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Innovation and Growth Policies in Japan-U.S. Economic Relations: Considering areas for new engagement*

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Abstract

There is wide consensus on the role of innovation as a primary driver of productivity and growth, generating new employment and contributing social returns benefiting the broader public. The Japanese and U.S. governments have placed increased emphasis on innovation as a core component of economic growth policies to boost job creation and economic competitiveness. They have also identified it as an important element in bilateral economic cooperation. Building on a long history of co-evolution of innovation and science and technology policies, this presents one area with good potential for deepening Japan-U.S. economic relations while meeting the challenges of an increasingly competitive global environment that both countries face.

This paper explores potential areas where Japanese and U.S. policymakers and stakeholders could increase cooperation around policies and initiatives related to fostering innovation and growth. Following review of recent literature and Japanese and U.S. innovation policy approaches, the paper suggests that existing bilateral frameworks offer near-term, sustainable channels to pursue increased engagement, including through new focus and by maximizing opportunities for synergies among various initiatives. Additionally, it identifies bottom-up initiatives that incorporate the vast networks of people and institutions linked across both countries as an already important component of cooperation around innovation, and one that should be further encouraged by the national governments to bring together diverse stakeholders and generate new energy within bilateral collaborative activities.

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INTRODUCTION

Innovation is a key characteristic and comparative advantage of both the Japanese and U.S. economies, and central to their future competitiveness and growth. In recent years the Japanese and U.S. governments have placed greater emphasis on innovation as a central focus of domestic policies to boost job creation and economic revitalization. Moreover, it is increasingly a topic at the fore of bilateral discussions. In their April 30, 2012 statement outlining a new joint vision for Japan-U.S. relations, Prime Minister Yoshihiko Noda and President Barack Obama put forward the goal of "enhancing economic growth and prosperity for our nations through bilateral economic harmonization and the promotion of regional economic integration," including promoting cooperation on "innovation, entrepreneurship…and science and technology," among other areas.[1]

This heightened focus on innovation and closely related policy areas is a positive development, one with good potential for deepening Japan-U.S. relations. Discussions on Japan-U.S. relations in Washington and Tokyo policy circles have in recent years tended to emphasize the security and political aspects of the relationship, while the importance of the bilateral economic relationship can get overshadowed. Accounting together for more than one-third of the world's GDP, the increasingly integrated U.S. and Japanese economies depend on each other for growth while also driving development across Asia's rapidly integrating economies. With intensifying regional competition and increasing trends of economic nationalism in the Asia-Pacific region, Japan and the United States have a leadership role to play in ensuring competitive and open markets vital to their continued growth. Meeting this challenge calls increasingly for closer consideration of ways to strengthen bilateral economic ties, including through fostering the innovation essential for future vitality.

Japan is renowned globally as a leader in innovation, particularly with regard to science and technology research and development (R&D) capabilities. Policymakers continue to grapple with how most effectively to fully unleash and successfully commercialize these assets to support future prosperity, following two decades of stagnant growth and predicted demographic shifts that will further slow it. Policies once successful in promoting commercialization of innovation and new growth sectors may no longer be effective or sustainable, due to disruptive new technologies, leaps by regional competitors, and domestic fiscal and political constraints. Challenges—including a risk-averse and burdensome environment for entrepreneurs, low levels of inbound foreign direct investment (FDI), and a rapidly aging society in which women, senior citizens, and highly-skilled foreign workers are not fully engaged in the workforce—are well recognized by Japanese policymakers and stakeholders. Nor are these problems unique to Japan; the United States, to different degrees and in different respects, faces similar kinds of challenges to its innovation ecosystem.

How Japan develops solutions to these issues will be closely watched in the United States. This is consistent with a long history of learning and co-evolution between the two countries on innovation and science and technology policies, a pattern that has had cumulative effects on both countries' economies. Policymakers, business leaders, and experts in both countries have pointed to complementary aspects in regards to these elements that could provide a basis for synergies.

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[1] The White House. "U.S.-Japan Joint Statement: A Shared Vision for the Future." Press Statement. April 30, 2012. Accessed on June 16, 2012 at http://japan.usembassy.gov/e/p/tp-20120507-01.html.

Overcoming constraints and barriers to these challenges require creative approaches, towards which end cooperative activities could present opportunities.

This paper explores potential areas where Japanese and U.S. policy makers and stakeholders could increase cooperation through policies and initiatives related to fostering innovation and spurring growth. It first reviews concepts and definitions of innovation in the context of public policy, including core elements of innovation-focused growth policies and the role of governments. Second, it examines macro-level challenges to Japan's economic growth linked with innovation framework policies. It does this, in part, through comparing the performance of Japan and the United States on key indicators and metrics of innovation policy in order to identify areas where measurable differences could point to complementarities. Third, it examines policy approaches that Japan and the United States have taken in recent years to advance innovation-oriented growth. Fourth, it considers potential areas where cooperation around innovation and related framework policies could be appropriate.

This paper will suggest that new focus and increased emphasis within existing bilateral frameworks, institutions, and networks offer near-term, sustainable channels and foundations on which to further build longer-term cooperation, in particular by maximizing opportunities for synergies among these various separate initiatives. These include bilateral negotiations and dialogues not just on innovation specifically but also trade, investment, and sector-specific issues; exchanges of best practices and information; and multilateral frameworks in which Japan and the United States often pursue shared goals and interests. Additionally, the paper identifies bottom-up initiatives incorporating the vast networks of people and institutions linked across both countries—ranging from entrepreneurs to universities and non-governmental organizations—as an already important component of cooperation and one in which new partnerships are emerging around innovation. These should be encouraged and further facilitated by the national governments to bring together diverse stakeholders and generate new energy within bilateral collaborative activities.

This paper aims to contribute to existing literature on Japan-U.S. economic relations by bringing together discussions on innovation, entrepreneurship, and science and technology policy with what is often a separate discourse on broader bilateral economic and trade policy. Exploring in a comprehensive way the linkages among these, within broader innovation and economic growth policy frameworks, stands to generate constructive new debate around this important topic.

INNOVATION: DEFINITIONS AND CONCEPTS IN PUBLIC POLICY

Innovation "translates knowledge into economic growth and social well-being."[2] There is wide international consensus on the role of innovation as a primary driver of productivity and growth, generating new employment while also contributing social returns benefitting the broader public. As a first step, it is useful to consider core concepts of innovation within public policy. While innovation is often closely associated in public consciousness with cutting-edge science and technology, and maverick inventors and entrepreneurs, it has far broader meaning and policy implications.

