of protectionist Chinese regulations on international competition).

[91] *See* Pat Choate, A Great Wall of Patents (Nov. 7, 2005) (unpublished working paper), http://www.uscc.gov/researchpapers/2005/working_paper_nov_7_05.htm ("In China, as with all other nations, the patent office issues the patent to the first person to file an application. The burden of proving that the Chinese patent seeker stole the idea can take years and cost hundreds of thousands of dollars in legal fees. If the Chinese patent holder makes a few modifications in the application that burden is even more difficult.").

[92] *Id.* (providing an overview of Chinese patent strategy and its impact on U.S. manufacturing).

[93] *Id.* (noting that part of China's patent strategy has been to review patent filings posted on the web for competitive advantage).

[94] *See* QAIO LIANG & WANG XIANGSUI, *supra* note 24 ("War in the age of technological integration and globalization has eliminated the right of weapons to label war and, with regard to the new starting point, has realigned the relationship of weapons to war, while the appearance of weapons of new concepts, and particularly new concepts of weapons, has gradually blurred the face of war. Does a single 'hacker' attack count as a hostile act or not? Can using financial instruments to destroy a country's economy be seen as a battle?").

[95] Choate, *supra* note 91 (noting $50 billion in losses to U.S. businesses per year due to Chinese patent pirating and counterfeiters).

necessary to later file and defend a patent. Since Chinese patent law recognizes those patent applications filed first, there is an incentive to provide early warning on innovative developments to Chinese entities.[96] Lawfare is thereby waged against newness, innovation, and usefulness.[97] Although critics claim China produces researchers less creative then Western innovators, this Competitor State is providing *Next-Gen* tools necessary to dominate new technological innovation.[98] The ability of libraries and library staff to collect and marshal resources with pinpoint accuracy increases the effects of China's Offensive Research Techniques (ORT)

VI. A HYPOTHETICAL

Take for the example the following hypothetical: A key U.S. academic working toward his PHD has come up with an innovative software code for aeronautical applications. Although his innovation is not yet patented, the innovation is extremely new, not obvious, clearly innovative, and useful. The U.S. academic is encouraged to present a Master's paper at a private but unclassified conference setting with limited public attendance.[99] The premise of the paper is purposed towards civil applications, but it could also provide significant military advancements in multiple fields. There is limited professional discussion regarding the conference among academics. The Master's paper is filed in the university's engineering library's holdings.

A Chinese student thereafter requests the paper from the student's engineering library. The request is ostensibly for personal research, but is realistically also to advance national science and technology objectives. The paper is obtained and filed in the National Science Library's digital holdings. Horizon Scanning tools map the information and an alert services early warning goes out to leading Chinese researchers in the field. National exploitation of

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[96] *Id.* at 4 ("In China, as with all other nations other than the United States, the patent office issues the patent to the first person to file an application").

[97] *See generally* ARTHUR R. MILLER & MICHAEL H. DAVIS, INTELLECTUAL PROPERTY: PATENTS, TRADEMARKS, AND COPYRIGHTS IN A NUTSHELL 10 (4th ed. 2007) (providing an overview of newness, innovation, and usefulness in the context of patent law).

[98] THOMAS L. FRIEDMAN, THE WORLD IS FLAT 365 (2005) (interviewing Bill Gates about the American education advantage and Chinese desire to dominate the U.S. in innovation).

[99] It is well publicized that Chinese libraries actively pursue the collection of foreign conference proceedings, dissertations, and theses. *See, e.g.*, Xue-Ming Bao, *The National Science and Technology Library: A Chinese Model of Collaboration*, ISSUES IN SCI. & TECH. LIBRARIANSHIP (Summer 2005), *available at* http://www.istl.org/05- summer/article4.html (displaying Table 1 NSTL Collection Statistics of Abstract Items dated Aug. 16, 2004 and identifying 2,078,805 foreign conference proceedings and 46,667 dissertations and thesis in its inventory). Given NSTL's mission to avoid duplication it is likely that each library networked to China's National Science Library collects dissertations, conferences proceedings, and theses in separate niche areas to avoid duplication.

the material occurs with the full weight of Chinese research teams being brought to bear on the science and technology development.

Co-author citation analysis occurs and the entire background of the student's research is assessed through various social networking tools. Chinese Offensive Research Techniques are employed in academic, commercial, and governmental settings. A large number of Chinese student researchers begin to write on the thesis or aspects of the innovation. Approaches are made to other leading experts in the field who have written on point. Their works are exploited through Co-Author Citation Analysis. The Principle of Mass takes over and Chinese research dominates the topic.[100] By the time the U.S. academic presents his PHD thesis, by Chinese standards, the innovation is no longer new, and, no longer non-obvious.

Chinese researchers rapidly file patents in China and advance technology applications with newness, innovation, and usefulness in both civilian and military arenas. Principles of juridical warfare manifest both RAPIDITY and SURPRISE. Further Chinese patents are developed around the innovation in a *Great Wall* strategy. Chinese researchers have therefore defeated U.S. academics on the high-ground of legal theory. Nothing in the Chinese tactical approach to the research is ostensibly illegal.

VII. THE PROOF

Under patent law, a potential patentee must demonstrate that he/she has developed a (1) new, (2) useful, (3) non-obvious, (4) process/product.[101] So long as Chinese researchers can *legally* acquire documents on advanced theses and innovations and assemble them into its Library Information Systems, to perpetuate and excel further writing by Chinese scientists and researchers at whatever level, the argument can be made that a potential patentee's idea is not new, and not non-obvious. The national security implications are obvious. Unless a Western academic is astutely aware of the threat of State-supported open source collection, the National Science Library alert services, and its competitive research architecture, he or she can severely disadvantage himself or herself with the early release of proprietary technology research. Academics who are publicly releasing innovative theses or curricula are also vulnerable. Similarly, commercial patent libraries or data holdings, whether they are open to

[100] *See* DEP'T OF THE ARMY, U.S. ARMY FIELD MANUEL, NO. 3-0, FUNDAMENTALS OF FULL SPECTRUM OPERATIONS 4-2–4-31(2001), http://www.dtic.mil/doctrine/jel/service_pubs/fm3_0a.pdf (discussing the Principle of Mass as a concentration of the effects of combat power at the decisive place and time; comparatively, Chinese libraries allow collection efforts to be directed with precision to achieve similar dominance in the strategic environment).

[101] MILLER & DAVIS, *supra* note 97.

the public or private, are at risk by these same Competitor Collectors. As Chinese patentees get to *The Prize*[102] and file first, the small-caliber American innovator,[103] who generally has no such governmental or commercial backing, is at an extreme disadvantage.

VIII. COMPETITOR COLLECTORS

It is generally accepted as common fact that Chinese students are both formally and informally tasked to collect on requirements for Chinese State objectives.[104] Chinese consulates are said to maintain a list of persons with talent whom they encourage to collect against science and technology objectives.[105] The drive for student collection has been primarily toward overt acquisition of information rather than illicit activity.[106] Authors are often confused as to whether or not students are officially employed by the state. To this end, it is likely that Chinese students obtaining scholarships or visa support from Chinese Academy of Sciences (CAS) and/or Ministry of Science and Technology (MOST) do so with a *quid pro quo*. While on scholarship, they are collecting against the State's national science and technology objectives.[107]

The real threat then is not necessarily what Chinese students/researchers are collecting, but how it is applied in China's Library Information System. Until the mid 2000s, Western competitors did not have to worry so much about China's library system. In the 1990s it was just beginning to digitize its resources.[108] The State's ability to collect information far

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[102] *"The Prize"* is defined by the author in this context as any patent that helps secure a science and technology advancement in a pivotal commercial or military field. *Cf.* DANIEL YERGIN, THE PRIZE: THE EPIC QUEST FOR OIL, MONEY, AND POWER (1991) (discussing the history of oil and the struggle for wealth and power surrounding the oil industry).

[103] *See* Dan Winters, *Atoms are the New Bits*, WIRED MAG., Feb. 2010, at 59 (discussing the garage-size inventor and advocating small caliber business with China but failing to discuss risks of patent infringement or costs of defending innovation).

[104] *See* Jeff Hayes, *Chinese Military, Hackers*, *and Cybernationalists*, http://factsanddetails.com/china.php (last updated Oct. 2011) (discussing generally accepted facts regarding United States, China, and Spies).

[105] *Id.*

[106] BILL GERTZ, THE CHINA THREAT: HOW THE PEOPLE'S REPUBLIC TARGETS AMERICA 131–34 (2000) (discussing unclassified handbook for Chinese spies and collection of unclassified information from U.S. laboratories and universities). *See generally* Huo Zhongwen &Wang Zongxiao, *supra* note 54 (providing background information from the Chinese perspective).

[107] The Chinese Library Information System is designed to capture open research for use against national priorities. *See Terrorism and Intelligence Operations: Before the Joint Econ. Comm.*, 105th Cong. (1998) (statement of Nicholas Eftimiades, Author, "Chinese Intelligence Operations") *available at* http://www.fas.org/irp/congress/1998_hr/eftimiad.htm (discussing cross-over between espionage and more open collection and the frequent use of Chinese travelers to collect information on national priorities).

[108] Liu Xiwen, *supra* note 23; *see also* Xihui Zhen, *Overview of Digital Library Development in*

outpaced its ability to manage its holdings. Today, however, secondary resources indicate that China is emerging as a powerhouse in library management.[109] Its emphasis on foreign acquisitions and digital holdings combined with its development of alert services capabilities should put Westerners on guard. "Now, any time a Western researcher puts something on the Internet [or files it in a Library] it can be directly leveraged by a foreign research team."[110]

The threat of Chinese students collecting against breaking U.S. science and technology developments has been well publicized.[111] Its integration with Chinese Library Information Systems and strategic incorporation into juridical warfare is, however, less understood. By 2008, there was a record number of Chinese students studying in the United States.[112] Even if not directed by the State, these students were taking on a spotting and assessing role, collecting new and emerging technological data on breaking theses and research work to be harvested by China's Library Information Systems.[113] China is on the offensive drive for science and technology

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China, D-LIB. MAG. (May/June 2010), http://www.dlib.org/dlib/may10zhen/05zhen.html (reviewing the development of Chinese electronic libraries from the mid 1990s on).

[109] *See* Cong Cao, *Has China Become a Patent Powerhouse?*, UPI ASIA ONLINE (Feb. 10, 2009), http://www.upiasia.com/Economics/2009/02/10/ (noting that China's increasing patent applications are the result of a change in China's strategy concerning scientific and technological development—from following others to taking the lead in building an indigenous innovation capability).

[110] *See* FRIEDMAN, *supra* note 98, at 369.

[111] *See Special Report: Espionage with Chinese Characteristics*, STRATFOR GLOBAL INTELLIGENCE (Mar. 24, 2010), http://web.stratfor.com/images/writers/INTEL_SERVICES_CHINA.pdf (discussing Chinese nationals who are asked to acquire targeted technologies while traveling and the Chinese Student and Scholar Association, and also noting that China's intelligence services focus on business and technology intelligence rather than political intelligence); *see also* Bill Gertz, *Chinese Student Suspects in Espionage*, WASH. TIMES, http://www.washingtontimes.com/news/2003/aug/4/20030804-112043- 2685r/?page=all (last visited Jan. 11, 2012) ("Two Chinese students studying in the United States supplied China's military with American defense technology . . . ."); *New Chinese Spy Chief an Expert on Commercial Intelligence, Monitoring Group Says* (Aug. 31, 2007), http://www.iht.com/articles/ap/2007/08/31/asia/AS-GEN China_Spy_Chief.php (discussing Geng Huichang and his former association with the China Institute of Contemporary International Relations and describing China's probable appeal to businesspeople and academics of Chinese origin to gain classified information on new technology, especially with possible military applications) (on file with author); SUN TZU, *supra* note 1, at 49 ("The ideal commander unites culture with a warlike temper; the profession of arms requires a combination of hardness and tenderness.").

[112] Jenifer Pak, *Overseas Education More Attainable for Chinese Students*, VOICE OF AM., Apr. 28, 2008, http://www.voanews.com/english/news/a-13-2008-04-28-voa23.html.

[113] *See* GERTZ, *supra* note 106, at 131–36 (arguing that the Chinese gather intelligence through

patents.[114]

IX. Collection Strategy[115]

In 1999, the Director of CIA and FBI forwarded a joint letter to congress highlighting Beijing's top national security priority.[116] This priority was to collect science and technology information to advance China's economic development.[117] For over a decade, Chinese collection practices have been described with the following characteristics:

> "China's collection of open source, sensitive, and restricted proprietary/trade secret U.S. technology and economic information, particularly advanced civilian, military, dual-use and bio-technology, remained a priority."
>
> "China's official collectors of economic intelligence were noted to use collection methods that were low-key and nonthreatening."
>
> "Chinese nationals working abroad lawfully gathered most S&T and economic intelligence through open sources, such as U.S. university libraries, research institutions, the Internet, and unclassified databases, providing the Chinese Government with highly valued, yet unclassified information."
>
> "The Chinese intelligence services were noted to have a long history of using Chinese students studying abroad to collect information, either formally for those services or informally for their home-based research institutes or universities. "
>
> "Many Chinese students in U.S. graduate schools were studying hard sciences and were able to collect a wide variety of information that is of value to China's efforts to ascend the technology ladder. "
>
> "Because the Chinese considered themselves to be in a developmental "catch-up" situation, their collection program tended to have a comparatively broad scope. Chinese collectors targeted information and technology on anything of value to China, which led them to seek to collect open-source information as well as restricted/proprietary and classified information."[118]

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the overt collection of technical information).

[114] Cong Cao, *supra* note 109 (discussing rising awareness in China of the importance of patents and intellectual property rights).

[115] Arguably the Chinese have positioned their researchers first on the technological battlefield. *See* SUN TZU, THE ART OF WAR 103 (Thomas Cleary trans., Shambhala Publ'ns 1st ed. 1988) (6th Cent. B.C.) ("Those who are first on the battlefield and await the opponents are at ease; those who are last on the battlefield and head into battle get worn out").

[116] Letter from George J. Tenet, Director, CIA & Louis J. Freeh, Director, FBI, to J. Dennis Hastert, Speaker of the House of Representatives (Dec. 12, 1999), *available at* http://www.fas.org/irp/threat/fis/prc_1999.html.

[117] Interview with Susan Ardis, *supra* note 71.

[118] Letter from George J. Tenet, *supra* note 116.

The underlying thread in China's science and technology collection is primarily that (1) it is overt, (2) it is legal, (3) it is precise, and (4) it is focused collecting on the lowest possible level of breaking research possible—the undergraduate and postgraduate level. In this arena, theses go unpublicized, papers go unpublished, and competitors go unnoticed. From all accounts, the research looks perfectly benign.[119] That is unless the information is acquired, catalogued, and leveraged into a document retrieval center. Once there, the information is exploited for creative and specialized high-end and dual-use engineering leads.[120] Libraries provide that extra precision for ORT.

X. Motivation and Drive

Author Thomas L. Friedman in *The World is Flat* has adequately addressed the drive behind Chinese LIS educational and research focus. First, the Chinese are seeking to get into the best schools possible and create premier universities at home.[121] Second, they are focused with seriousness on science and technology innovation.[122] Third, they are focused on collaboration within and between universities, companies and the Chinese government.[123] The purpose is not to beat us to the top,[124] but to "*Leapfrog*" beyond Western standards to the next generation of innovation and high-end technology.[125] The design of the LIS is intended to support the development of leading universities and research institutes through competitive advantage and collaboration.[126] Additionally, it is purposed to ensure the success of China's 863 technology policy to achieve core technology advances in military and civilian fields.[127]

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[119] Interview with Susan Ardis, *supra* note 71.

[120] *See* HUO ZHONGWEN & WANG ZONGXIAO, *supra* note 54 (providing an overview on Chinese intelligence collection strategies).

[121] FRIEDMAN, *supra* note 98, at 224–25.

[122] *Id.*

[123] *Id.*

[124] *Id.* at 365.

[125] TIMOTHY L. THOMAS, THE DRAGON'S QUANTUM LEAP: TRANSFORMING FROM A MECHANIZED TO AN INFORMATIZED FORCE (2009) (discussing the People's Liberation Army new mode of thinking to apply Sun Tzu's concepts in the information age).

[126] *See* Xue-Ming Bao, *supra* note 99 (discussing the virtual nature of China's National Science and Technology Library).

[127] *See National High-tech R&D Program (863 Program)*, MINISTRY OF SCI. & TECH. OF THE PEOPLE'S REPUBLIC OF CHINA (Jul. 7, 2009), http://www.most.gov.cn/eng/programmes1/index.htm (discussing China's National High-tech research and development program as the 863 Program and its objectives (1) to boost innovation capacity in the high-tech sector; to achieve breakthroughs in key technical fields that concern economic lifeline and national security; and, to "leap-frog" development in key high-tech fields to fulfill strategic objectives). This program is aimed at the forefront of world

XI. COMPETITIVE INTELLIGENCE MISSION

To better understand the Western vulnerabilities of emerging technology development and patent law, one must better understand the Chinese LIS architecture. The LIS architecture by design creates competitive advantage for China's leading research entities against Western innovators. China's NSL and its affiliate libraries include in their mission statement *Competitive Intelligence— Jing Zheng Qing Bao*—as a national priority.[128] Before going on its important to define Competitive Intelligence. Typically, Competitive Intelligence is a concept utilized primarily in the commercial sector. It refers to a broad away of research collection and often carries various definitions. With regard to China, the term is characteristic of an aggressive and focused pursuit of commercial competitor information. Indeed, it would appear from a survey of publications in this area that Chinese libraries do not take on a passive role, but rather are actively engaged in the collection of breaking research information.[129] The active collection and databasing of scientific and technology resources is helping drive stupendous growth in patent applications and journal articles.[130]

XII. DIGITAL EXPLOITATION

The field of Competitive Intelligence itself is trending toward more clandestine intelligence collection and may include elements or naming conventions associated with Market Research Analysis, Business Intelligence, Patent Strategy and Protection, Pre-Competitive Research, Collaborative Research, Due Diligence, Competitor Intelligence, Alerting Services, Early Warning, or Horizon Scanning, etc. All of these collection methods have one

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technology development and at intensifying innovation efforts to outpace front-runners and "leap-frog" beyond. *Id.* MOST takes the lead in drawing up science and technology plans and policies, drafting related laws, regulations and department rules, and guaranteeing their implementation. *Id.* In 1986, leading Chinese scientists proposed to accelerate China's high-tech development, which later led to the vision and implementation of Program 863. *Id.*

[128] *See* Zhang Zuozhi George, *supra* note 17 (discussing China's reference to Competitive Intelligence as *Jing Zheng Qing Bao* and the role played by local and national government in its development); *see also* SUN TZU, *supra* note 1, at 20 ("What the ancients called a clever fighter is one who not only wins, but excels in winning with ease. But his victories bring him neither reputation for wisdom nor credit for courage. For inasmuch as they are gained over circumstances that have not come to light, the world at large knows nothing of them, and he therefore wins no reputation for wisdom; and inasmuch as the hostile state submits before there has been any bloodshed, he receives no credit for courage."). *See generally* Zhengzhong Li & Yu Dong, *Competitive Intelligence in China: A Case Study,* 8.1COMPETITIVE INTELLIGENCE REV. 73 (1997) (discussing the role of Competitive Intelligence in China).

[129] *See* Cheng Shuai, *supra* note 43.

[130] Rovner, *supra* note 76.

commonality—digital exploitation of information on a competitor's plans, intentions, and developments. In spite of ethical Competitive Intelligence guidance proffered by organizations such as the Society for Competitive Intelligence Professionals (SCIP),[131] the proliferation of these analytical methodologies and collection techniques, combined with advanced technologies,[132] networking, databasing, analysis, targeted elicitation, and intelligence methodologies, presents an increased collection threat to pre-competitive data—(pre-patented data). When these techniques are State-driven or influenced and low profile in nature, they can be collectively described as Offensive Research Techniques (ORT). They may be overt and legal, but they can be exceptionally damaging to emerging innovation. The Chinese LIS provides a network through which the Chinese government may use low profile ORT in a predatory manner.

XIII. OFFENSIVE RESEARCH TECHNIQUES (ORT)[133]

The Competitive Intelligence mission of Chinese LIS lines up with Chinese military strategists wide-ranging concept of the battlefield.[134] The LIS mission can be incorporated into a battle planner's *kaleidoscope* to provide an inexhaustible variety of military or quasi military operations in

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[131] *Vision and Mission Statements*, STRATEGTIC & COMPETITIVE INTELLIGENCE PROF., http://www.scip.org/about/content.cfm?itemnumber=580&navItemNumber=503 (last visited Jan. 11, 2012); *Code of Ethics for CI Professionals*, STRATEGTIC & COMPETITIVE INTELLIGENCE PROF., http://www.scip.org/About/content.cfm?ItemNumber=578&navItemNumber=504 (last visited Jan. 11, 2012).

[132] Numerous resources indicate the trend towards clandestine collection of information in the commercial sector. *See* Delta Airlines, SKYMALL MAG., Late Spring 2011, at 63 (highlighting the proliferation of collection technologies into the mainstream consumer market); *see also* ACM IV SEC. SERVICES, SURVEILLANCE COUNTERMEASURES 1–32 (1994) (providing "a serious guide to detecting, evading, and eluding threats to personal privacy"); ACM IV SEC. SERVICES, SECRETS OF SURVEILLANCE vii–14 (1993) (providing "a professional's guide to tailing subjects by vehicle, foot, airplane, and public transportation"). *See generally* KATHERINE ALBRECHT & LIZ MCINTYRE, SPY CHIPS 1–13 (2006) (discussing the proliferation of radio frequency identification chips for both public and private sector collection purposes); RICHARD J. HEUER, JR. & RANDOLPH H. PHERSON, STRUCTURED ANALYTIC TECHNIQUES FOR INTELLIGENCE ANALYSIS (2011) (providing an overview of analytical techniques).

[133] *See* SUN TZU, *supra* note 1, at 32 (quoting *Maneuvering*, "Let your plans be dark and impenetrable as night, and when you move, fall like a thunderbolt"); *id.* at 26 (quoting *Weak Points & Strong*, "O divine art of subtlety and secrecy! Through you we learn to be invisible, through you inaudible, and hence we can hold the enemy's fate in our hands"); *id.* at 14 (quoting On *Waging War*, "A wise general makes a point of foraging on the enemy"); *id.* at 19 (quoting *Tactics*, "Security against defeat implies efensive tactics; ability to defeat the enemy means taking the offensive").

[134] *See generally* Zhang Zuozhi George, *supra* note 17 (providing historical background information on Competitive Intelligence in China).

the digital arena.[135] The Chinese LIS architecture is cloaked in legality. However, both civilian and military researchers have access to its resources. This muddles any Law of Armed Conflict (LOAC) analysis for LIS staff, networks, facilities, or holdings.[136] Given LIS's enabling capabilities, both civil and military researchers may utilize/direct Offensive Research Techniques against Western technology entrepreneurs.

Characteristics of a hostile assault against Western technology research initiative that could lead to dual use military developments include: (1) Predation (parasitical solicitation);[137] (2) Precise Acquisition of Science and Technology Information (not general but to the Nth degree);[138] (3) State Support or Governmental Direction (touching on strategic priorities);[139] (4) Quasi-Legal Elicitation (intrusive in nature);[140] (5) Transferability (applicable to military development);[141] (6) Pivotal Attributes (designed for Leapfrog or Tipping Point manufacture/production);[142] (7) Discreet, Surreptitious, or Deceptive Inquiry/Analysis (e.g. masked by third parties);[143] (8) Disruptive

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[135] *See* QIAO LIANG & WANG XIANGSUI, *supra* note 24, at 30 ("While no military thinker has yet put forth an extremely wide-ranging concept of the battlefield, technology is doing its utmost to extend the contemporary battlefield to a degree that is virtually infinite . . . In the wake of the expansion of mankind's imaginative powers and his ability to master technology, the battlespace is being stretched to its limits. Using Addition to Win the Game . . . we need only shake the kaleidoscope of addition to be able to combine into an inexhaustible variety of methods of operation.").

[136] *See, e.g.*, M. McCary, *Battlefield Sunrise: The Legal Status of Renewable Energy Sources Examined Under the Laws of Armed Conflict*, 11 USAFA J. LEG. STUD. 99, 107–09 (2002) (providing an example of LOAC analysis which could be applied to libraries).

[137] *Parasitical Solicitation* is defined by the author as solicitation for information on innovative developments that would/could otherwise disadvantage a researcher.

[138] *Precision* is defined by the author as exploitation of a particular researcher's findings in a very narrow area.

[139] *State-Support or Direction* is defined by the author as governmental funding, sponsorship, or objectives for technological research projects.

[140] *Quasi-Legal Elicitation* is defined by the author as any means of untoward elicitation that would offend the sensibilities of a researcher who may be working on technological projects in pre-competitive phases.

[141] *Transferability* in regards to military application is defined by the author as any technology development that can be used for either a civil or military application.

[142] *Pivotal Attributes* or *Tipping Point* research is defined by the author as that research, which if perfected, would lead to numerous successes in the field or other disciplines creating a synergistic effect in technology advancement. *See generally* MALCOLM GLADWELL, THE TIPPING POINT—HOW LITTLE THINGS CAN MAKE A BIG DIFFERENCE 259 (2001) (discussing *Pivotal Attributes*).

[143] *Discreet/Deceptive/Surreptitious Inquiry or Analysis* is defined by the author as those inquiries or analyses made in a manner which is not transparent, not open, and possibly clandestine in manner.

Development— focused in an emerging or explosive technology field;[144] (9) Targeted Research (manifesting a high degree of advanced knowledge of the researcher and/or research area);[145] (10) Timely and Offensive Approach (inquiry is not coincidental but forward to the point of being intrusive).[146] If a Western researcher encounters queries for research with these characteristics, he should be wary that a prospective collaborator may in actuality be an aggressive competitor.

XIV. E-LIBRARY TARGETING TOOLS

The primary predatory pre-competitive collection practices that China LIS uses follow:

Alert Services: It is obvious from official briefings that China uses Horizon Scanning and Early Warning software technology to identify new technology developments and provide breaking Alert Services to customers.[147] In some cases China refers to these alerts as "Signal Lamps"[148] in customer databases.[149] These services are intended to put eyes on target research at the earliest stage possible. The purpose of these services would be to provide a "Tip-Off" which would marshal the entire weight of a research team toward a new innovation.

Subject Librarians: China uses Subject Matter Librarians to marshal resources for customers. The Subject Librarian identifies key topics, forecasts future trends, exploits foreign material, and pushes resources to Chinese research teams.[150] The Subject Matter Librarian's skillset is similar

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[144] *Disruptive Development* is defined by the author as a breakthrough in technology advancement that would throw a competitor off-balance or disrupt commercial markets.

[145] *Targeted Research* is defined by the author as technological leads confined to very narrow targeted requirements—targeted research may or may not be addressed with precision against a particular researcher but may instead be directed more broadly in scope toward institutions or a group of researchers.

[146] *Timely and Offensive* is defined by the author as any inquiry that would offend the sensibilities of a researcher on the basis of when it was received in light of any pre- competitive developments that are ongoing.

[147] Jinxia Huang, *supra* note 18; *see also* Liu Xiwen, *supra* note 23 (discussing the use of "Signal Lamps" and "Alert Services" in China's Library Information System).

[148] Chinese strategists have traditionally emphasized "*Signals*" in military doctrine. *See* SUN TZU, *supra* note 115, at 63 (discussing the importance of changing colors so they will not be recognizable to the enemy); SUN TZU, *supra* note 1, at 33 (discussing "*Signals*" as a means of confusing the enemy).

[149] Jinxia Huang, *supra* note 18; *see also* Liu Xiwen, *supra* note 23 (discussing the use of "Signal Lamps" and "Alert Services" in China's Library Information System).

[150] *See* Yafan Song, *Continuing Education in Chinese University Libraries: Issues and Approaches*, 55 LIBRI 21, 21–30 (2005), www.librijournal.org/pdf/2005-1pp21-30.pdf (providing a statistic of 88,900 Science and Technology librarians as of 1994, and describing new skills and talents for

to a Western Intelligence Officer.[151] Their emerging position is one where they are positioned alongside or directly with the research team they are supporting.[152] Personalized subject services are available at leading university libraries and designed to foster innovation.[153]

Link Analysis. In U.S. military and law enforcement circles, connecting the dots between individuals in a targeted group is simply called "Link Analysis."[154] There exist specific software tools, which graphically display social networks to help better understand individual and organizational structures.[155] Chinese libraries appear to be using these techniques to analyze the intellectual structure of given scientific fields.[156] Otherwise described as "Author Co-Citation Analysis", this type of analysis can be used to pinpoint otherwise undisclosed or discreet working groups.[157] These social

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university librarians such as digital technology management, foreign language exploitation, deep subject matter expertise, ability to forecast, analyze, and access information accurately and quickly, taking concern for intellectual property, and the ability to communicate well with customers).

[151] *Id.* (explaining that, based on the author's experience, the modern day Chinese librarian carries the same skill-set as Western intelligence officers).

[152] *See generally* Jinxia Huang, *supra* note 18 (indicating the use of Chinese Subject Matter Librarians and their position on the Forward Edge of the Technological Battlespace); *see also* Liu Xiwen, *supra* note 23 (indicating the use of Chinese Subject Matter Librarians and their position on the Forward Edge of the Technological Battlespace).

[153] *See, e.g.*, *About Us*, SHANGHAI JIAO TONG UNIV. LIBR., *available at* http://www.lib.sjtu.edu.cn/view.do?id=1352 (last visited Jan. 7, 2012) (discussing the goals of the SJTU library).

[154] See Steve Inskeep, *U.S. 'Connects The Dots' to Catch Roadside Bombers*, NPR, Dec. 3, 2010, *available at* http://www.npr.org/templates/transcript/transcript.php; For a discussion of U.S. employment of mathematical models to draw inferences from social networks. Arguably these techniques have proliferated into the realm of Competitive Intelligence for exploitation of pre-competitive business data. More ominously, these techniques can be used to assess what is known about an emerging researcher, who he/she is related to, where and what they have done in the past, and what associations and research projects they are working on.