[2] Wessner, Charles W. "The Global Innovation Imperative: Opportunities for the Sultanate of Oman." Presentation. The Research Council. Muscat, Oman. March 8, 2012. Accessed on June 13, 2012 at http://home.trc.gov.om/Portals/0/international%20relations/Charles%20Wessner_Oman-Innov%202012_03_08_.pdf. PDF file.

Innovation is defined by the OECD as "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations." It encompasses not only science and technology R&D—which public policies to promote innovation often have focused narrowly around—but also intangible assets including organizational management, workforce training, marketing, design, and testing.[3] Innovation can be described also as a dynamic and interactive process, taking place across a broad range of interconnected areas and levels of society with involvement of diverse actors "who arrive at innovation in interaction."[4]

Two concepts closely linked with innovation in public policy are national innovation systems and competitiveness. The concept of national innovation systems, as described by the OECD, is based on an understanding that innovation and technological developments result from complex relationships among actors, as described above, that produce, distribute, and apply various kinds of knowledge: "The innovative performance of a country depends to a large extent on how these actors relate to each other as elements of a collective system of knowledge creation and use…what is most important is the web of interaction of the system."[5] These linkages can take the form of joint research, personnel exchanges, cross-patenting, and purchases of equipment, among others. Competitiveness is defined by the World Economic Forum in this context as "the set of institutions, policies, and factors that determine the level of productivity of a country."[6]

National innovation systems serve as policy and institutional mechanisms channeling innovation into competitiveness and growth. As described in a U.S. National Research Council report on the U.S. and Japanese innovation systems, innovation "involves an adaptive network of institutions that encompass a variety of informal and formal rules and procedures...that shape how individuals and corporate entities create knowledge and collaborate" to bring innovative goods and services to market. Moreover, "if competitiveness can be defined as the ability to gain market share by adding value better than others in the globalized economic environment, the ability of these actors to collaborate successfully within a given innovation ecosystem gains significance."[7] The national innovation system also matters given beliefs of path dependency and that countries develop along certain trajectories of knowledge accumulation, shaped by country-specific institutional factors, which influence future development patterns.[8]

Intangible assets are increasingly recognized as playing an important role in innovation-driven growth. The OECD classifies these "building blocks of future economic growth" as assets

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[3] OECD. "Ministerial Report on the OECD Innovation Strategy. Innovation to Strengthen Growth and Address Global and Social Challenges. Key Findings." May 2010. Accessed on June 20, 2012 at http://www.oecd.org/dataoecd/51/28/45326349.pdf. PDF file.

[4] Smits, Ruud, Stefan Kuhlmann, and Morris Teubal. "A System-Evolutionary Approach for Innovation Policy." In *The Theory and Practice of Innovation Policy: An International Research Handbook*. PRIME Series on Research and Innovation Policy in Europe. Edited by Ruud E. Smits, Stefan Kuhlmann, Philip Shapira. Northampton, MA: Edward Elgar, 2011. pp. 417, 429-430.

[5] OECD. *National Innovation Systems*. Paris: OECD, 1997. p. 9. Accessed on June 28, 2012, at http://www.oecd.org/dataoecd/35/56/2101733.pdf. PDF file.

[6] Sala-I-Martin, Xavier, with Benat Bilbao-Osorio, Jennifer Blanke, Margareta Drzeniek Hanouz, and Thierry Geiger. "The Global Competitiveness Index 2011-2012: Setting the Foundations for Strong Productivity." In World Economic Forum. *2011-2012 Global Competitiveness Index*. Geneva: World Economic Forum, 2011. p. 4.

[7] Nagaoka, Sadao, with Masayuki Kondo, Kenneth Flamm, and Charles Wessner. "Preface." In Committee on Comparative Innovation Policy: Best Practice for the 21st Century; Sadao Nagaoka, Masayuki Kondo, Kenneth Flamm, and Charles Wessner, Editors. *21st Century Innovation Systems for Japan and the United States: Lessons from a Decade of Change: Report from a Symposium*. National Research Council. Washington, DC: National Academies Press, 2009. p. xiii

[8] OECD. *National Innovation Systems*. p. 13.

without a physical or fiscal embodiment, grouped broadly into the categories of computerized information such as software and databases; innovative property such as R&D, copyrights, designs, and trademarks; and economic competencies including brand equity, firm-specific human capital, networks, tacit knowledge and organizational know-how, advertising and marketing, among others. Research shows that expanded investment in intangible assets has overtaken investment in traditional capital such as machinery, equipment, and buildings in the United States, Europe, and Japan, and generated much as 18 percent of growth in multi-factor productivity in the United States between the late 1990s and mid-2000s.[9]

In exploring potential areas for Japan-U.S. cooperation around innovation, it is helpful to consider two underlying questions. First, what comprises core elements of innovation-focused economic growth policies? Second, what roles for governments and public policy related to innovation are most effective? These have long been significant topics of debate as policymakers grapple with managing the increasing complexity and speed that characterizes innovation, while governing systems and policy approaches remain largely organized in practice around the increasingly outdated concept of a linear model of innovation.

On the first question, there is increasing recognition that fostering growth through innovation requires a holistic policy approach addressing the underlying framework components of research, physical and regulatory infrastructure, and education.[10] The scope of actors involved in innovation continues to widen, and a process once largely led by government, businesses, universities and research laboratories now includes philanthropic and other non-governmental organizations and consumers. A vast range of framework policies and economic conditions—including labor, tax, financial, intellectual property, government procurement, and standards-setting processes—are important components. Within these, administrative burdens, bankruptcy rules, and social attitudes towards risk taking are particularly important for entrepreneurs, who serve as "carriers of innovation."[11]

What are other building blocks of effective innovation-driven growth policies? Wessner identifies three core components of the "innovation imperative" that governments must address to bolster their global competitiveness. First is recognition that innovation is essential for maintaining a country's competitive position in the global economy. Second is that small businesses and universities play a key role in the innovation process; collaboration among them and with large businesses is needed to capitalize on education and research investments. Third is that new partnerships among government, industry, and universities are needed to foster collaboration and innovation, and that institutional change is necessary to change and compete successfully. Wessner points to countries meeting this imperative through high-level focus on developing positive frameworks to support growth; sustained support for R&D; universities oriented to addressing 21st century challenges; dynamic entrepreneurs; and partnerships among all of these stakeholders to

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[9] OECD. "New Sources of Growth: Intangible Assets." December 8, 2010. Accessed on June 28, 2012 at http://www.oecd.org/dataoecd/60/40/46349020.pdf. PDF file. Also see: Athena Alliance. *New Building Blocks for Jobs and Economic Growth: Intangible Assets as Sources of Increased Productivity and Enterprise Value. Report of a Conference by Athena Alliance.* September 2011. p. 111. Accessed on June 28, 2012 at http://www.oecd.org/dataoecd/8/14/48918196.pdf. PDF file.

[10] Atkinson, Robert D., Stephen J. Ezell, and Luke A. Stewart. *The Global Innovation Policy Index.* March 2012. Washington, DC: Information Technology and Innovation Foundation and the Kauffman Foundation, 2012. pp. 9-18. Accessed on June 25, 2012 at http://www2.itif.org/2012-global-innovation-policy-index.pdf. PDF file.

[11] Athena Alliance, *New Building Blocks for Jobs and Economic Growth,* pp. 123-124. Also see Collins, Stephen. *The Race to Commercialize Biotechnology. Molecules, Markets and the State in the United States and Japan.* London: RoutledgeCurzon, 2004. p. 7.

bring innovations to market.[12] This comprehensive approach to innovation policy and focus on framework elements has increasingly been reflected in policy approaches by governments, the private sector, and the academic community—including in Japan and the United States, as will be explored below.[13]

Innovation is dynamic and disruptive, a challenge for governments trying to craft innovation policies and a weakness within structured national innovation system approaches. Smits, et al, argue that policy aiming to facilitate innovation system transformation should focus on creating and supporting dynamic elements in the system, which requires specific attention to emergence processes, conditions for targeting new industries and market technologies. They identify four functional dimensions of innovation policy instruments, including reshaping innovation systems to prevent lock-in and ensure all relevant actors are involved; building cross-linking platforms and new spaces for learning and experimenting; stimulating demand articulation, strategy, and vision development; and providing and exploring infrastructure for distributed strategic intelligence (building on technology assessment, foresight, evaluation, and benchmarking). Related policy instruments that focus at the system level include non-product standards, foresight programs, integrated approaches to revive or stimulate development of new sectors, information campaigns of governments and branch organizations to raise awareness by public and enterprises for the opportunities specific technologies are offering.[14]

How can policy makers manage the complexity that comes with attempting to craft innovation policy in the 21st century? Leon Fuerth, who served as national security advisor to U.S. Vice President Al Gore, explores the concept of "anticipatory governance," which he defines as a "system of institutions, rules, and norms that provide a way to use foresight, networks, and feedback for the purpose of reducing risk and increasing capacity to respond to events at earlier rather than later stages of development." Pointing to the lack of effective mechanisms at the U.S. national-level equipped to handle the rising trends of accelerating change and increasing complexity, he suggests that without an integrated foresight system, networked approach to complex priorities, and formal feedback systems that able learning from experiences, the U.S. government will continue to struggle with unanticipated challenges to national security and lost economic opportunities.[15] As innovation presents many similar challenges to policy makers, an approach incorporating these elements offers one model governments and organizations could incorporate in developing innovation policies, whether internally or in collaborative activities.

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[12] Wessner, Charles W. "The Innovation Imperative: Global Strategies for Competitiveness." Presentation. "E Kamakani Noi'I – Wind that Seeks Knowledge." Symposium organized by the U.S. National Academy of Sciences and the University of Hawaii. Sheraton Waikiki, Waikiki, Hawaii. January 13, 2011. pp. 4-5. Accessed on June 13, 2012 at http://www.hawaii.edu/offices/op/innovation/wessner.pdf. PDF file.

[13] For example, the Global Federation of Competitiveness Councils, an international network of public and private-sector competitiveness organizations including in Japan and the United States, have set forward principles guiding national competitiveness in the global economy. These include the importance of private-sector involvement in developing public policy initiatives to address short and long-term competitiveness issues and create new industries; greater R&D investment to advance development and deployment of new technologies; 21st century workforce skills and openness to the highly-skilled human resources from around the world; focus on successes of regions and metropolitan areas—"which are fast becoming the true engines of creativity and innovation; strong intellectual property rights; a modern, well maintained physical and communications infrastructure; open, transparent and fair trade; improved and sustainable energy efficiency and natural resource productivity; and transparency, efficiency, and smart regulation to ensure a more stable environment for business and investment. Global Federation of Competitiveness Councils. *2010 Global Competitiveness Principles*. p. 3. Accessed on June 28, 2012 at http://www.thegfcc.org/. PDF file.

[14] Smits, et al, pp. 429-432.

[15] Fuerth, pp. 31-33, 36-38, 45-46.

From this overview, responses to the two questions presented above start to emerge. First, a complex, intertwined set of elements and actors play a part in innovation-focused growth policies. These increasingly cut across traditional sectors, institutional lines, and international boundaries; require broad engagement by all stakeholders—both within and outside government; and are dynamic and rapidly changing. Second is the important role of governments in shaping the environment and framework conditions, and in serving as a facilitator, coordinator, and partner rather than as a director.[16] Consideration of these factors is central in looking at potential areas for bilateral cooperation, which will be explored below.

INNOVATION IN JAPANESE AND U.S. ECONOMIC GROWTH POLICIES

Innovation and economic growth, especially with focus on the development and deployment of new technologies, has been at the center of Japan-U.S. interactions from their start. Japan and the United States share a long history of co-evolution of innovation and science and technology policies, going back to Japan's period of rapid modernization during the Meiji Era. This learning has gone both ways, and with significant effects in both countries.

In the 1970s, the Japanese government forged research consortiums with the private sector to address what was at the time seen as an existential threat by U.S. competitors.[17] The perceived success of these efforts, together with the perceived strengths of Japan's *kaizen* production methods and education system, influenced U.S. policymakers, business executives, and scholars during the 1980s as they developed new policy approaches to enhance U.S. innovation and competitiveness. These led to initiatives including the Bayh-Dole University and Small Business Patent Act ("Bayh-Dole Act"), aimed at encouraging the commercialization of patents resulting from federally-funded research and university-industry collaboration.[18] Since the 1990s, the Japanese government has in turn introduced policies modeled on these and other U.S. initiatives, including the Small Business Innovation Research (SBIR) program, which works to increase private-sector commercialization of innovations derived from federal government research and development funding, given their role in encouraging the successful growth of the Internet economy, biotechnology, and other new industry sectors. The success of U.S. high-tech industry clusters including Silicon Valley continues to significantly influence discussions in Japan of how to encourage new growth sectors and regional development.

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[16] The facilitator role for government and public policy is further articulated by Atkinson, et al, suggesting that governments most effectively support innovation through "strategic investments in and supporting key broad technologies and/or industries," as opposed to picking "national champions" or letting the market determine everything. Atkinson, et al, *The Global Innovation Policy Index,* p. 18.