[155] *See IACA Resource Center*, INTL ASSOC. OF CRIME ANALYSTS, http://www.iaca.net/resources.asp?Cat=Software (last visited Jan. 8, 2012) (describing various analytic tools for link analysis).

[156] *See* Rulmin Ma, *supra* note 75; Qiao Xiaodong et al., *China National Science and Technology Digital Library (NSTL)*, 16 D-LIB MAG. (May/June 2010), http://www.dlib.org/dlib/may10/xiaodong/05xiaodong.html ("The National Science Technology Library processes and analyzes citation information from international journals and conference proceedings, in order to supply domestic web users with comprehensive information mining service."). There is nothing that indicates that the "comprehensive information mining service" is available to foreign (e.g. U.S.) researchers.

[157] Interview with Jonathan Pratter, Foreign & Int'l Law Librarian, Tarlton Law Library, The Univ. of Texas School of Law (Feb. 10, 2011) (noting that co-citation analysis is a very effective means of interpreting journal data. Mr. Pratter has over 25 years of information management experience).

networking techniques can be used to locate leads and target advanced or emerging research of leading innovators.[158] Google Chinese Scholar and Pajek have been discussed as two social networking tools available in China for this type of analysis.[159] The exact tools utilized by the NSL network are undetermined.

Cross-Domain Delivery: Chinese library leadership understands that to be effective in supporting advanced research, resources need to be pushed which cross-over various academic domains. The important characteristic of today's high-technology advances is "integration", where each technology is made up of various technologies to form a technology group.[160] Chinese subject librarians are working on this premise in apparent concert with Chinese military strategists.[161] In cases where a breaking innovation is identified, cross-domain research will be pushed to leading researchers allowing them to better understand the various fields impacted.[162]

Visualization: China LIS is using visualization to map out key technologies and identify trends and analysis.[163] Visualization can be very effective in areas

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[158] See Noah Shachtman, *How Technology Almost Lost the War: In Iraq, the Critical Networks Are Social — Not Electronic*, WIRED MAG. (Nov. 27, 2007), http://www.wired.com/politics/security/magazine/15- 12/ff_futurewar, for a discussion of the U.S. application of information technology tools in "network-centric warfare." According to General David Petraeus, this type of warfare is designed to "transmit data, full-motion video, still photos, images, information. So you can more effectively determine who the enemy is, find them and kill or capture, and have a sense of what's going on in the area as you do it—where the friendlies are, and which platform you want to bring to bear." *Id.* On the battlefield, the
U.S. has employed the synergy of technology, software, and social science in Human Terrain Teams (HTTs). *Id.* Comparatively, these same tools are being utilized in the science and technology field to map emerging innovations. *Id.* From a review of Chinese library trends, this Competitor State appears well poised for netcentric warfare in the science and technology field. Although not directly considered a front on the War on Terrorism, General John Abizaid's quote regarding our Enemy may be aptly descriptive: "The enemy is better networked than we are." *Id.*

[159] Rulmin Ma, *supra* note 75.

[160] HUO ZHONGWEN & WANG ZONGXIAO *supra* note 54.

[161] *See* QIAO LIANG & WANG XIANGSUI *supra* note 24 (discussing the important characteristic of military high technology as "integration").

[162] *See, e.g.*, *Information Services*, NAT'L SCI. LIBR., CHINESE ACAD. OF SCI., http://www.english.las.cas.cn/rs/is (last visited Jan. 8, 2012) (highlighting Sci-Tech Novelty Retrieval Center which helps researchers through a literature survey to avoid repetition of sceintific research).

[163] *See* Jinxia Hung, *supra* note 17, at slide 31 (noting the use of visualization technologies for information retrieval within the National Science Library architecture). *See generally* Liu Yong, Jiang Jing & Zhou Jian, *Competitive Intelligence Service Visualization on Knowledge Discovery*, IEEE XPLORE 203–07 (2010), http://www.ieee.org/portal/innovate/search/search.html (providing an overview of the use of

of technology, patent, and trends analysis as well as for Co-Author Citation Analysis.[164] Visualization can help researchers better understand a particular problem-set, or the particular technologies associated with a breaking innovation.[165] Additionally, it can identify new leads.166 We can expect China's use of visualization to increase as it further perfects its LIS architecture.

Warehousing: China uses both commercial and indigenously produced Digital Library holdings to warehouse collection resources.[167] China is seeking to upgrade its servers and network capacity of its LIS architecture.[168] Warehousing increases the LIS ability to conduct deep dive research.[169]

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competitive intelligence visualization for knowledge discovery); Wingyan Chung & Ada Leung, *Supporting Web Searching of Business Intelligence with Information Visualization,* IEEE XPLORE 807–11 (2007), http://www.ieee.org/portal/innovate/search/article_details.html?article=4427193 (discussing the usefulness of information visualization).

[164] *See* Stephen Few*, Visualizing Change: An Innovation in Time-Series Analysis*, SAS & JMP White Paper (2007), *available at* http://www.jmp.com/few (providing a sampling of visualization techniques that can be applied across the science and technology spectra).

[165] *See* Taotao Sun & Steven A. Morris, *Timeline and Crossmap Visualization of Patents*, PROC. OF WIS 1–11 (H. Kretschmer & F. Havemann eds., 2008) (demonstrating the use of mapping and visualization techniques in the context of patents).

[166] *See generally* Yang Y et al., *Text Mining and Visualization Tools – Impressions of Emerging Capabilities*, World Patent Information (2008), doi: 10.1016/j.wpi.2008.01.007, http://dblab.mgt.ncu.edu.tw/%E6%95%99%E6%9D%90/2008%20DM/57.pdf (discussing the various capabilities of visualization tools).

[167] *See* CHIEN LIN, *supra* note 66, at 131–32, 195–96 (describing China's use of both indigenous and foreign databases for information retrieval); GONG YITAI, *supra* note 65, at 157; Ben Gu, supra note 87 (discussing databasing, digitizing, and warehousing of information by the National Library of China); Qiao Xiaodong et al., *supra* note 156 (providing an overview of China's National Science and Technology Library and describing the NSTL's unified and centralized data storage, data mining, information extraction, and metadata storage responsibilities).

[168] *See New Server for the National S&T Library,* CHINA SCI. & TECH. NEWSLETTER, No. 317 (Dec. 30, 2002), http://www.most.gov.cn/eng/newsletters/2003/200411/t20041130_17714.htm (discussing server upgrades for the National Science and Technology Library (NSTL) which will deliver information through a 1000Mbps high-caliber optic network).

[169] High power computer capabilities are increasing research capabilities for libraries in the science and technology arena. *See generally*, Chris Anderson, et al., *The Petabyte Age*, WIRED MAG., Jul. 2008, at 106–22 (describing the impact of high-powered computer technology to various disciplines; highlighting the analysis of such information data through visualization; hypothesizing the end of theory; and noting also "Tracking the News" through alerting services and analysis—various applications of these technologies can be easily transferred to Competitive Intelligence methodologies). *Compare* Michael A. Nielsen, *Simple Rules for a Complex Quantum World*, THE SCI. AM., May 2003, at 25–33 (discussing the emerging discipline of quantum mechanics and information science), *with* Jia Liu, *Metadata Development in China—Research and Practice*, 10 D-LIB MAG. (Dec. 2004),

Networking: China's LIS architecture relies on a collaborative networking model to exchange and harness resources among libraries.[170] As it is a challenge to determine just how foreign resources are managed, there is little transparency in this area. China is improving its NSL network infrastructure and server capacity.[171]

Deep Web Holdings: China's ability to store both current and historic web information will only improve in the future.[172] Chinese researchers will therefore be able to increase their capability to conduct deep dive research on both authors and their works.[173] Western academics, innovators, and businessmen working on new technologies will have difficulty remaining anonymous amidst Chinese capabilities in this field.[174]

Ultimately, these tools are being used to take the fight to the footnotes of the competitor. Alongside these practices are emerging a new type of librarian.

XV. CHINESE LIBRARIANS—BIBLIO WARFARE SPECIALISTS

According to Yafan Song, of Renmin University of China, Library, Haidian, Beijing, China, in a 2005 publication entitled "Continuing Education in Chinese University Libraries: Issues and Approaches", China's libraries were considered to be entering a new educational environment with the expectation and capability to support faculty members that were undertaking academic research at a high level in a variety of subjects and tutoring people with high abilities.[175] The skill-set of Chinese librarians was to include: forecasting, analyses, database management, assessment and acquisition of information, collaboration and networking with researchers, management of digital technology, and reading of foreign documents.[176]

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http://www.dlib.org/dlib/december04/liu/12liu.html (last visited Jan. 7, 2012), *and* FRIEDMAN, *supra* note 98, at 181 (discussing improvements in search engines and future capabilities).

[170] 170 *See* Press Release, Thomson Reuters and the Chinese Academy of Science Research Front Analysis Center Jointly Honour China's Contribution to Global Research and Development (May 28, 2008), http://www.thomsonreuters.com/content/press_room/science/265534 (discussing China's collaborative research work).

[171] *See, e.g.*, *New Server*, *supra* note 168.

[172] *See* Press Release, *supra* note 170 (discussing China's excellence in research).

[173] *See Deep Web Technologies Paves the Way for China to Join the World Wide Science Alliance,* PR NEWSWIRE, Nov. 24, 2008, www.highbeam.com/doc/1G1-189647461.html (describing a powerful federated search engine that allows anyone with internet access to launch a single query across World Wide Science's 375 million pages of scientific and technological holdings).

[174] *See* Li Xiang-jun et al., *Research of Enterprise Competitive Intelligence Collection System Based on Cross-Language Information Retrieval*, 1 ISECS 601–604 (2009) describing cross-language implementation of Competitive Intelligence tools and methodologies).

[175] Yafan Song, *supra* note 150, at 22–23.

[176] *Id.* at 24–25.

These skills are directly comparable to a Western intelligence analyst.[177] The mission may not be aimed at bombs on target, but it is to obtain the tangible end-result of advancements in either the civil or military technology sector. The aim-point is America's center of gravity—*creativity and innovation*.[178] The end-goal of these subject-matter librarians is to analyze and push resources to more senior researchers regardless of the research mission.[179] According to leading Western academics, there is nothing comparable in the American university system.[180] When it comes to patent strategies, Chinese librarians may appear to be innocuous in nature, but they fulfill the roles of targeting, collection management, and analysis. They are in fact spooks[181] in sheep's clothing.

The specialized Subject Matter Librarian assists the Chinese government in obtaining early warning of a new innovation and quickly devoting personally tailored resources to appropriate science and technology research teams.[182] The effect is to obtain breakthrough on advanced technology and capture

[177] Based on Author's own experience in field.

[178] Interview with Susan Ardis, *supra* note 71 (noting that arguably, Americans are more concerned with improving on the current technology rather than taking a risk with new creativity and innovation).

[179] *See* Jinxia Huang, *supra* note 18, at slides 15, 16, 27 (noting that Chinese librarians are "assigned to various institutes to provide personalized training and consulting and customized information analysis services for research labs and teams." Subject Matter Librarians appear networked to info analysis groups and research and development decision-making bodies.). *Compare Brief Introduction of the Wuhan Branch*, *infra* note 262 (discussing Subject Matter Librarians); Yafan Song, *supra* note 150, at 25 (describing the professional skills and abilities emerging in the Chinese librarian field to include "collaboration with students and other members of the learning community to analyse learning and information needs, and to locate and use the resources that will meet those needs").

[180] *Id.*; Interview with Jonathan Pratter, *supra* note 157.

[181] *A Spook* is loosely defined by the author in this context as any individual under government employment or influence who is collecting information against national priorities for processing or exploitation in the technical arena.

[182] Subject Matter Librarians appear networked to info analysis groups and research and development decision-making bodies. *See* Jinxia Huang, *supra* note 18, at slides 15, 16, 27 (noting that Chinese librarians are "assigned to various institutes to provide personalized training and consulting and customized information analysis services for research labs and teams"). *Compare Brief Introduction of the Wuhan Branch*, *infra* note 262 (discussing Subject Matter Librarians); GONG YITAI & G.E. GORMAN, *supra* note 43, at 75–76 (stating that Chinese librarians are involved in scientific research and that "generally speaking, professional titles for librarians [in China] include: Research Librarian, Associate Research Librarian, Librarian, Assistant Librarian, and Clerk. Given the multidisciplinary nature of library services, these titles vary in accordance with the nature of the work. Thus, Librarians engaged in scientific research may have the titles of scientists: Research Professor, Associate research Professor, Assistant Researcher, and Practitioner. On the other hand librarians who look after technological equipment may have engineering titles: Senior Engineer, Engineer, Assistant Engineer, and Technician").

market or government control in a particular field. The LIS's early-stage acquisition of theories, processes, theses, or experiments can spark competitive research domestically and further propel government resources toward numerical superiority necessary for gaining critical development edge.[183] While the American strategy of warfare has always been to capture the high ground,[184],[185] Chinese strategy calls to leverage the library. Incidentally, Chinese librarians are active on all fronts—they are internationally active in both Competitive Intelligence and Library Associations and numerous foreign libraries.[186]

XVI. THE OYSTER EFFECT

The mission statement of the Chinese National Science Library suggests that the LIS architecture is designed to quickly and quietly acquire details of breaking algorithms, production processes, steps for creative replication, analytical techniques, theories, modified materials, software, testing results, etc. as they come off the printer.[187] Remember, we are discussing ORT, which is overt, legal, precise, and low-profile. While, the effectiveness of China's LIS for national objectives, strategic intelligence, early warning, and science and technology development is unknown, a few extrapolations can be made from its mission. Experts say that China is highly competitive; however, they temper their comments with statements that highly original work is

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[183] *See* Reuben F. Johnson, *China Eager for Russian Air Technology—Delegation to Industry Expo Largest*, WASH. TIMES, May 4, 2010, at 8 (discussing targeted collection of technical data on Russian jet-propulsion systems by numerous Chinese delegates "like ants on a march").

[184] *See* Allen G. Peck, *Airpower's Crucial Role in Irregular Warfare*, AIR & SPACE POWER J. 10–15 (Summer 2007), http://www.airpower.au.af.mil/airchronicles/apj/apj07/sum07/sum07.pdf (discussing airpower's irregular warfare applications in an asymmetric environment and use of aircraft as various collection platforms; comparatively Chinese libraries play a similar role in mapping science and technology landscapes).

[185] The Chinese are seeking to utilize their libraries for information dominance. *Cf.* WILLIAM C. SHERMAN, AIR WARFARE 3 (Air University Press 2002) (1926) (discussing the importance of looking forward in warfare and using all new developments); DAVID R. METS, THE AIR CAMPAIGN 63 (1999) (advocating simultaneous attacks on all varieties of target sets with the priority going to air superiority and high-tech solutions for dominance on the battlefield).