[17] The Very Large Scale Integration Project (VLSI) in semiconductors is regarded by some as the most successful of Japan's government-sponsored R&D consortiums, though Kneller remarks that "probably the efforts of each participating company's researchers working independently from those of other companies—not close cooperative research among scientists and engineers from fiercely competing companies—that contributed most to success." Kneller, Robert. *Bridging Islands. Venture Companies and the Future of Japanese and American Industry.* Oxford: Oxford University Press, 2007. p. 269.

[18] Nagaoka, Sadao and Kenneth Flamm. "The Chrysanthemum Meets the Eagle: The Co-evolution of Innovative Policies in Japan and the United States." In Committee on Comparative Innovation Policy: Best Practice for the 21st Century; Sadao Nagaoka, Masayuki Kondo, Kenneth Flamm, and Charles Wessner, Editors. *21st Century Innovation Systems for Japan and the United States: Lessons from a Decade of Change: Report from a Symposium.* National Research Council. Washington, DC: National Academies Press, 2009. pp. 3-18.

Based on these historic patterns, future innovation policies in Japan and the United States will undoubtedly influence each other. As the Japanese and U.S. economies continue to deepen their integration and linkages through trade, FDI, and global supply chains, innovation policies in each country will increasingly affect the other.

Driving many of these policies have been perceptions as much as facts. Today, perceived success factors in the United States—in particular elements of the U.S. entrepreneurial culture—are closely examined in Japan for ideas and models. At the same time, recent media coverage has focused on the struggles of Japan's iconic companies once seen as innovation leaders, notwithstanding the important innovative and disruptive role in bringing new products and business models to the Japanese market played in recent years by executives such as Masayoshi Son of Softbank and Hiroshi Mikitani of Rakuten. A frequently-cited example is how Japanese electronics manufactures were ahead of the curve on products like smartphones, or had all the technologies and components needed for mp3 devices, yet were not able to find an international market or unable to successfully pull together platforms like Apple's iPod due to internal company decisions and divisions. This indicates the challenge is not necessarily one of innovation in technology capabilities, but of business and organizational models and intangible assets.[19] In some ways, recent media coverage of Japan has echoes of the decline of iconic U.S. manufacturers during the 1980s—a time during which now global market-leading U.S. companies having both innovative technologies and business models were emerging.[20]

Despite general perceptions in Japan, American attitudes on the state of the U.S. innovation environment are not always positive. *Atlantic Century II*, a 2011 innovation policy benchmarking study by the U.S.-based Information Technology and Innovation Foundation, ranked the United States second-to-last among forty-four major economies in improvements made to innovation capacity from 1999 through 2011.[21] Thought leaders on innovation and science and technology policy have for years raised the alarm about the United States losing its competitive advantage as other countries develop strong innovation policies. Challenges in the U.S. context include th need to improve the education system, particularly in science, technology, engineering and mathematics education; uneven and unpredictable public funding and incentives for R&D; limited support for

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[19] For example, see Crothers, Brooke. "Sony's Fall and Japan's Hang-ups." *CNET*, April 21, 2012. Accessed on April 23, 2012 at http://news.cnet.com/8301-13924_3-57414373-64/sonys-fall-and-japans-hang-ups/. Fackler, Martin. "Declining as a Manufacturer, Japan Weighs Reinvention." *New York Times*, April 15, 2012. Accessed on April 16, 2012 at http://www.nytimes.com/2012/04/16/world/asia/amid-manufacturing-decline-japan-weighs-a-reinvention.html?_r=1&pagewanted=all; Katz, Richard. "How Japan Blew its Lead in Electronics." *Wall Street Journal*, March 22, 2012. Accessed on March 23, 2012 at http://online.wsj.com/article/SB10001424052702304636404577297621752245682.html; and Tabuchi, Hiroko. "How the Tech Parade Passed Sony By." *New York Times*, April 14, 2012. Accessed on April 16, 2012 at http://www.nytimes.com/2012/04/15/technology/how-sony-fell-behind-in-the-tech-parade.html?pagewanted=all. This challenge is not unique to Japanese companies; see, for example, Troianovski, Anton, and Sven Grundberg. "Nokia's Bad Call on Smartphones." *Wall Street Journal*, July 18, 2012. Accessed on July 19, 2012 at http://online.wsj.com/article/SB10001424052702304388004577531002591315494.html.

[20] Schaede, Ulrike. Interview by Laura Araki. "An Interview with Ulrike Schaede: Japan's Evolving Business Strategies. *National Bureau of Asian Research Policy Q&A*. May 7, 2012. Accessed on June 19, 2012 at http://www.nbr.org/research/activity.aspx1id=246.

[21] Atkinson, Robert D. and Scott M. Andes. *Atlantic Century II: Benchmarking EU and U.S. Competitiveness*. Washington, DC: Information Technology and Innovation Foundation, 2011. Accessed on June 25, 2012 at: http://www.itif.org/files/2011-atlantic-century.pdf. PDF file. The first *Atlantic Century* study was cited by the Obama Administration in its *Strategy for American Innovation* policy; see: The White House, National Economic Council, Council of Economic Advisors, and Office of Science and Technology Policy. "A Strategy for American Innovation: Securing Our Economic Growth and Prosperity." February 2011. p. 8. Accessed on June 18, 2012 at http://www.whitehouse.gov/innovation/strategy. Also see Ezell, "The State of Innovation in the States."

commercialization of innovation; restrictive immigration policies; and political complacency that "we'll always be number one without having to do anything about it."[22] A 2005 U.S. National Research Council report titled *Rising Above the Gathering Storm*, which called attention to these and related challenges to U.S. competitiveness, led to passage by Congress in 2007 of the COMPETE Act, a bill containing many of its provisions—though these were not actually funded until 2009. This sense of U.S. competitiveness at risk is a core theme in the Obama administration's innovation policy statements and is shared by several members of Congress from both major political parties.[23]

Despite perceptions of drifting U.S. interest in Japan, it is noteworthy that U.S. opinion leaders and the broader public continue to hold positive views about Japan's economy and science and technology capabilities, as shown in the results of an annual survey conducted by the Ministry of Foreign Affairs. In the 2012 poll, 97 percent of respondents and 98 percent of opinion leaders surveyed said that Japan plays a significant role in world affairs related to science and technology. Among opinion leaders surveyed, 98 percent of opinion leaders said that Japan should take initiative in science and technology cooperation in global issues such as environment and climate change, an important potential area for Japan-U.S. cooperation. In response to the question "Which areas should Japan focus on in order to deepen economic ties between Japan and the United States?," the top response of opinion leaders was "promote technology cooperation, such as clean energy and a high-speed railway system" (88 percent) ahead of signing a bilateral free trade agreement or participating in the TPP (both at 86 percent).[24] These results suggest an openness and support in the United States for cooperation with Japan in these areas.

JAPAN'S INNOVATION IMPERATIVE: IMPLICATIONS FOR GROWTH

Following two decades of slow growth, Japanese policymakers and key stakeholders continue to struggle with the challenge of how most effectively to unleash Japan's full innovative resources to support future growth and prosperity. These range from successful commercialization and monetization of Japan's cutting-edge science, technology, and integrated systems capabilities, to fostering high-growth startup companies in an environment widely viewed as not conducive to entrepreneurship due to risk-aversion, cultural factors, and onerous administrative and regulatory barriers. As put by the OECD in a recent report, while Japan is a global leader in education and R&D, "this is not fully reflected in its innovation performance."[25]

Many issues identified as factors in Japan's slow economic growth during the "lost decades" are closely linked with the core framework conditions described above. Citing as one example recent studies by Fukao, significant gaps in total factor productivity (TFP) between the

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[22] Ezell, Stephen. "The State of Innovation in the States: Entrepreneurship and Innovation in Silicon Valley: Best Practices and Emerging Trends Conference." Presentation. Information Technology and Innovation Foundation. March 8, 2012. Accessed on June 19, 2012 at http://www2.itif.org/2012-state-innovation-states.pdf. PDF file.

[23] For example, in early 2012 U.S. Senator Jerry Moran (R-Kansas)—a co-sponsor of the proposed Startup Act to create new incentives for commercialization of university-based research, and also a new STEM-visa with permanent residence status for immigrants with advanced degrees in those categories—stated that "we've become a country that is often risk-averse." Yin, Clifton. "The Startup Act Has Promising Implications for Clean Energy Innovation." *The Innovation Files.* Information Technology and Innovation Foundation. Accessed on March 23, 2012 at: http://www.innovationfiles.org/the-startup-act-has-promising-implications-for-clean-energy-innovation/

[24] Ministry of Foreign Affairs, Government of Japan. "2012 U.S. Image of Japan Study." Accessed on June 13, 2012 at http://www.mofa.go.jp/announce/announce/201215/pdfs/0522_04_02.pdf. PDF file.

[25] OECD, "Policies for a Revitalization of Japan." April 2012. p. 4. Accessed on June 28, 2012 at http://www.oecd.org/dataoecd/32/2/50190618.pdf. PDF file.

manufacturing and services sector—the latter of which now accounts for 80 percent of employment in Japan and 70 percent of Japan's nominal GDP but substantially lags behind in terms of TFP—are one important factor. A second factor is that while large Japanese companies witnessed TFP gains during the past two decades, and conducted the bulk of Japanese private sector R&D during that time, small and medium enterprises (SMEs)—which make up the vast majority of Japanese businesses—lagged behind, particularly in regards to the internationalization and R&D that were hallmarks of the growth of U.S. SMEs during the same time period. A third factor is the trend of decreasing number of spillovers from large companies to small companies in the manufacturing sector, attributed in part to the dilution of trading relationships between large and small companies.[26]

Significant underinvestment in intangible assets in the services sector was identified in these studies as a major source of lagging productivity. Notably, TFP growth in ICT-using sectors such as distribution services (retail, wholesale and transportation)—which have larger shares in the economy than ICT-producing sectors—declined substantially after 1995, in contrast to the United States where TFP growth accelerated both in ICT-producing and using sectors. This matters as, because ICT investment "may contribute to innovation in production processes, the difference in ICT-capital service input between Japan and the other countries is likely one of the major causes of the stagnation of TFP in Japan."[27] Investment in other intangible assets such as brand equity, firm-specific human capital, and organizational structure has been significantly lower in Japan than in the United States or United Kingdom. Structural challenges in Japan's labor market—specifically lack of labor mobility and lack of on- and off-the-job training for non-regular workers, are closely linked factors.[28]

Moreover, many of these challenges and lack of investment in intangibles are interlinked. For example, Fukao explains that if Japan's comparatively low ICT investment results from reluctance to reorganize business structures and retrain workers, it thus may be linked to the increase in part-time workers that in turn result from Japan's labor market structures. There are also interrelations between slow growth, low economic metabolism, and the falling behind of Japan's services sector in internationalization and building economies of scale.[29]

Policies identified to address these challenges are, likewise, closely linked with innovation ecosystem and framework policies. These include promoting innovation through fostering and accelerating ICT investments; increasing economic metabolism; increasing FDI into Japan, and promoting investment in intangible assets. Specific actions identified to support these four goals include support for ICT investments, guarantees of labor mobility, increasing support for vocational and off-the-job training for workers, easing regulations, implementing tax cuts, policies to promote FDI and free trade agreements, and promoting organizational reforms within companies.[30] Additionally, other policies identified by economists as necessary steps for Japan to promote growth

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[26] Fukao, Kyoji. "*'Majiwareta Nijunen' to Nihon Keizai*". Presentation. Research Institute of Economy, Trade and Industry, BBL Seminar, Tokyo, Japan. April 6, 2012. Accessed June 14, 2012 at http://www.rieti.go.jp/jp/events/bbl/12040601.html.

[27] Fukao, Kyoji. "Service Sector Productivity in Japan: The Key to Future Economic Growth." RIETI Policy Discussion Paper Series 10-P-007. August 2010. pp. 4-6. Accessed on June 28, 2012 at http://www.rieti.go.jp/jp/publications/pdp/10p007.pdf. PDF file. Notably, the study also shows that differences in labor productivity between Japan and the United States during the period considered were mainly caused by Japan's low level of ICT-capital service input and low TFP.

[28] Fukao, "Service Sector Productivity," pp. 8-11, 14-16. Also see OECD. "Policies for a Revitalization of Japan," pp. 4, 16.

[29] Fukao, "Service Sector Productivity," p. 18.