[186] *See* CHINESE AM. LIBR. ASS'N (CALA), http://www.cala-web.org (last visited Jan. 8, 2012) (describing CALA as an affiliate of the American Library Association (ALA)); *see also Standing Committee*, THE INT'L FED'N OF LIBR. ASS'NS (IFLA), http://www.ifla.org (last visited Jan. 8, 2012) (indicating permanent representation by China on the Science and Technology Libraries Section).

[187] *See Information Services*, NAT'L SCI. LIBR., CHINESE ACAD. OF SCI., http://english.las.cas.cn/rs/ (last visited Jan. 13, 2012) (discussing the information services provided by the library).

still rare.[188] Arguably, China's libraries are facilitating creative research that is neither seen nor heard.[189]

What can be deduced, through secondary material is that Chinese LIS acquires breaking information and pushes it to advanced research teams at leading universities and institutes. Those teams are protected not only by a wall of patents, but a wall of culture, language, government protection, and xenophobia.[190] The end result is *The Oyster Effect*: Chinese libraries obtain a small pebble of information on innovation and capitalize on it with the full weight of its customer research teams. The *Clam-Shell* closes around this innovation and advancements behind the Red Flag are then made in both civil and military arenas at the expense of the original innovator, and with little public awareness by the Western world. *Pearls* of technology are advanced rapidly. Science and technology breakthroughs are then patented or rolled-out for public review at time of competitive advantage.[191] The LIS strategy for development appears well laid out. Let the reader decide how effective this strategy is.

XVII. ARCHITECTURE OF CHINA'S NATIONAL SCIENCE LIBRARY.[192,193]

As of mid-2008 the Chinese Academy of Science[194] was actively pursuing a

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[188] Rovner, *supra* note 76 (quoting Zhigang Shuai, deputy secretary-general of the Chinese Chemical Society and a chemistry professor at Tsinghua University in Beijing as saying that "[a]mong the patents and papers, very, very few can be regarded as groundbreaking, or the best, or the first in their fields"). *Compare* SUN TZU, *supra* note 1, at 11 ("Laying Plans—All warfare is based on deception, hence when able to attack, we must seem unable"; Chinese researchers arguably maintain their best research behind Chinese walls), *and* SUN TZU, *supra* note 115, at 49 (quoting "Strategic Assessments—A military operation involves deception. Even though you are competent, appear to be incompetent. Though effective, appear to be ineffective"), *with* FRIEDMAN, *supra* note 98, at 367 (noting that "China is focused on overcoming its weaknesses beginning with creative thinking—to match our strengths").

[189] Rovner, *supra* note 76.

[190] China has frequently been characterized as a xenophobic nation. *See, e.g.*, Dennis Van Vranken Hicky, *The Roots of Chinse Xenophobia during Most of the Twentieth Century, Chinese Schools Taught History as a Series of Guo Chi, or National Humiliations Caused by Foreign Powers*, 17.7 WORLD & I, 26–37 (July 2002) (discussing the history of Chinese xenophobia).

[191] *See, e.g.,* HANS JOACHIM FUCHS, DIE CHINA AG: ZIELMAERKTE UND STRATEGIEN CHINESISCHER MARKENUNTERNEHMEN IN DEUTSCHLAND UND EUROPA 391 (2007) (noting that commercial gains are often not one by the best products but by the timing of an innovation'sdeployment into the market).

[192] See *Brief Introduction*, NAT'L SCI. LIBR., CHINESE ACAD. OF SCI., http://english.las.cas.cn/au/bi/ (last visited Jan. 8, 2012), for an official Chinese profile of the Chinese Academy of Sciences National Science Library.

[193] Chinese LIS is modeled on principles of Sun Tzu's strategy. *See* SUN TZU, *supra* note 1, at 27 (advocating in *Weak Points & Strong* the strength of a single united (research) body while the enemy must split up into (research) fractions).

national-level digital library system designed to integrate scientific and technological research resources for both universities and federal retrieval.[195,196] The DL system was to provide active support to intelligence collection practices.[197] As described, Chinese librarians have taken on intelligence functions to include direction, collection, processing, and active support to nationally sponsored researchers. Customers were to be able to use the DL system to develop national strategy, planning, management, intelligence, subject selection, research application, promotion, and development of high-end technology projects.[198] The system was in design as far back as 1996.[199] Its services appear robust, but their effectiveness is undetermined.

The NSL maintains a predatory position as demonstrated by its Competitive Intelligence mission and alert services. This increases the threat to early-stage Western research by providing the foundational support necessary for pre-competitive targeting, copyright infringement, dual-use exploitation, cyber penetration, and intellectual property theft. From an investigative standpoint, even if direct infringement on intellectual property rights is not occurring through the LIS, the nature of Chinese LIS connections masks plans and intentions behind Chinese library acquisitions. LIS early warning capabilities and networked university holdings suggest that NSL incorporates a nation-wide design to capitalize on the sheer number of Chinese researchers to secure competitive advantage for state-influenced actors.

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[194] CAS maintains a Bureau of High-Tech Research and Development and various academic divisions including physics, chemistry, medicine, earth sciences, information technology and technological sciences. It is affiliated with research institutions, educational institutions, high-tech enterprises, and the National Science Library. It promotes the development of China's high and new technology industries. *See generally About CAS*, THE CHINESE ACAD. OF SCI. (CAS), http://www.english.cas.cn/ACAS/ (last visited Jan. 8, 2012) (discussing CAS as a leading academic institution and comprehensive research and development center in natural science, technological science, and high-tech innovation in China).

[195] For general background on the development of China's digital library architecture, *see* Xihui Zhen, *supra* note 108.

[196] *Id.; see also* Wang Wenqing, *Building the New-Generation China Academic Digital Library Information System (CADLIS): A Review and Prospectus*, 16 D-LIB MAG. (May/Jun 2010), http://www.dlib.org/dlib/may10/wenqing/05wenqing.print.html (providing an overview of CADLIS).

[197] Liu Xiwen, *supra* note 23.

[198] *Id.*

[199] See *Introduction*, CHINESE DIGITAL LIBR. CONSTRUCTING & VALUE-ADDED SERV., http://www.global.cnki.net/grid20/Aboutcnki/Introduction.htm (last visited Jan. 8, 2012), for a discussion of Tsinghua University's support for the China National Knowledge Infrastructure Project, a national e-publishing project started in 1996. The project was to include newspapers, dissertations, proceedings, yearbooks, reference books, etc. *Id.* CNKI has greatly boosted the Chinese library systems to go digital and help researchers with their works. *Id.*

Although China's LIS may not be directly considered an intelligence collection entity, it clearly has an intelligence collection mission.[200] It was directed by the Chinese Academy of Sciences and its collection processes and model for integrating holdings was designed to be incorporated into national security planning and science and technology collection and research projects.[201] The Chinese DL is purposed to provide one-stop cross-domain research capabilities for the implementation of nationally-directed scientific projects.[202] Chinese Competitive Intelligence has been characterized as "*astonishingly sophisticated*."[203] But this should be unsurprising given the state-level emphasis placed on the subject.

CAS affiliates were to have access to LIS resources through various networks including the Chinese Academy of Sciences Network (CASnet), the Peking University Network (PUnet), the Tsinghua University Network (TUnet) and the National Science Digital Library Network (CSDL).[204] Other networks were being developed for research entities such as the Shanghai Library and affiliated research institutes.[205] The system was likely to be integrated with most if not all science and technology entities such as China's Ministry of Science and Technology (MOST).[206]

Schematics for CAS LIS networks showed the primary network to be the Chinese Sciences Digital Library (CSDL) where both public and private sector customers could utilize shared resources among universities and the Chinese Academy of Sciences.[207] The network was described as a nation-wide service.[208] The level of access for particular customers such as private researchers versus government employees varied but was otherwise undetermined.[209]

China's Subject Matter Librarians are emerging with special status and trust

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[200] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (describing clearly a strategic and tactical intelligence/information role of the Library Information System).
[201] Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23.
[202] Liu Xiwen, *supra* note 23.
[203] *See* Stephen Miller, *Chinese Host SCIP Members*, 4 CI NEWSWATCH (Sept.–Oct., 2001), http://www.scip.org/publications/CIMArticleDetail.cfm?ItemNumber=1069 (discussing the sophistication of the Chinese business environment and how advanced Chinese Business Intelligence leadership is without much influence from Western Competitive Intelligence practices).
[204] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (discussing library networks).
[205] *See* Liu Xiwen, *supra* note 23 (discussing Shanghai Library's network).
[206] Xihui Zhen, *supra* note 108.
[207] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (providing schematics for the Library Information System).
[208] Liu Xiwen, *supra* note 23.
[209] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (providing schematics for the Library Information System).

among China's science and technology community.[210] Their role is not just to maintain resources, but to facilitate new innovations.[211] The exact nature of China's LIS public and private connections is an area ripe for further research. Although Chinese libraries claimed to purchase or develop their own DL holdings, there were indications that holdings were also acquired in a predatory or low- profile manner.[212]

XVIII. NATIONAL DIRECTION[213]

The National Science Library's LIS system capitalizes on a China's federated and distributed emphasis on learning.[214] Architecturally, CAS directed a science and technology collection program among university libraries; such libraries include those at Peking University, Tsinghua University, and Shanghai University.[215] These are rising universities seeking reputation as world-class or premier research institutes. Their libraries are also being outfitted with the latest in library technology.[216] Additionally, organizations including the Society for Competitive Intelligence in China (SCIC) and the Chinese Institute for Competitive Intelligence (CICI) appeared to be providing training, education, and resources for the NSL mission.[217],[218]

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[210] *See* Jinxia Huang, *supra* note 18; Yafan Song, *supra* note 140 (discussing Subject Matter Librarians).

[211] Yafan Song, *supra* note 150.

[212] Interview with Susan Ardis, *supra* note 71 (discussing DL holdings).

[213] See *Brief Introduction*, NAT'L SCI. LIBR., CHINESE ACAD. OF SCI., http://english.las.cas.cn/au/bi/ (last visited Jan. 8, 2012), for an official Chinese background on the National Science Library.

[214] Rovner, *supra* note 76.

[215] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (discussing library networks).

[216] See Yuan Zhou, *Catching up with Technology: Recent Developments in Chinese Libraries*, CHINESE AM. LIBR. ASS'N. (CALA), http://www.cala- web.org/book/export/html/642 (last visited Jan. 8, 2012), for a discussion of library developments at Shanghai Library and implementation of a Horizon Integrated System as well as a tempered look at the networking and technological infrastructure of Chinese libraries. Arguably, China's use of Competitive Intelligence even with a slow information architecture is leading to plenty of commercial and military successes.

[217] *See* SOC'Y OF COMPETITIVE INTELLIGENCE OF CHINA (SCIC), www.scic.org.cn (last visited Jan. 8, 2012) (detailing "The Home of Competitive Intelligence"). China's SCIC website espouses Marxist-Leninist ideology and notes the organization is associated with China's Weapon Industry. *Id.* SCIC provides alert services for various government departments and tracks foreign delegates. *Id.* It reportedly has 400 corporate members and 800 individual members with a staff of 2000. It applies military-intelligence theory to economics theory. *Id.* Library staff are on SCIC's General Committee. *Id.* SCIC claims to be a non-profit organization for everyone involved in creating and managing business knowledge. *Id.*

[218] S*ee* CHINA INST. OF COMPETITIVE INTELLIGENCE www.cichina.org/english/aboutus.org (last visited Jan. 8, 2012) (describing this organization as the premier Competitive Intelligence

As of 2011, China's three most prominent national libraries, (branch libraries of its National Science Library), espoused a Competitive Intelligence mission.[219] These include Wuhan, Chengdu, and LanZhou Libraries.[220] Each of these libraries was aligned with the National Science Library Information System of the Chinese Academy of Sciences.[221] These three universities have a self proclaimed intelligence or competitive intelligence function to support CAS scientific research projects.[222] On their websites, Wuhan and Chengdu Library described their mission focus as the exploitation of foreign acquisitions.[223]

A survey of secondary material shows that these libraries likely incorporate the resources, support, guidance, and direction of CAS subject librarians, digital library holdings, and CAS research tools. They would have a variety of accesses to LIS-datalinked research networks and be subject to national level project directives. Appearances suggest that China is building a national system that will support Chinese researchers identified with high-end or emerging research talent.

The national focus of China's education system combined with its emerging library trends indicates that outstanding Chinese scholars are early- identified as rising stars to assist in national research endeavors. They are then pipelined toward critical scientific and technology collection projects that fall under CAS and NSL technology objectives. They may never be working on a western-style closed-door sensitive program, but they will be clam shelled as *Outliers* through LIS's *Oyster Effect*.[224] In parallel, the LIS architecture will vacuum up early stage international research for digital exploitation by the researchers in the NSL network.[225]

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training organization in China). CICI holds 15 professional Competitive Intelligence and analysis training seminars across China annually. *Id.*

[219] *See Brief Introduction,* NAT'L SCI. LIBR., CHINESE ACAD. OF SCI., http://english.las.cas.cn/au/org/ (last visited Jan. 13, 2012) (discussing the library's organization and goals).

[220] *Id.*

[221] *Id.*

[222] *Id.*

[223] CHENGDU BRANCH OF THE NAT'L SCI. LIBR., CHINESE ACAD. OF SCI., http://english.clas.cas.cn/ (last visited Jan. 13, 2012); THE WUHAN BRANCH OF THE NAT'L SCI. LIBR., CAS http://english.whlib.cas.cn/ (last visisted Jan. 13, 2012).

[224] *See generally* MALCOM GLADWELL, OUTLIERS 15–68 (2008) (discussing the "Matthew Effect" and "10,000 Hour Rule" which provide hidden advantages and extraordinary opportunities and cultural legacies that allow beneficiaries to work hard, gain success, and make sense of the world in ways others cannot).

[225] *See China and Economic Espionage: Hearing Before the Joint Econ. Comm.*, 105th Cong. (1997) (statement of Mr. John J. Fialka), *available at*

Since China has been developing an integrated system of digital holdings and a system of scientific research support through data-linked library platforms, Chinese researchers who do not have an intelligence affiliation may have served or still serve as *defacto* collectors for national technology priorities. High-end researchers likely have access to alert services of non-public or advanced research leads, and early warning of Western research developments in their particular specialty area. As a result of this "*Tip Off*" information they may time their international travel to engage in targeted non-public or public dialogues with leading researchers in the field. Discerning whether their work is in a civilian or military field would be a challenge.

As shown, LIS resources can facilitate the low profile targeting of particular Western research, which then would be incorporated into China's national-level reference databases. When CAS-sponsored researchers—specifically students and professors—return to China,[226] with unpublished holdings, specific web or network knowledge, unpublished research, or information that would otherwise be considered by Western standards pre-competitive collaborative data, their material would be subject to further collection, review, analysis, databasing, dataholding, and exploitation by the entire network of subject librarians and their LIS expert customers to include those who have expanded access to information from CAS affiliates.

XIX. CULTURED PEARLS

In short, a Chinese scientist's sponsorship or affiliation with CAS allows the Chinese researcher to get-out-in-front of a breaking research development with little or no notice to the U.S. intelligence or research community. The CAS integration of Chinese LIS ensures that Chinese researchers will populate NSL holdings through either witting or unwitting participation in state-directed science and technology objectives. This population of advanced research information creates an in informatics environment where China can foster *Cultured Pearls* and "*Out of the Blue*" technology advances in various scientific fields.[227] Chinese commentators on collection strategy have indicated that 80% of science and technology collection

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http://www.fas.org/irp/congress/1997_hr/j970617f.htm (discussing Chinese collection of economic secrets as a giant "vacuum cleaner", its emphasis on student collection, and noting the "spin-on" phenomenon of Chinese learning to make better technology products from the design work "spun off" U.S. technology).

[226] *See* Rovner, *supra* note 76 (quoting Zhigang Shuai regarding China's investment in human resources and welcoming of expats back home, specifically well-trained scientists who have come from almost every leading roup in North America, Japan, and Europe).

[227] *See generally* GLADWELL, *supra* note 224.

is gained from open sources.[228] With the advent of LIS collection trends, this percentage has likely climbed to over 90- 95%.[229] Consequently, the Chinese researcher or scientist can be aiding or abetting a dual-use national-level effort without ever being identified as a counterintelligence threat.[230]

Since these libraries are not openly associated with China's intelligence infrastructure, they appear non-threatening. More importantly, Western researchers and academics, even in lead fields remain little aware of the national collection and targeting focus of Chinese libraries.[231] They do, however, pose both a direct and indirect threat to emerging Western research by sheltering high-end research from prying eyes and providing national-level targeting support to leading research teams. At the same-time, China's scientists, librarians, academics, and librarians, have access to a full array of collaborative learning resources to help further the nation's technological

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[228] *E.g.*, HUO ZHONGWEN & WANG ZONGXIAO, *supra* note 54 (describing how 80% of technology requirements can be garnered from open source information).

[229] From the author's perspective, 90–95% is a reasonable estimate. This percentage is probably higher if augmented with cyber collection. *Cf.* Adam Entous, *U.S. Sounds Alarm at China's Military Buildup*, WALL ST. J., Aug. 15, 2010, http://online.wsj.com/article/SB10001424052748703908704575433933444265178.htm (discussing cyber intrusions which appear to have originated in China and aimed at exfiltrating information of strategic or military utility); Alex Spillius, *America Prepares for "Cyber War" with China*, TELEGRAPH, Jun. 15, 2007, http://www.telegraph.co.uk/news/worldnews/1554642/America-prepares-for-cyber-war-with-China.html (discussing how America's foes are looking at ways of hacking into U.S. networks to glean trade and defense secrets); Bryan Krekel, *Capability of the People's Republic of China to Conduct Cyber Warfare and Computer Network Exploitation*, U.S.-CHINA ECON. & SEC. REVIEW COMM'N (Oct. 16, 2009), http://www.uscc.gov/researchpapers/2009/NorthropGrumman_PRC_Cyber_Paper_FINAL_Approved%20Report_16Oct2009.pdf (highlighting in the Executive Summary that China's sophisticated cyber intrusion techniques are complemented by a deep knowledge of targeted networks and ability to sustain activities inside targeted networks both in government and commercial sectors); Martin Beckford, Heidi Blake and Duncan Gardham, *China May Seek to "Control the Internet", US Report on Web Hijack Warns,* TELEGRAPH, Nov. 18, 2010, http://www.telegraph.co.uk/news/worldnews/asia/china/8143460/China-may-seek-to-control-the-internet-US-report-on-web-hijack-warns.html ("The redirection of internet traffic [by China] is not just political espionage but the inclusion of data from Dell, IBM, Microsoft, and Yahoo raises concerns around corporate espionage.").

[230] *See* Harvey Rishikof, *Economic and Industrial Espionage*, NAT'L STRATEGY F. REV. (Spring/Summer 2009), http://nationalstrategy.com/NSFReview/SpringSummer2009NSFROnlineJournal/FeatureEssayEconomicandIndustrialEspionage.aspx (discussing intellectual thieves "eating our lunch" with significant technologies walking out of our laboratories with substantial commercial and substantial defense applications).

[231] Interview with Susan Ardis, *supra* note at 71; Interview with Jonathan Pratter, *supra* note 157.

prowess. Even significant failures can be a topic of high-interest collection as they can provide Chinese researchers with a critical edge to understanding where to apply, and where not to apply, more promising research and development resources.

XX. CHAIN OF COMMAND

As of early 2010, the National Science Library of the Chinese Academy of Sciences provided the overarching direction to the development and integration of Chinese Library Information Services.[232] According to its website, the three aims of the NSL were to (1) establish channels between resources as well as services and users; (2) develop digital reference work and information literacy education; and (3) develop subject competency information research, analyze subject trends, and find subject research hotspots.[233] Subject librarians of the NSL were to introduce and recommend all kinds of useful resources, service systems, and information tools to meet scientific demands.[234] Additionally, the NSL provided knowledge services for Very Important Person (VIP) users and key research groups according to the needs of research projects or scientists.[235] Their role was to encourage innovation by shorting the distance between the library and the users by going deep into the first line and making connection with scientific customers.[236]

As of early 2010, the Chinese NSL claimed to be linked to at least 89 CAS institutes in 24 cities across China.[237] It provided an interlibrary loan system connecting every CAS institute and connecting to major academic

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[232] *See generally Information About the National Science Library*, CHINESE ACAD. OF SCI. (Sept. 17, 2009), http://english.cas.cn/Re/Lib/200909/t20090917_39018.shtml (indicating the direction the NSL provided).

[233] *See General Information About the National Science Library*, CHINESE ACAD. OF SCI. (Sept. 17, 2009), http://english.cas.cn/Re/Lib/200909/t20090917_39018.shtml (indicating the aims of the NSL).

[234] *See* Jinxia Huang, *supra* note 18 (discussing subject librarian services).

[235] *See* Jinxia Huang, *supra* note 18; Liu Xiwen, *supra* note 23 (discussing VIP and high- level customers of Library Information System services).

[236] *Compare* DEITCHMAN, *supra* note 5 (discussing aspects of accelerated technology development; arguably there is a need to maintain the edge in such areas as computing hardware and software, materials, aircraft and missiles, fiber optics, superconductivity, directed energy, etc.), *with* Jinxia Huang, *supra* note 18 (discussing Slides 7–35 which lay out the Chinese system of library information storage).

[237] *CAS Institutes*, CHINESE ACAD. OF SCI., http://english.cas.cn/CASI/ (last visited Jan. 8, 2012). The Chinese Academy of Sciences frequently changes access to historic web page data so, consequently, the article is based on the late 2010 findings. For an official Chinese overview of its library structure, see *About CAS*, CHINESE ACAD. OF SCI., http://english.cas.cn/ACAS/ (last visited Jan. 8, 2012).

libraries.[238] It has developed many innovative services and tools, including integrated journal browsing, online reference, subject portals, and remote and mobile authentication.[239] It has also provided full text of Chinese scientific literature.[240]

The NSL was divided into a General Office, an Operational Office, a Collection Development Department, an Information System Department, Department of Subject Information Services, and an Editing and Publishing Center.[241] From a survey of secondary material, this LIS network appeared to incorporate collection from foreign-based institutes, think tanks, and or policy programs.[242] LIS support or connections to quasi-governmental owned companies could not be discounted. And, Chinese research centers appeared to be included in the network.

XXI. ORGANIZATIONAL STRUCTURE[243]

The following Chinese libraries were identified with the NSL. They all had a Competitive Intelligence mission. As such, these libraries are likely also be associated with developments at SCIC, CICI, leading university libraries, and technology research parks[244] throughout China. Taking into account NSL's self- described mission to provide prompt information services to institutes research groups, labs, individuals, through in-person and virtual connections,[245] these libraries appear to be fully integrated into a system designed to harvest emerging technical information on scientific topics of national concern. The capability of LIS datalinked research networks between these libraries was largely undefined.

Beijing Library (National Library of China):[246,247] The National Library of

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[238] *Id.*

[239] *See generally Information About the National Science Library*, CHINESE ACAD. OF SCI. (Sept. 17, 2009), http://english.cas.cn/Re/Lib/200909/t20090917_39018.shtml (discussing the Chinese NSL's innovative services).

[240] *Id.*

[241] *See* Jinxia Huang, *supra* note 18 (discussing the organization of the NSL).

[242] Author makes this deduction from a review of various library descriptions. *See, e.g.*, Xue-Ming Bao, *supra* note 99 (providing an overview of the NSL Chinese model).

[243] *See generally Administration*, CHINESE ACAD. OF SCI., http://english.cas.cn/Administration/ (indicating the heading "organizational structure").

[244] *See generally* Hongyi Sun, Wenbin Ni, Joseph Leung, *Critical Success Factors for Technological Incubation: Case Study of Hong Kong Science and Technology Parks*, 24.2 INT'L J. MGMT. (2007) (discussing technology parks).

[245] *See, e.g.*, Xue-Ming Bao, *supra* note 99 (describing NSL's mission).

[246] See NAT'L LIBR. OF CHINA, http://www.nlc.gov.cn/old/old/newpages/english/situation/index.htm (last visited Jan. 8, 2012), for an official Chinese profile of the Bejing Library.

[247] *See generally* Ben Gu, *supra* note 87 (discussing National Library of China's science and

China is briefed as part of the National Science Library architecture.[248] It is described as being a comprehensive research library, a national repository of home publications and a national center of library information networks.[249] The National Library of China not only has the largest collection of Chinese books in the world, but also the biggest collection of materials in foreign languages in the country.[250] Although the National Library of China appears to be focused on historical holdings, it maintains Chinese doctoral dissertations, and digital science and technology holdings.[251] The library is networked to databases with multiple academic institutions including Shanghai and Tsinghua University.[252] The National Library of China appears also to be closely linked to the other three branches of the National Science Library.

Wuhan Library.[253] The Wuhan Branch of the National Science Library carries out decision-making intelligence, academic intelligence, and enterprise Competitive Intelligence research, and has submitted many high quality research reports, and played an important role as a knowledge base and think tank for CAS.[254] Its focus is on advanced energy, advanced manufacturing, and new materials knowledge for CAS innovation.[255]

The Wuhan Branch of the NSL was founded in 1956 as a regional center of documentation and information system of the Chinese Academy of Sciences.[256] Now known as the Wuhan Library (Whlib), Whlib has been making very important contributions to research activities of CAS, and the local development of science and technology and the economy.[257] Whlib is the sub-center of the China Science and Technology Network Information Center (CSTNet) in Southern-Central China and it owns a strong technical force.[258] It integrates walk-in and web-based services 365 days a year, 12.5 hours per day.[259] Whlib is also Whuhan SciTech Project Consulting Center of

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technology focus).

[248] *See* NAT'L LIBR. OF CHINA*, supra* note 246.

[249] *Id.*

[250] *Id.*

[251] *Id.*

[252] *Id.*

[253] See *Brief Introduction*, THE WUHAN BRANCH OF THE NAT'L SCI. LIBR., CAS, http://english.whlib.cas.cn/ (last modified Aug. 20, 2009), for an official Chinese profile of the Wuhan Library.

[254] *See Brief Introduction of the Wuhan Branch, CAS*, THE NAT'L SCI. LIBR., CHINESE ACAD. OF SCI., http://english.las.cas.cn/au/org/whb/ (last modified Sep. 14, 2009) (describing the Wuhan Branch).

[255] *Id.*

[256] *Id.*

[257] *Id.*

[258] *Id.*

[259] *Id.*

CAS and the Branch of Sci-Tech Project Consulting Center of Hubei Province.[260] Whlib is the Documentation and Information Center of Donghu Hi-tech Development Zone to take services to Hi-tech zone and enterprises.[261]

Subject librarians of Whlib go to the institutes of CAS in different cities such as Wuhan, Changsha, Guangzhou, Nanjing, Suzhou, Shenzhen, and carry out service for researchers.[262] Whlib has in the past, also played a leading role in databasing for sustainable development and Chinese environment and resource projects.[263]

Chengdu Library:[264] The Chengdu Branch of the National Science Library, aka Chengdu Library, provides strategic intelligence research, subject information study and service, and competition intelligence service for the leadership, bureaus, science and technology innovation bases, and graduate education bases.[265] Chengdu Branch also provides strategic intelligence for local institutes and enterprises, facilitating decision-making, science research, scientific advancement, and sustainable development of society.[266]

The strategic objective of the Chengdu Library is to establish a digital networked information platform, to provide multi-level science and technology literature information service base, information study base, computer network service base, education base of library science and information study, and intellectual property (IP) information service base.[267]

Chengdu Library administrates the Chengdu node of CST and Chengdu Mirror of the National Science and Technology Library.[268] Chengdu Library has developed featured resources such as Nature Medicine Information Portal, Strategic High Technology Innovation Portal, Patent Innovation Portal, and Sichuan Science and Technology Information Sharing Platform.[269] Chengdu Library cooperates with Sichuan University in master education of library science and informatics.[270]

Chengdu Library was founded in 1958 as a regional center of documentation

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[260] *Brief Introduction of the Wuhan Branch*, *supra* note 254.
[261] *Id.*
[262] *Id.*
[263] *Id.*
[264] See CHENGDU BRANCH, CHINESE ACAD. OF SCI., http://www.cdb.cas.cn/ (last visited Jan. 8,2012), for an official Chinese profile of the Chengdu Library.
[265] *See Chengdu Branch*, THE NAT'L SCI. LIBR., CHINESE ACAD. OF SCI., http://english.las.cas.cn/au/org/cdb/ (last modified Sep. 9, 2009) (describing the Chengdu Branch).
[266] *Id.*
[267] *Id.*
[268] *Id.*
[269] *Id.*
[270] *Id.*

and information system of the Chinese Academy of Sciences.[271] It is now the biggest science library in southwest China and a leading information service and information study center.[272]

Chengdu Library is a member of Online Computer Library Center (formerly the Ohio College Library Center) (OCLC) and cooperates with colleges and agencies from United States, Britain, Germany, Thailand, Russia, and other countries for international academic exchanges.[273]

LanZhou Library:[274] The LanZhou Branch of the National Science Library, aka Lanzhou Library of Academia Sinica (LLAS), is otherwise known as a Scientific and Information Center for Resources and Environment of the Chinese Academy of Sciences.[275] Lanzhou Library plays a crucial role in exploiting and utilizing foreign scientific information sources as well as publicizing domestic scientific research achievements.[276]

LanZhou Library's major tasks are providing appropriate information research and consulting for innovative research of CAS and for the concerned ministries of the nation in multiple disciplines, especially earth sciences, resources, and environmental sciences.[277] LanZhou Library has participated and chaired at least forty research projects from the National Key Science and Technology Research and Development Program of China.[278] It has important influence on the research of resources, environmental science, earth sciences, global studies, and regional sustainable development.[279]

LanZhou Library has journal publications on Advances in Earth Sciences, Remote Sensing Technology and Application, Gold Science and Technology, and Natural Gas Geoscience.[280] LanZhou Library was founded in 1955, and as of 2006 became a branch library of the National Science Library.[281]

National Science and Technology Library: China's National Science and Technology Library is a virtual library created through the collaboration of major

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[271] *Chengdu Branch*, *supra* note 265.
[272] *Id.*
[273] *Id.*
[274] See *Brief Introduction*, THE LANZHOU BRANCH OF THE NAT'L SCI. LIBR., CAS, http://english.llas.cas.cn/au/bi/ (last visited Jan. 8, 2012), for an official Chinese profile of LanZhou Library.
[275] *See LanZhou Branch Library*, THE NAT'L SCI. LIBR., CHINESE ACAD. OF SCI., http://english.las.cas.cn/au/org/cdb/ (last modified Sep. 12, 2009) (describing the LanZhou Branch).
[276] *Id.*
[277] *Id.*
[278] *Id.*
[279] *Id.*
[280] *Id.*
[281] *LanZhou Branch Libary*, *supra* note 275.

national level libraries and information research institutes.[282] Directed by the Ministry of Science and Technology, the NSTL purchases, collects, and develops literature resources in the fields of science and technology, engineering, agriculture, and medicine from both China and around the world.[283] Based on 2004 statistics, NSTL had a strong focus on collecting English language and other Western language conference proceedings, dissertations, and theses.[284] NSTL provides a strong national online document delivery service strengthening science and technology access.[285]

XXII. OPERATING AREA

The organizational structure of China's National Science Library and its Library Information Systems outlines China's focus on strategic intelligence, emerging technologies, digital holdings, subject matter exploitation, and patent developments.[286] The operating area for these libraries is purely legal.[287] But the state-directed collection and marshaling of early stage research for competitive advantage raises significant questions for patent attorneys. At what stage should Western researchers be defending their research? If an innovation is "*Captured*"[288] before it is publicized, or even in early print, can ownership of the innovation still be maintained? Since we are in a world where more and more information is stored in digital bits and digital holdings,[289] science and technology libraries and their repositories

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[282] *See*, *e.g.*, Xue-Ming Bao, *supra* note 99 (displaying Table 1 NSTL Collection Statistics of Abstract Items dated Aug. 16, 2004 and identifying 2,078,805 foreign conference proceedings and 46,667 dissertations and thesis in its inventory). Given NSTL's mission to avoid duplication it is likely that each library networked to China's National Science Library collects dissertations, conferences proceedings, and theses in niche areas to avoid redundancy.