[30] Fukao, "*'Majiwareta Nijunen' to Nihon Keizai.*"

and boost its economic metabolism include: increasing the number of women, senior citizens, and highly-skilled foreigners in the workforce; eliminating entry barriers for entrepreneurs to start a business ("international comparisons indicate that starting a business in Japan is relatively complicated, costly and time consuming"); implementing regulatory reforms to remove administrative burdens on SMEs; entering into free trade agreements and expanding inbound FDI; and promoting investment in intangible assets.[31]

MEASURING JAPANESE AND U.S. COMPLEMENTARITIES: COMPARING THE INDICATORS

In considering areas for Japan-U.S. cooperation related to innovation, one possible approach is to compare where the two countries stand on performance of core framework policy elements. Several of the above challenges are reflected in Japan's performance in international innovation-related indicators. While a comparison of indicators is an imperfect approach—for example, many intangibles important in the innovation process cannot easily be quantified—it offers one opportunity for benchmarking performance on a broad set of data, including on education, R&D financing, patents and their outputs, new industries, and GDP growth.[32] Comparison could indicate areas not at the focus of current bilateral activities but which offer productive opportunities for cooperation of some sort, whether through policy dialogues, sharing of best practices, or the engagement of non-governmental actors, particularly at a time of heightened interest in Japan in the U.S. innovation system.

Reviewing a number of reports[33] shows some consistent results and outcomes related to Japan and the United States in terms of performance of various innovation and competitiveness indicators. Specific indicators and metrics in which there were notable differences between Japan

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[31] OECD, "Policies for a Revitalization of Japan," pp. 4-5.

[32] As stated by the Global Federation of Competitiveness Councils, "benchmarking national competitiveness across a broad set of established and forward-looking metrics…(is) necessary to drive the successful development and implementation of appropriate competitiveness policies." Global Federation of Competitiveness Policies, ibid. At the same time, the specific model of innovation and economic performance indices and inputs used in the model can distort results; see "Charting Innovation. New Ideas About New Ideas." *Economist*, July 4, 2012. Accessed on July 26, 2012 at http://www.economist.com/blogs/graphicdetail/2012/07/charting-innovation.

[33] Several international indices comprehensively cover many of the elements noted above as core to innovation-focused economic growth. For purposes of this paper, the indices reviewed include the World Economic Forum (WEF) *Global Competitiveness Report 2011-2012* (Geneva: World Economic Forum, 2011. Accessed on June 28, 2012 at http://www3.weforum.org/docs/WEF_GCR_Report_2011-12.pdf); the OECD *Science, Technology and Industry Outlook 2010* (Paris: OECD, 2010. Accessed on June 28, 2012 at http://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-industry-outlook-2010_sti_outlook-2010-en) and *2009 Science, Technology and Industry Scorecard* (Paris: OECD, 2009. Accessed on June 28, 2012 at http://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-industry-scoreboard-2009_sti_scoreboard-2009-en); and the Information Technology and Innovation Foundation (ITIF) 2011 *Atlantic Century II* benchmarking study (Atkinson, Robert D. and Scott M. Andes. *Atlantic Century II: Benchmarking EU and U.S. Competitiveness.* Washington, DC: Information Technology and Innovation Foundation, 2011. Accessed on June 25, 2012 at: http://www.itif.org/files/2011-atlantic-century.pdf) and 2012 *Global Innovation Policy Index*. These indices were selected to be representative of the broader range of international indices evaluating innovation and competitiveness, and also because each in comparable but different ways looks more broadly at core elements of broader national innovation systems, rather than indicators linked specifically to innovation such as patents. Each study considers different sets of countries, utilize data that is not necessarily incorporated in every study nor weighted in the same way. Also reviewed were additional OECD reports, including "Policies for a Revitalization of Japan" released in April 2012. Additional studies are cited where appropriate.

and the United States—many of which frequently arise in discussions in Japan of challenges and shortcomings in its innovation environment—are briefly summarized below.[34]

Utilizing Innovation Assets: Japan consistently ranks highly across all studies and indices as a global leader in basic research, including on high-quality triadic patents[35] and other indicators linked to science, technology, and R&D resources and capabilities. Japan stands out compared to the United States and other OECD member countries for its high level of private sector R&D, which amounted to nearly 80 percent of all Japanese R&D (Chart 1); public R&D levels are around average among OECD member countries. (Chart 2) Additionally, comparisons of patents in new growth sectors reveal that Japan had relatively more environment-related patents, while the United States had comparatively more health-related patents. (Charts 3 and 4) These are noteworthy as Japanese companies have in recent years often expressed interest in cooperation with U.S. firms in new energy technologies in particular, [36] and both sectors are key focus areas of the innovation and economic growth agenda in both countries.

However, there is a general perception among many Japanese stakeholders that Japan is not realizing its full potential for commercializing its innovative resources. This is measured, in part, in several indicators, including Japan's comparatively low output of scientific articles on a per capita basis, levels of citations in research papers, and percentage of firms that have introduced new-to-market innovations—though a large percentage of firms introduced non-technological innovations. Indicators also point to comparatively low levels of international cooperation in innovation activities, as measured by the number of overseas financing for R&D, and patents filed with foreign co-inventors.[37] (Chart 5) Japan also ranked low in comparisons on highly-cited scientific publications. (Chart 6)

In some respects the issue may be less the level of commercialization of innovation as compared to the type of innovation. An analysis by Nagaoka and Walsh of the commercialization of triadic patents in Japan and the United States found similar levels of commercialization in both countries, but different structures of commercialization. For example, results indicated that university researchers' inventions in the United States played a much larger role for startup businesses as a source of patents than in Japan, particularly in high technology sectors, and that in Japan most startup-intensive areas were less R&D intensive compared to the United States.[38] They also found that a significant amount of inventions (more than 20 percent) were not the result of R&D projects and that these made up a significant proportion of inventions valued among the top

[34] As identified in the previous section, increasing the level and role of women in the workforce and openness to immigration are hugely important to the innovation ecosystem and economic growth, and are areas of significant difference between Japan and the United States in international indicators. While these topics are not explored in detail in this section given the focus of this paper on examining potential areas for increasing bilateral cooperation around innovation, they are essential components to any discussion of innovation and economic growth in Japan.

[35] Triadic patents refer to patents that have been recognized in the United States, Japan, and European Union. They are frequently used as an indicator of innovation because inventions with all three patents are on the whole considered to be higher-quality patents as compared to inventions patented in only one entity. OECD, *STI Outlook 2010,* Annex 3A.1. p. 234.

[36] Author's conversations with several Japanese industry associations.

[37] OCED, *STI Outlook 2010*, pp. 196-197.

[38] Nagaoka, Sadao, and John P. Walsh. "Commercialization and Other Uses of Patents in Japan and the U.S.: Major Findings from the RIETI-Georgia Tech Inventor Survey." RIETI Discussion Paper Series 09-E-011. February 2009. p. 22.