[283] *Id.*

[284] *See id*. (displaying Table 1 NSTL Collection Statistics of Abstract Items dated Aug. 16, 2004 and identifying 2,078,805 foreign conference proceedings and 46,667 dissertations and thesis in its inventory).

[285] *See* Qiao Xiaodong, *supra* note 156 (providing an overview of China's National Science and Technology Library).

[286] *Id.*

[287] *Id.*

[288] "Captured" is defined by the author in the science and technology research arena, (both in the military and legal sense), as acquiring ownership where no prior ownership existed, for example, with wild animals, mining, and water, or by military action. *See* BLACK'S LAW DICTIONARY 727 (3d pocket ed. 2006) (defining *Rule of Capture* as "*Property*. The principle that wild animals belong to the person who captures them, regardless of whether they were originally on another person's land").

[289] *See, e.g.*, Christi Fish, *UTSA Opens Nation's First Bookless Library on a University Campus*, UTSA TODAY, Sept. 9, 2010, www.utsa.edu/today/2010/09/aetlibrary.html (discussing the University of Texas at San Antonio's bookless Applied Engineering and Technology (AET) Library and the trend to move higher education library collections online which began in October 2000

will be a part of the operating area for discreet technology surveillance, collection, and exploitation augmented by cyber infiltration.[290, 291].

Thomas L. Friedman addresses some of these issues by asking "how we can build legal barriers to protect an innovator's intellectual property so he or she can reap the financial benefits and plow those profits into a new invention."[292] China's Library Information System appears to provide a State solution to the problem with ORT's Oyster Effect. State-influenced researchers are encouraged, rewarded,[293] and protected by its LIS. The challenge for Western businessmen, lawyers, and academics is how to increase collaboration in a manner that encourages sharing of the intellectual property required for cutting edge innovation while simultaneously protecting nascent stage advancements from unauthorized theft or cloning.[294] In light of documented cyber threats,[295] licensing works with digital providers cannot be

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when Kansas State University opened the Fiedler Engineering Library. The UTSA library encourages collaboration among higher engineering students).

[290] *See* Siobhan Gorman, *China Expands Cyberspying in U.S., Report Says*, WALL ST. J., Oct. 22, 2009, http://online.wsj.com/article/SB125616872684400273.html (discussing U.S.- China Economic and Security Review Commission's finding that China is utilizing cyberspying operations against U.S. corporations and that the Chinese government has likely supported or orchestrated very professional attacks acquiring technical information. The attacks have been targeted at defense information, conducted with extensive reconnaissance, and large scale).

[291] *See* Mara Hvistendahl, *The China Synbdrome*, POPULAR SCI. (Apr. 23, 2009), http://www.popsci.com/scitech/article/2009-04/hackers-china-syndrome (discussing Chinese hackers attacking U.S. companies and government agencies since 1999 and noting the possibility that cyber attacks might be only loosely affiliated with the Chinese government).

[292] FRIEDMAN, *supra* note 98, at 253–55.

[293] *See* Richard C. Paddock, *Booming China Lures Key Professors Home from U.S.*, AOL NEWS, Sept. 23, 2010, http://www.aolnews.com/2010/09/23/booming-china-lures-key-professors-home-from-us/ (describing the Chinese government program called the "Thousand Talents" and monetary incentives to encourage Chinese nationals to seek opportunities in China and also noting the goal of jump-starting innovation in science and technology). Returning scientists are referred to as "sea turtles" while part-time returnees are referred to as "sea gulls." *Id.* Both are treated as national heroes and set up with first-class science and resource support. *Id. See also* FRIEDMAN, *supra* note 98, at 370–71 (discussing China's focus on the 2004 U.S. Council on Competitiveness National Innovation Initiative Summit, specifically its translation of our report and integration of U.S. findings into its twenty year strategic plan); SUN TZU, *supra* note 1, at 39 (quoting Chia Lin in Variation on Tactics "Entice away the enemy's best and wisest men, so that he may be left without counselors").

[294] Interview with Susan Ardis, *supra* note 71 (arguing that there is little transparency in library sharing). While Western institutions are generally open to researchers, the full extent of sharing by China's National Science Library's Library Information System appears restricted and unknown). *Id.*

[295] *See, e.g.*, John J. Tkacik, Jr., *Trojan Dragon: China's Cyber Threat*, EXECUTIVE SUMMARY BACKGROUNDER (Feb. 8, 2008), http://www.heritage.org/research/reports/2008/02/trojan-dragon-chinas-cyber-threat

considered a fully secure manner in which to distribute emerging research publications.[296]

XXIII. PREDATION

By definition, Predation is the act of Preying or Plundering.[297] As of early 2010, numerous open sources manifested various dangers of predatory collection that could likely be associated with Chinese LIS entities including but not limited to: identification and targeting Western academics, Masters and PhD candidates, early warning of pre-competitive Western research; advanced acquisition of emerging scientific theses for dual-use or competitive research and development; exploitation of Western research centers and laboratories; unauthorized textbook translations; unsolicited requests for non-public research data and scientific papers; pursuit of critical software code; identification and collection of breakthrough algorithms; purchase of illegally acquired holdings; direct technical penetration of university or corporate library networks; and targeting of specific Western researchers for access to library holdings.[298]

(providing a survey of publicized cyber attacks attributed to China); Shane Harris, *Chinese Hackers Pose Serious Danger to U.S. Computer Networks*, GOV'T EXEC. (May 29, 2008), http://www.govexec.com/dailyfed/0508/053008nj1.htm (noting that "Chinese hackers attempt to map the IT networks of [American corporations] on a daily basis" and further describing that "executives from [at least] three Fortune 500 companies, all had document-steaing code planted in their computers while traveling in China. . . .The Chinese make little disctinction between hackers who work fort he government and those who undertake cyber adventures on its behalf.").

[296] Interview with Susan Ardis, *supra* note 71.

[297] *See* RANDOM HOUSE WEBSTER'S COLLEGE DICTIONARY 968 (2001) (defining *Predation* as (1)
the act of plundering or robbing; (2) predatory behavior; (3) the capture and consumption of prey).

[298] This assessment of Predation is based on the author's own experience in the legal and intelligence fields and discussion with Western academics and librarians. In these fields, this type of predation often goes unreported to U.S. investigators and is not frequently prosecuted in civil and criminal court because: (1) damages are difficult to assess and prove, (2) party opponents often are hidden behind third party entities, (3) collection is often masked by the guise of academic collaboration, (4) disclosure of invasive collection is often thought to be embarrassing for the victimized individual/entity, and, (5) collection does not meet threshold for legal challenge. *See* OFFICE OF THE NAT'L COUNTERINTELLIGENCE EXEC., FOREIGN SPIES STEALING US ECONOMIC SECRETS IN CYBERSPACE: A REPORT TO CONGRESS ON FOREIGN ECONOMIC COLLECTION AND INDUSTRIAL ESPIONAGE, 2009–2011, 2–3 (2011), http://www.dni.gov/reports/20111103_report_fecie.pdf (noting China as a foreign collector and providing a broad outline of "non-cyber" methods of economic espionage to include: Requests for Information, Solicitation or Marketing of Services, Conferences, Conventions, and Trade Shows, Official Foreign Visitors and Exploitation of Joint Research, Foreign Targeting of U.S. Visitors Overseas, and Open Source Information); Micha Springut, Stephen Schlaikjer & David Chen, *China's Program for Science and Technology Modernization: Implications for*

China's LIS resources have magnified the risk of predation.[299] The challenge is operating as a researcher in this environment.

XIV. SITUATIONAL AWARENESS

Considering predation, every U.S. student/researcher needs to understand that his or her research may be leveraged into a much wider research initiative once it's documented in a library setting. Every U.S. student/researcher also needs to think of him or herself as competing against every rising Chinese student who could acquire access to his or her material.[300] Furthermore, every U.S. student/researcher needs to look at foreign collaborators as potential competitors in the event they are seeking to push for patent or commercial opportunities.[301] In the area of high-end engineering, Americans must understand that they are at a disadvantage when it comes to Chinese Offensive Research Techniques.[302] After all, China is seeking to lure their nationals home and obtain competitive edge, not pay them to further U.S. business

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American Competitiveness, U.S.-CHINA ECON. & SEC. REVIEW COMM'N (2011), http://www.uscc.gov/researchpapers/2011/USCC_REPORT_China's_Program_forScienc e_and_Technology_Modernization.pdf (documenting China's reliance on foreign innovation as a science and technology strategy: "The [Chinese] government does not aim to move out of the way of markets. Rather, the PRC government has become a leader in a technology commercialization drive . . . China's national innovation system struggles to balance its need to utilize foreign sources of technology with a desire to nurture homegrown innovation. Nevertheless the PRC has positioned itself to reap the benefits of global commercial and scientific networks."); Dave Drab, *Economic Espionage and Trade Secret Theft: Defending Against the Pickpockets of the New Millenium*, XEOROX WHITE PAPER 4 (2003), http://www.xerox.com/downloads/wpaper/x/xgs_business_insight_economic_espionag e.pdf (discussing the danger of foreign governmental collection and outlining various types of information targeted to include financial, organizational, marketing, technical, and scientific data, such as access card control information, project information, pricing information, sales forecasts, financial information, computer source code, test material/prototypes/design specifications, customer business info, engineering plans and drawings, formulas, research, blueprints/diagrams, confidential documents, software, implementation methodology, technical records, biomedical research).

[299] *See* JAMES GLEICK, CHAOS—MAKING A NEW SCIENCE 181–87 (1987) (arguing that Chinese libraries create order from information chaos and are thereby poised to capture innovative pearls for exploitation).

[300] FRIEDMAN, *supra* note 98, at 278.

[301] *Id.* at 353.

[302] *See* Geoff Colvin, *Desperately Seeking Math and Science Majors*, CNN MONEY (July 29, 2010) http://money.cnn.com/2010/07/29/news/international/china_engineering_grads.fortu ne/index.htm (discussing Applied Materials challenge in finding high-caliber candidates for its new Solar Technology Center and noting that some of the most advanced research in this high-value, fast growing field is being done in China). By comparison, the fastest-growing college majors in America as of 2007 were in parks, recreation, leisure, and fitness studies, as well as security and protective services. *Id.*

advances.[303,304] To that end, they are creating the mechanisms for legally validating idea theft.

XXV. RULE OF CAPTURE

Arguably, the Chinese Library Information System is positioned on the juridical battlefield to defend a new *Rule of Capture*.[305] Ideas or innovations may be freely captured in the information wild early in the technology planning stage.[306] As long as the information was openly acquired, even in the most incipient stages, it cannot be considered theft of a *Trade Secret*.[307] Amidst China's library trends, U.S. innovators will not be able to claim their innovations are protected by geographical boundaries or digital licenses. If a larger library network obtains, scans, digitizes, and exploits early-stage theses, papers, or curricula, Rule of Capture suggests that the library's customers should reap the legal rewards.[308] A competitor's advancement of a patent on

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[303] *See Attracting More Overseas Talent*, CHINA SCI. & TECH. NEWSLETTER, No. 561 (Oct. 10, 2009), http://www.most.cn/eng/newsletters/2009/200910/t20091010_73575.htm (discussing China's Ministry of Human Resources and Social Security objective to attract more talented people from overseas, especially high caliber overseas Chinese students). The China Ministry of Human Resources and Social Security will attract overseas talent with three programs (1) more study abroad opportunities; (2) more opportunities for talented people to work in China; and (3) support for high-tech start-ups and innovations. *Id.* The brand name for its student programs is "Chinese Serving China." *Id.*

[304] Paddock, *supra* note 293.

[305] *See generally*, ERNEST E. SMITH ET AL., INTERNATIONAL PETROLEUM TRANSACTIONS 181–82, 236–38 (1993) (discussing *Rule of Capture* as a means to deny liability for draining another property owners reserves). Comparatively, when applied to juridical warfare, one might say Chinese Library Information Services are positioned to drain pre- competitive information resources for early exploitation by the Competitor State.

[306] *See* JOHN S. LOWE, OIL & GAS IN A NUTSHELL 9–11 (5th. ed. 2009) (discussing Rule of Capture and early application to wild game).

[307] *Trade Secret* is defined as: A formula, process, device, or other business information that is kept confidential to maintain an advantage over competitors; information— including a formula pattern, compilation, program, device, method, technique, or process—that (1) derives independent economic value, actual or potential from being generally known or readily ascertainable by others who can obtain economic value from its disclosure or use, and (2) is the subject of reasonable efforts, under circumstances to maintain its secrecy. This definition states the majority view, which is found in the Uniform Trade Secrets Act. **2.** Information that (1) is not generally known or ascertainable, (2) provides a competitive advantage, (3) has been developed at the plaintiff's expense and is used continuously in the plaintiff's business, and (4) is the subject of the plaintiff's intent to keep it confidential). This definition states the minority view, which is found in the Restatement of Torts § 757 cmt. b (1939). BLACK'S LAW DICTIONARY 727 (3d pocket ed. 2006).