10 percent of patents, "suggesting that R&D expenditure significantly underestimates inventive activities."[39]

To some degree, these results could reflect the often-cited trend of in-house and autarkic innovation within large companies in Japan.[40] Another implication for Japan from the patent study results cited by the authors was that nurturing high-tech firms in collaboration with universities will be an important agenda item.[41] This highlights a significant difference in innovation-related indicators between Japan and the United States, the extent of university-industry (and university-industry-government) collaboration on R&D and commercialization. During the past two decades Japan has undertaken several reforms and new policies intended to support deployment of new innovation from university research and bridge this gap, including through enacting its own versions of U.S. policies seen as successful such as the Bayh-Dole Act and establishment of technology licensing offices (TLOs).

Statistics show an increase in recent years in Japan of the amount of joint research, contract research, university startups, and patent utilization resulting from university-industry collaboration, particularly after the 2004 reforms corporatizing national universities, though these numbers have leveled off in recent years.[42] There have also been observations that the university-industry cooperation system in Japan still favors large companies as compared to startups, resulting perhaps in the "preempting" of many discoveries made at the university level. Relevant factors include the weakness of university administrations and TLOs, a long pattern of professors working directly with companies rather than through universities, career preferences of students, among others.[43] Other framework policies may also affect the ability of successful commercialization of innovation resulting university industry collaboration, including legal structures and tax treatment around new companies resulting from these partnerships.[44] Observers note that the performance and long-term outcomes of programs such as Japan's university-industry cooperation policies may not yet be systematically reviewed as they have been in the United States, though several may still be too recent to effectively assess results.

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[39] Nagaoka, Sadao, and John P. Walsh. "The R&D Process in the U.S. and Japan: Major Findings from the RIETI-Georgia Tech Inventor Survey." RIETI Discussion Paper Series 09-E-010. p. 1.

[40] Kneller, pp. 263, 291.

[41] Nagaoka and Walsh. "The R&D Process in the U.S. and Japan: Major Findings from the RIETI-Georgia Tech Inventor Survey," p. 23.

[42] See Ministry of Economy, Trade and Industry (METI), Government of Japan. *"Oupun Inobehshon ni yoru Kenkyuu Keihatsuryoku no Kyouka oyobi Gijyutsu Jinzai no Ikusei-Ryuudouka-Katsuyou."* Reference materials. Accessed on July 26, 2012 at www.meti.go.jp/committee/materials2/downloadfiles/g100401b05j.pdf. p. 14. PDF file. The number of Japanese patent licenses actually exceeded the number of U.S. patent licenses in 2008, but the level of monetization of Japanese licenses was under 5 percent the total of that of the United States. Also see Ministry of Economy, Trade and Industry and Ministry of Education, Science, Technology and Culture, Government of Japan. *"Daigaku Chizai Honbu-TLO no Hyouka Shihyou no Kentou ni tsuite."* Reference materials. Accessed on July 26, 2012 at http://www.kantei.go.jp/jp/singi/titeki2/tyousakai/kyousouryoku/2012dai2/siryou2_2.pdf. PDF file. Also see Ministry of Economy, Trade and Industry, Government of Japan, and Japan Small Business Research Institute. *2011 White Paper on Small and Medium Enterprises in Japan.* Tokyo: METI/JSBRI, 2011. p. 189.

[43] Kneller, pp. 288-289.

[44] The American Chamber of Commerce in Japan, in a 2010 report on Japan's growth strategies, suggests that "the most significant reason for the lack of progress in (advancing successes from university-industry collaboration) has been the absence of convenient and tax efficient legal structures for pooling the financial, technology, and human resources of universities and companies together." It proposes that allowing Japanese limited liability corporations to use pass-through tax treatment and convert to *kabushiki kaisha* status on a tax-deferred basis would change this scenario. American Chamber of Commerce in Japan (ACCJ). *Charting a New Course for Growth: Recommendations for Japan's Leaders.* Tokyo: American Chamber of Commerce in Japan, 2010. p. 66.

Entrepreneurship: Attention is increasingly focused on the role entrepreneurs play in introducing new innovations—both technologies and business models and their interface—to market. Entrepreneurial U.S. companies are estimated to have generated nearly all net job creation in the United States between 1980 and 2005.[45] However, Japan's entrepreneurial environment is widely seen as challenging due to risk aversion, onerous administrative and regulatory barriers, and relatively negative popular attitudes towards entrepreneurship, among other factors.

These perceptions are substantiated, to some degree, by key indicators and analyses. On indicators closely linked with entrepreneurial activity, Japan rated comparatively low with the United States and internationally. Metrics related to regulatory and administrative opacity (including licenses, permits, and simplicity of procedures) (Chart 7) and the number of days required to open a business (Chart 8) were comparatively high for Japan. The entry and exit of firms were significantly lower as compared to the United States, indicating that relatively less new firms with innovative business models and technologies are entering the Japanese market.[46] One Japanese entrepreneur described the situation thus: "[I]t's quicker to go abroad to try out, market, succeed and then come back to Japan to convince various parties to approve your project. Japan closes up when you come up with pioneer-type products."[47]

One measure of popular attitudes is the Global Entrepreneurship Monitor survey of international attitudes on entrepreneurship. The most recent version of this survey found that while Japanese respondents felt there was strong media attention and interest in entrepreneurship, they had significantly less positive attitudes about starting a new business or thought it a good career choice as compared to U.S. and U.K. respondents.[48] These kinds of attitudes, coupled with risk aversion and family and social pressures, have tended to lead to university graduates seeking employment with large, established companies or in academia, steering away from small firms and venture companies needing skilled employees.[49] Another important factor constraining potential entrepreneurs, limited labor mobility, will be explored below.

At the same time, and similar to perceptions about the level of commercialization of innovation, the issue may be less one of a lack of entrepreneurs in Japan and more one the surrounding environment in which they must operate.[50] Recent studies indicate that policies

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[45] Kauffman Foundation. "Kauffman Foundation-Funded U.S. Census Bureau Data Highlight Importance of Business Startups to Job Creation in the U.S." Press statement. January 14, 2009. Accessed on August 3, 2012 at http://www.kauffman.org/newsroom/business-dynamic-statistics.aspx.

[46] Atkinson, et al, 2012 *Global Innovation Policy Index*, pp. 50-56. Also see Ministry of Economy, Trade and Industry and Japan Small Business Research Institute, *2011 White Paper on Small and Medium Enterprises in Japan,* p. 185; Noland, Marcus. "Industrial Policy, Innovation Policy, and Japanese Competitiveness." Working Paper 07-4 (May 2007). Peterson Institute of International Economics. Accessed on June 19, 2012 at http://www.petersoninstitute.org/publications/wp/wp07-4.pdf. PDF file. p. 15; and OECD, "Policies for a Revitalization of Japan," p. 5.