[308] *See generally id.*at 629 (defining *Rule of Capture* as "*Property*. The principle that wild animals belong to the person who captures them, regardless of whether they were originally on another person's land"); ONLINE LAW DICTIONARY,

the basis of data that was pre-competitive in nature cannot be considered illegal.[309] So long as the competitor can prove *First Use* in development and support the position with relevant patent filings, the issue of how "*Tip-Off*" information was collected/exploited becomes irrelevant. With regard to China, the State's use of its Library Information System to draw from a well-spring of technology leads will likely hold sway as a legitimate international norm, even if it creates an unfair advantage for Chinese state-directed/influenced entities.[310] The resultant effect will be an increased difficulty of challenging/defending patents on the juridical battlefield.[311]

XXVI. RETRENCHMENT

In comparison to China's LIS, American libraries are in a period of retrenchment.[312] Funding for major university library programs is being cut.[313] Collaboration between libraries is declining.[314] Competitive Intelligence tools for library customers are not provided.[315] And, focus on personalized services

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http://law.yourdictionary.com/rule-of-capture (last visited Jan. 13, 2012) (defining *Rule of Capture* as "(1) Acquiring the ownership of property where there previously was no ownership; thereby, any wild animals captured belong to the person who captures them, regardless of whose property they were upon previously. (2) If the recipient of property displays an intent to take full control of that property and not just pass it on to another, that person captures full rights to that property including the ability to pass it on to his or her heirs"); BARRON'S LAW DICTIONARY 68 (5th ed. 2003) (defining *capture* in both a legal and military sense).

[309] Navarro & Autry, *supra* note 26 (suggesting that an American patent in China is considered merely a blueprint).

[310] *Cf.* MARK W. JANIS, AN INTRODUCTION TO INTERNATIONAL LAW 157 (3d ed. 1999) (noting that there is no international sovereign to enforce international law). *See generally* Symposium, *The Air and Missile Warfare Manual: A Critical Analysis*, TEX. INT'L. L.J. (2011) (noting that State practice determines what law is not international law). It is doubtful, however, that China would follow *Stare Decisis* of *Paquete Habana.; The Lola*, 175 U.S. 677 (1900), and pay owners of pre-competitive data profits for LIS captured information.

[311] As official reports indicate, it is already extremely difficult to protect and defend patents against Chinese infringement. U.S. INT'L TRADE COMMISSION, PUB. NO. 4199, CHINA: INTELLECTUAL PROPERTY INFRINGEMENT, INDIGENOUS INNOVATION POLICIES, AND FRAMEWORKS FOR MEASURING THE EFFECTS ON THE U.S. ECONOMY 1 (2010) http://www.usitc.gov/publications/332/pub4199.pdf.

[312] Interview with Susan Ardis, *supra* note 71 (discussing the looming loss of funding and digital databases for networked sharing under *TexShare*).

[313] *See, e.g.*, Mary Jackson, *Another View: Why Libraries are Not Expendable*, THE RIVER CITIES SUNDAY TRIBUNE, Feb. 20, 2011, at A4 (discussing Texas legistature's proposed 70 percent cut of library services across the State and increasing reliance on digital holdings); Letter from Lisa Dunham, Smithsonian Inst., Air & Space Mag. Adopt-A-Library Program (June 2011) (on-file with Author) (discussing shortage of funds for libraries across the United States).

[314] Mary Jackson, *supra* note 313.

[315] *Id.*

that might yield the next innovation are virtually non-existent.[316] While larger American corporations in recent past had their own technical libraries designed to map emerging technologies, many private technical libraries have closed under market downturns.[317] Americans, who otherwise proudly call themselves creative risk takers, are in this area demonstrating risk aversion.[318] Most companies and researchers are seeking to improve for profit on the last product rather than find the next innovative solution.[319] This library retrenchment will, unfortunately, lead to a Competitor State such as China, meeting and surpassing us in various technical capabilities.[320] As the civilian world makes additional advances in high-end technology, the various cross-over fields in which military applications can be developed will increase.[321] Retrenchment of our libraries thus limits our ability to respond to a Competitor State's "*out-of-the-blue*" advances and minimizes our ability to deter more hostile acts of aggression.[322] On the other hand, China's use of juridical warfare will provide a powerful tool by which to avoid open conflict with the West and secure strategic technological advantages.

XXVII. THE VULNERABILITY

Chinese library innovation combined with American library retrenchment creates vulnerability in American deterrence.[323] Although individuals engaged in the world of business activities agree that the Chinese are excellent at espionage,[324] they do not expect to lose their Home Field advantage. Chinese

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[316] *Id.*

[317] Interview with Susan Ardis *supra* note 71.

[318] *Id.*

[319] *Id.*

[320] DEITCHMAN, *supra* note 5, at 200; s*ee also* John Toon, *Technology Indicators: Move Over U.S.—China to be New Driver of World's Economy and Innovation*, GEORGIA TECH RESEARCH NEWS (Jan. 24, 2008), http://www.gtresearchnews.gatech.edu/newsrelease/high-tech-indicators.htm (describing China as a "powerhouse" and highlighting its consistent gains in all technology indicators).

[321] DEITCHMAN, *supra* note 5, at 207.

[322] *Cf.* LARRY SCHWEIKART, AMERICA'S VICTORIES—WHY THE U.S. WINS WARS AND WILL WIN THE WAR ON TERROR 132—78 (2006) (stating that "If You Build it, We Will Win," and noting that just as Americans willingly accept good ideas from lower ranks, so, too, has the U.S. military embraced inventions and processes from the private sector, giving it an unprecedented advantage in wartime production), *and* SUN TZU*, supra* note 115, at 90 (quoting Master Sun on *Formation* "So it is that good warriors take their stand on ground where they cannot lose, and do not overlook conditions that make an opponent prone to defeat."). Unfortunately, without a strong collaborative library infrastructure in the science and engineering field, our ability to field innovations on the battlefield is more limited.

[323] *See generally* THOMAS C. SCHELLING, THE STRATEGY OF CONFLICT (1980).

[324] *See* Timothy L. Thomas, *Google Confronts China's "Three Warfares*," PARAMETERS 111 (Summer 2010) ("People engaged in the world of business activities agree on one thing, the

Library Information Systems provide the venue for which overt, legal, precise, and low-profile collection can be conducted on our turf ultimately resulting in a juridical disadvantage in defending emerging technology developments on the international scene.[325] "*The Chinese utilize any number of espionage tools and establish the rules and regulations that stifle attempts by foreign business to participate as an equal in the Chinese market. This is how the Chinese play the game*."[326] They are, however, taking it one step further in looking to capture validity on the international market. The employment of digital reconnaissance,[327] ORT collection, and self-created databases precludes transparent sharing of holdings.[328]

The libraries provide an example of a pragmatic employment of juridical warfare. In the traditional paradigm of Diplomacy, Intelligence Military and Economics, Chinese Libraries have leveraged all four categories. When used for political profiling, they serve to strengthen diplomacy; when utilized to provide intelligence, they serve to strengthen China's strategic and tactical decision-making capabilities; when utilized to advance a dual-use science and technology advances, they serve to strengthen the military; when utilized to acquire competitive information necessary for patent filings, they provide legitimacy to economic advancements and litigation.[329] By this light, China's LIS serves as a critical enabler for defense strategy.[330] The incorporation of China's rapidly

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Chinese are excellent at espionage.").

[325] *See id.* at 101–13 (discussing Chinese acts of commercial espionage and use of thorough reconnaissance planning and precision attack on folders using breach teams, collection teams, exfiltration teams, and intermediate staging servers, and also discussing culpability of educational institutions in the collection process and noting that China has played down such collection capabilities).

[326] *Id.* at 111.

[327] *See generally id.* at 101–12 (discussing China's reconnaissance efforts).

[328] Jim Garamone, *China's Military Capabilities Continue to Grow, Report Says*, U.S. DEP'T OF DEF. (Mar. 25, 2009), http://www.defense.gov/news/newsarticle.aspx?id=53642 (discussing the Military Power of the People's Republic of China and quoting Pentagon Press Secretary Geoff Morrell that "more dialogue and transparency was needed in dealing with Chinese government and military").

[329] *See generally* Rishikof, *supra* note 2 (discussing juridical warfare). One would be remiss to believe that China does not use pre-emptive litigation as a means to protect its technical acquisitions and developments. *See* Stuart S. Malawer, *Globalism, Trade, and Virginia*, 59 VIRGINIA LAWYER, Dec. 2010, at 27–32 ("China actively and aggressively uses the litigation process for both domestic and foreign policy purposes . . . it uses the litigation process to contest U.S. trade restrictions and, often, as a response to U.S. actions both in and outside the World Trade Organization.").

[330] Arguably, Chinese science and technology library holdings provide leads and f oundational information necessary for more direct and clandestine collection activity; *See, e.g.*, Simon Cooper, *How China Steals U.S. Military Secrets*, POPULAR MECHANICS (July 10, 2009), http://www.popularmechanics.com/technology/military/news/3319656

growing Competitive Intelligence industry into the LIS mission makes collection of resources and applications for consumers more effective than American library services.[331]

Chinese libraries are most heavily geared toward collecting and analyzing economic secrets.[332] This is a field where they are "*eating our lunch*."[333] The majority of LIS collection is not suspicious because it's done openly and legally. According to leading experts, we are seeing a simultaneous build-up of advanced weaponry in the Asia-Pacific region on a scale and at a speed not seen since the Cold War.[334] Alongside this build-up, we will see China's armed forces develop and field disruptive military technologies while obfuscating plans and intentions.[335] Chinese military officials have stated that in the world of economic warfare the boundary between war and peace becomes fuzzy.[336]

(discussing how China covert agents "vacuum[ed] up every shred of technology information or hardware that they [could] get their hands on); Peter Grier, *Spy Case Patterns the Chinese Style of Espionage*, THE CHRISTIAN SCI. MONITOR (Nov. 30, 2005), http://www.intelligencesearch.com/ia092.html (discussing China's reliance on a multitude of Chinese students, visiting scientists, and nationals of Chinese heritage to meet national science and technology collection objectives); S. Eugene Poteat, *The Attack on America's Intellectual Property—Espionage After the Cold War*, THE BENT OF TAU BETA PI 16 (Winter 2001), http://www.tbp.org/pages/publications/Bent/Features/W01Poteat.pdf (stating that Chinese intelligence services have seen and understood the change from military competition to worldwide economic competition and have completed the shift in their intelligence requirements accordingly to become masters of economic and industrial espionage).

[331] *See generally* Bao Changhuo et al., *The Developing Chinese Competitive Intelligence Profession*, 9.4 THUNDERBIRD INTL. BUS. REV. 42–46 (1998) (discussing China's flourishing competitive intelligence industry and prospects for the future).

[332] Thomas, *supra* note 324, at 103–105.

[333] Rishikof, *supra* note 230, at 4 (discussing intellectual thieves "eating our lunch" with significant technologies walking out of our laboratories with substantial commercial and substantial defense applications).

[334] *See* Amol Sharma et al., *Asia's New Arms Race*, WALL ST. J., Feb. 12, 2011, http://www.online.wsj.com/article/SB10001424052748704881304576094173297995198.html (discussing the most demanding security situation faced since the Second World War, but stating that China is still far from challenging the U.S. for global military supremacy, and quoting Hu Jintao from early 2011 "We do not engage in an arms race. We are not a military threat to any country—China will never seek to dominate or pursue an expansionist policy.") Chinese defense spending is up, $78 billion in 2010 and up $17 billion from 2001. *Id.* This does not include arms imports or technology research expenditures. *Id.* Michael Schiffer, the Deputy Assistant Secretary of Defense for East Asia has stated that the U.S. does not view China as an adversary. *Id.*

[335] *See* MILITARY POWER 2009, *supra* note 42, at 51(discussing the impact of capabilities to allow China to project power to ensure access to resources or enforce claims to disputed territories).

[336] *See* Thomas, *supra* note 324, at 109–10 (discussing 2009 China Military Science article by

"International commerce and advancing technology have increased the likelihood and opportunity for economic intelligence and industrial espionage."[337] Indeed, boundaries are eroding legally, behaviorally, and electronically.[338] In academic settings, and technology parks, where Western intellectual exchange and technological incubation is most advocated,[339] risk of library enabled ORT will increase.[340]

On a tactical level, key vulnerabilities exist. First, we've said a few times that China's library can serve to bring the full weight of a state-level research team to bear on a Western innovator. Second, ORT can be utilized to indirectly obtain access to critical dual-use research databases by entering into third- institute partnerships. Third, it can obtain advanced leads on government activities and research through close affiliation with libraries chartered under the Federal Depository Libraries Plan. Fourth, it can identify, highlight, and foster targeting of otherwise anonymous or obscure researchers. Fifth, it can exploit both hard-copy and digital collections of public, private, or governmental libraries such as NASA and National Labs. Sixth, it can target data collection at the earliest stage possible.

The tactical battlefield of the future is in the footnotes of the information collected. The industries most vulnerable collection by China's ORT are naturally those that China places priority State interest in. Those industries include: clean energy technology, next generation information technology, bio-technology, high-technology (including aviation, space, manufacturing technology), new energy resources, new materials/nano-technology, and advanced automobile designs.[341] These are the industries that innovators should be concerned about

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Colonel Long Fangcheng and Senior Colonel Li Decai analyzing comprehensive national power, and noting further that the world economic sector has become a goal for the Chinese).

[337] *Id.*

[338] Rishikof, *supra* note 230, at 2, *see also* FRIEDMAN, *supra* note 98, at 375 ("[T]he main challenge to America today comes from the fact that all the walls are being taken down and other countries can now compete with us much more directly.").

[339] *See, e.g.*, *Fact Sheet: U.S.-China Science and Technology Cooperation—Highlights:32 Years of Collaboration*, U.S. DEP'T OF STATE (Jan. 29, 2011), http://www.whitehouse.gov/sites/default/files/microsites/ostp/st-fact-sheet.pdf (describing government-to-government collaboration); Fish, *supra* note 289 (discussing collaboration among engineering students in national libraries); Jonathan Watts, *U.S. and China to Unveil Plan to 'Take Over' Cleantech Market*, THE GUARDIAN, Sept. 9, 2009, http://www.guardian.co.uk/environment/2009/sep/09/china-us-greentech-plan (discussing business collaboration on high tech clean-energy projects).

[340] Hongyi Sun et al., *supra* note 244, *see also* Charles Day, *Physics in China*, PHYSICS TODAY, Mar. 2010, at 33–38, http://www.csupomona.edu/~zywang/day.pdf (noting that China is utilizing home-grown advances and participation in international projects to increase its science and technology capabilities).

[341] Gregory White, *The 7 Strategic Industries the Chinese Government Loves and Why*

protecting as China speaks boldly on both the means and objectives behind its collection and innovation strategy.

XXVIII. IMPACT

When it comes to libraries, China is successfully wielding its Soft Power. Globally it is number two in science and technology publications.[342] Skeptics might say don't worry.[343] However, the United States cannot meet the advancement of technologies described by Defense Secretary Gates quickly and nimbly without marshaling its own library resources for scientific and technological advantage. In a battle-space where technology is fluid, lawfare is state-directed, and libraries maintain deep research capabilities, a full awareness of an enemy's application of information resources is uncertain.[344] Chinese libraries increase the scale of that uncertainty by expanding the access of dual- use science and technology collections to top national researchers at all levels.[345] They provide an additional platform for increasing both the quantity and quality of scientific research.[346]

You Should Too, BUSINESS INSIDER, Feb. 3, 2011, http://www.businessinsider.com/the-7-strategic-industries-the chinese-government-loves-2011-2, *see also China Triples Spending on Nanotechnology over Past Five Years,* CHINA DAILY.COM, Jan. 12, 2011, http://www.chinadaily.com.cn/business/2011-01/12/content_11834566.htm (highlighting China's investment of over "5 billion yuan ($760 million) on research and development of nanotechnology between 2006 and 2010" and quoting Wan Gang, Minister of Science and Technology's ultimate goal of achieving original nanotechnology breakthroughs); *China Outlines Roadmap in Developing Emerging Industries of Strategic Importance*, GOV.CN, Sept. 8, 2011, http://www.english.gov.cn/201009/08/content_1698684.htm (providing an official statement documented by Editor Pliny Han). *But see* Benjamin Lim & Don Durfee, *Exclusive: China May Cut Spending on Strategic Industries*, REUTERS, July 7, 2011, http://www.reuters.com/assets/print?aid=USTRE7660XO20110707 (arguing that China does not need to invest in its strategic industries if ORT is paying dividends).

[342] *See* Ping Zhou & Loet Leydesdorff, *China Ranks Second in Scientific Publications Since 2006*, INT'L SOC. FOR SCIENTOMETRICS & INFORMETRICS NEWSLETTER, No. 13, Mar. 2008, at 7–9 (noting that the Chinese path for development is unique among scientific nations). China's world share of publication has been growing exponentially both in absolute and relative terms. *Id.* China is gaining and other major countries/regions are accordingly losing percentage world shares. *Id.*

[343] *See* FRIEDMAN, *supra* note 98, at 365 (noting some critics who think that China cannot turn out innovators).

[344] *See* CENT. INTELLIGENCE AGENCY, NIC 2000-02, GLOBAL TRENDS 2015: A DIALOGUE ABOUT THE FUTURE WITH NONGOVERNMENT EXPERTS (2000) http://www.internet.cia/cia/publications/globaltrends2015/index.html (discussing high stakes national security issues and *Key Uncertainties: Technology Will Alter Outcomes*).

[345] *Id.*

[346] *See* Yao Changqing, *Development Strategy for High-Quality Science and Technology Journals in China*, 16 D-LIB MAG. (Sept./ Oct. 2010), http://www.dlib.org/dlib/september10/changqing/09changqing.print.html (describing China's

The American response should be to actively promote incentives for American researchers to collaborate with each other in an environment protected on U.S. soil and fostered by U.S. law.[347] This Competitor State and its development of networked libraries further an environment where the risk of detection of intellectual property infringement is slight. "[Since] the penalties applied by the courts and administrative authorities are generally low and the climate of widespread piracy favours the infringer, Chinese [intellectual property rights] law tends to be seen as an irrelevance—by both the abuser and abused."[348] The Chinese LIS architecture is positioned to exploit pre-competitive data in a manner, which further undermines patent law. It gives the individual with the best access an advantage rather than the individual with the better innovation. On a state-level, LIS provides an avenue for circumventing or minimizing U.S. strategic advantage in military technology advances.

Since patents are the primary vehicle for protecting technology in most technology based-businesses, there is a need to understand how China's LIS can undermine Western law.[349] Chinese companies are aggressively utilizing Competitive Intelligence to secure the high-ground in the marketplace.[350] China's LIS provides additional support for those market gains and provides legitimacy to any early-stage patent infringement. Even though the basic idea behind the patent system in China is the same as that in the U.S. and the U.K: (in exchange for publishing details of an invention, the state grants the inventor a monopoly over his invention for a period of 20 years), the Chinese government is clearly directing, insulating and protecting technology advancements through

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Ministry of Science and Technology strategy for improving the quality of Chinese science and technology journals and highlighting a priority on indigenous publications).

[347] *See* Brendan I. Koerner, *Made in America*, WIRED MAG., Mar. 2011, at 105–09 (discussing the trend of U.S. companies to return manufacturing to U.S. soil). Arguably, current public private sector initiatives such as the Federal Bureau of Investigation's *InfraGard—A Collaboration for National Infrastructure Protection* do not and cannot help American companies and innovators advance high-end technology research. *See generally* INFRAGARD, http://www.infragard.net (last visited Jan. 12, 2012). Such public sector corporate outreach programs are one-sided and only serve to collect national security leads. Therefore, full participation cannot be expected by the private industry, only participation that does not inconvenience corporate initiatives. Additionally, *InfraGard*'s Subject Matter Experts do not have the charter or technological background to advise on or facilitate high-end technology advances. Similarly, FBI's student advisories do not provide any indication as to the depth of the threat to emerging American researchers studying abroad or to homebound technology entrepreneurs.

[348] HUNTER RODWELL CONSULTING & ROUSE & CO. INT'L, INTELLECTUAL PROPERTY RIGHTS IN CHINA: A GUIDE FOR UK COMPANIES 1 (2004), http://www.ipo.gov.uk/ipr-guide-china.pdf.

[349] *See generally id.* at 7–35.

[350] *See* FUCHS, *supra* note 191, at 394 (highlighting China's aggressive use of Competitive Intelligence to gain the edge in the German market).

the LIS assembly of technological foreknowledge.[351] If history provides any indication, the competitive nature in which this open technology collection is driven can easily mask more sinister intentions.[352] Rest assured, China will play down its collection capabilities and R&D successes.[353]

XXIV. EPILOGUE

The author is a former U.S. Air Force intelligence officer and licensed attorney. The account is consistent with reputable analytical assessments and warfare studies. While the effectiveness of China's reliance on a national-level Library Information System (LIS) for science and technology and intelligence exploitation could not be determined, the nature of the information reviewed suggested that the Chinese libraries' pre-competitive collection practices were ubiquitous, targeted, and competitive in nature. They are focused toward nationally directed civilian-military (dual-use) research applications.[354] The predatory nature of the LIS system appears to undercut legal precepts of innovation and newness as China rapidly furthers its *Great Wall of Patents*.[355] While we cannot prevent juridical warfare,[356] our national response should be (1) to raise awareness of the potential library threat, (2) marshal our own library resources357[357] for collaborative edge,[358] and (3)

[351] See SUN TZU, supra note 115, at 168 (discussing the use of spies and quoting Master Sun as saying that "what enables an intelligent government and a wise military leadership to overcome others and achieve extraordinary accomplishments is foreknowledge").

[352] *Cf.* LADISLAS FARAGO, THE GAME OF THE FOXES 37–40 (1973) (discussing German Competitive Intelligence collection as a precursor to military advancements and armed conflict).

[353] *See* Miao Qihao, *Presentation: Competitive Intelligence in Peacefully Rising China* (Jan. 17, 2011) (discussing innovation and the evolution of a national Competitive Intelligence infrastructure in China at a Competitive Intelligence Conference in France; specifically playing down China's national competitive intelligence capabilities; separately highlighting Competitive Intelligence as a tool for warfare strategy).

[354] *Cf.* SUN TZU, *supra* note 115, at 67 (quoting Master Sun on *Planning a Siege* "Therefore those who win every battle are not really skillful—those who render others' armies helpless without fighting are the best of all").

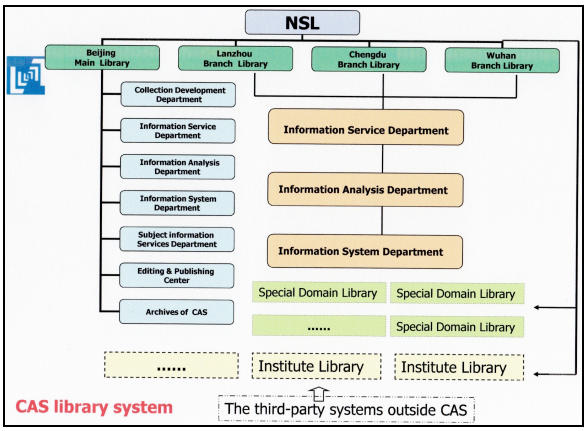
[355] *Cf.* SUN TZU, *supra* note 1, at 58 ("Rapidity is the essence of war. Take advantage of the enemy's unreadiness, make your way by unexpected routes, and attack unguarded spots.").

[356] Arguably pronouncements, regulations, and laws will not control use of libraries for military purposes. Neither does it appear that such pronouncements have even been fielded; *See also* Mark Rosenzweig, *Libraries in a Time of War & Emergency*, INT'L RESPONSIBILITIES TASK FORCE, AM. LIBR. ASS'N (Jan. 16, 2011) http://www.pitt.edu/~ttwiss/irtf/resolutions.war.html (discussing only the protections of libraries in wartime).

[357] Arguably, science and technology innovation must be advocated at the lowest level of education possible along with concepts of proprietary rights. Cf. Interview with Mary Jackson, Director, Marble Falls City Library, Marble Falls, Texas (Feb. 22, 2011) (discussing the integration of Texas Science Technology Engineering and Math Education programs with local

advocate transparency in China's library developments. We should not fail to define properly our competitor,[359] for the consequences could be stark and irreversible.[360,361]

APPENDICES



Jinxia Huang on the National Science Library Structure

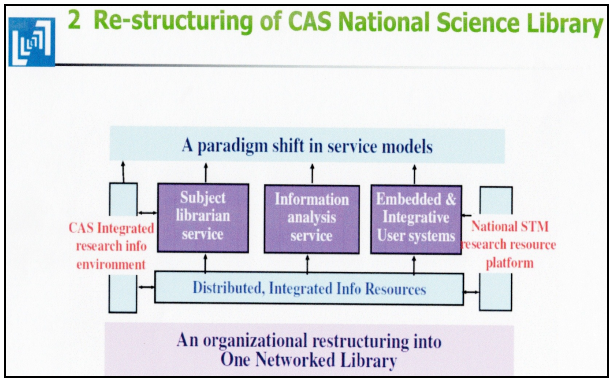
libraries, but noting the impact of a lack of funding on digital projects).

[358] *See* MULTIDISCIPLINARY UNIV. RESEARCH INITIATIVE, http://www.arl.army.mil/www/default.cfm?page=472 (last visited Jan. 12, 2012) (discussing the advantages of a multidisciplinary team effort). *Cf.* FRIEDMAN, *supra* note 98, at 398 ("Therefore we should be embarking immediately on an all-hands on deck, no holds barred, no budget too large, crash program for science and engineering education."). *See generally* John Millard, *Ohioview: The Leadership Role of Libraries in Science and Technology Partnerships*, ISSUES IN SCI. & TECH. LIBRARIANSHIP (Winter 2000), http://www.library.ucsb.edu/istl/00-winter/article4.html (indicating that some strides have been made in this area but without a full picture of competitor consortia).

[359] *See generally* John Pomfret, *Insight—China's Attitudes Turn Away from the West*, AUSTIN AM. STATEMENT, Mar. 21, 2010 (discussing China's increasingly anti-Western tone and adoption of policies reflective of heightened fear of foreign influence).

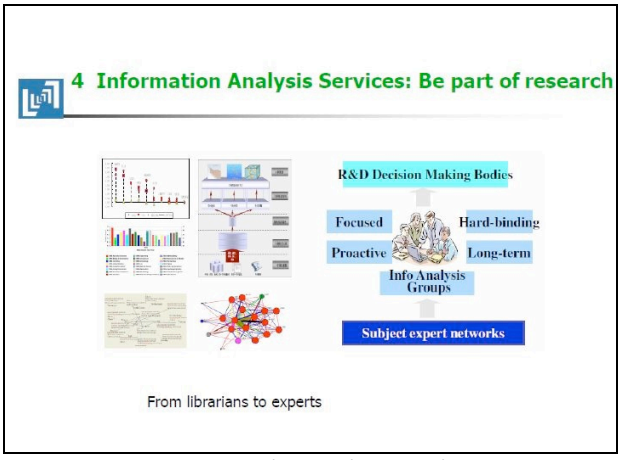
[360] Ambassador Henry A. Crumpton, Keynote Speech at Texas International Law Review Symposium: The Air and Missile Warfare Manual: A Critical Analysis (Feb. 10, 2011).

[361] *Cf.* FRIEDMAN, *supra* note 98, at 398 (quoting Nobel Prize Winning Economist Paul A. Samuelson, MIT, "We may still be the lead cyclist breaking wind for the riders behind us, but the others are closing in.").

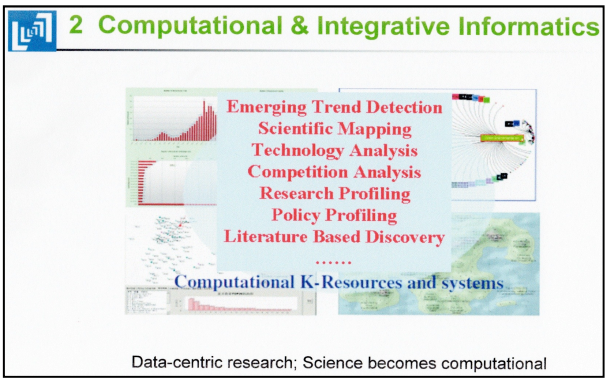


Jinxia Huang on Direction of the National Science Library

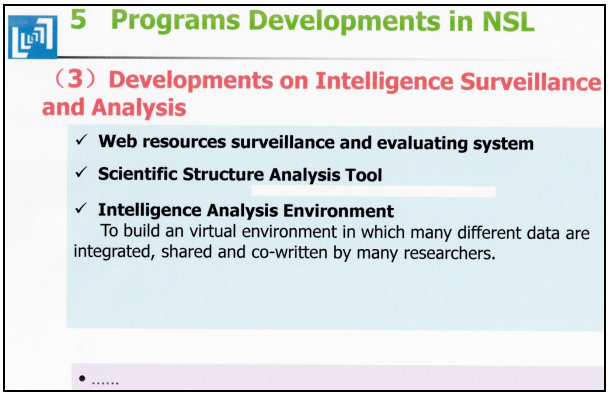
Jinxia Huang on the National Science Library's use of Subject Librarians



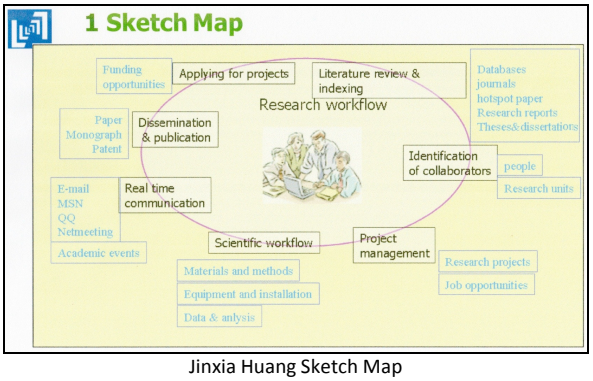
Jinxia Huang on Targeted National Science Library Services



Jinxia Huang on National Science Library's Intelligence Mission



Jinxia Huang on the National Science Library's Targeted Analytical Cycle



Jinxia Huang Sketch Map