[47] Mr. Yoichi Takamoto, chief executive office of Tmsuk, quoted in Nagano, Amie and Takato Mori. "From Silver to Gold: The Implications of Japan's Ageing Population." Economist Intelligence Unit Report, 2010. p. 24. Accessed on June 28, 2012 at http://www.ge.com/jp/docs/1291403990446_Silver_to_Gold01_en.pdf. PDF file.

[48] Cited in Ministry of Economy, Trade and Industry and Japan Small Business Research Institute, *2011 White Paper on Small and Medium Enterprises in Japan,* p. 186.

[49] ACCJ, p. 28. Also see Kneller, pp. 284-289. The author has frequently heard this point raised at presentations and in conversations with Japanese and U.S. businesspeople and academic experts.

[50] For example, Yukihiro Kayama, President and Founder of FIT-One Holdings, Inc., a Japanese venture fund, has said that rather than a lack of entrepreneurs, the biggest problem is the infrastructure. Kayama, Yukihiro. Interview by Andrew Staples. "Entrepreneurship, IT Innovation and Business Development in Japan." Doshisha University Global

implemented during the past two decades may be starting to show positive effects related to entrepreneurship in Japan. A 2010 study by Fukao and Kwon cited by the American Chamber of Commerce in Japan found that from 1996 through 2006, foreign-held companies in Japan and newly established Japanese firms were the only two groups that consistently increased employment on a net basis. Younger Japanese companies had higher job survival rates than older ones—creating 1.2 million new net jobs as of 2006.[51]

Additional studies of recent trends found that new Japanese companies founded following significant financial, legal and regulatory reforms made during the late 1990s and early 2000s—particularly in new industry sectors requiring strong human capital development—grew to average industry size by two to three years in terms of percentile market rank, and on average to the seventieth percentile of industry rates after five years.[52] An analysis of reforms during this same period to bankruptcy rules and a lowering of the institutional costs of failure have led to a rise in bankruptcies, with the implication that these reforms may be encouraging more Japanese individuals with greater social capital and networks to engage in entrepreneurial activities.[53] These topics, and government policies towards entrepreneurship, will be considered in more detail below.

Trade and Investment: Trade and FDI are major drivers of innovation, bringing new technologies, processes and knowledge across borders and spurring innovation through increased competition enabling both countries to build upon their competitive advantages. Studies have indicated that "as much as one-half of U.S. productivity growth derives from foreign technology acquired through trade, licensing, and direct investments (including joint equity ventures and wholly-owned subsidiaries)."[54] Comprehensive trade agreements that tackle regulations, standards, and other market access barriers identified as particular challenges to the flow of knowledge and innovative goods and services have the dual potential effects of generating increased innovation domestically through increased competition and flexibility, while removing barriers in overseas markets to the export of innovative goods and services.

Japan ranks comparatively low, however, on indicators of openness to trade and investment. Japan has the lowest value of inbound FDI among the G-7 economies, despite long-standing efforts by successive Japanese governments to attract new investment. Less significant than tariff barriers are regulatory and other market access barriers to trade and FDI, including General Agreement on Trade in Services restrictiveness and investment-related restrictions including foreign equity.[55] As noted by the OECD, "fewer non-tariff measures would better enable Japanese firms to access the efficiency gains and opportunities for innovation by further developing global supply chains."[56] This is particularly important for innovative Japanese entrepreneurs and venture companies seeking new markets or outside funding, for many of which business with foreign companies has been critical to

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MBA Program, Kyoto, Japan. June 3, 2011. Internet video interview. Accessed on July 27, 2012 at http://gmba.doshisha.ac.jp/news-and-events?page=1.

[51] ACCJ, pp. 10-22.

[52] Eberhart, Robert N., and Michael Gucwa. "Entrepreneurship in Japan: A Data Report." Accessed on April 22, 2012 at http://www.accj.or.jp/doclib/advocacy/Eberhart_Gucwa_Report_Final.pdf. PDF file. pp. 3, 13-14.

[53] Eberhart, Robert N., Charles E. Eesley, and Kathleen M. Eisenhardt. "Failure is an Option: Failure Barriers and New Firm Performance." Draft Working Paper and Preliminary Results Palo Alto, CA: Stanford University, 2012. Accessed on June 25, 2012 at http://iis-db.stanford.edu/pubs/23422/Failure_is_an_Option_11.4.pdf. PDF file. pp. 2, 21.

[54] Atkinson, et al, *2012 Global Innovation Policy Index*, p. 20.

[55] Atkinson, et al, *2012 Global Innovation Policy Index*, pp. 21-37.

[56] OECD, "Policies for a Revitalization of Japan," p. 10.

success when large Japanese companies do not engage.[57] Additionally, Japan's efforts to attract inbound FDI have been hampered by challenges ranging from high corporate tax rates, to a focus on greenfield investment but apprehension to mergers and acquisitions of domestic firms by foreign investors, and lingering outside perceptions of Japan as a prohibitive market to do business in, among other factors.[58]

Education: Japan has long been a global leader on many indicators of education. However, OECD PISA assessments of education find continued challenges in Japan with creative thinking and problem solving skills, despite significant progress on this within Japanese education policy in recent years.[59] Additionally, Japanese universities have a low profile and representation on comparisons of universities rated as highly regarded in specific scientific fields. (Chart 9)

One education indicator with significant implications for Japan's innovation ecosystem is the comparatively lower—and decreasing—number of Japanese students going overseas for long-term study. An increasingly interconnected global economy demands a global outlook for startups from day one. A recent study by the Larta Institute on characteristics and success factors of high-growth entrepreneurs suggests that these entrepreneurs need a global, "network-centric" approach to accessing and deploying "just in time" resources to address challenges and opportunities as they aim to grow their business.[60] Many successful high-tech entrepreneurs in Kyoto—a center of innovation and entrepreneurship in Japan—and other Japanese SMEs have active international business linkages, including connections built up during university studies or work in the United States.[61] These trends indicate that Japanese students may be missing out on opportunities to build these global connections and networks, especially compared to the increasing number of their Chinese, Korean, and Indian counterparts going to the United States for study.

Finance: Despite Japan's high levels of funding for R&D, access to finance is repeatedly cited as a challenge for innovation and particularly for entrepreneurs in Japan. Indicators show a significantly lower level of venture capital, as well as ease of access to loans, in Japan compared with the United States.[62] This reflects in part different characteristics of Japanese and U.S. venture capital. As compared to U.S. venture capital firms, a large percentage of Japanese venture capital firms are subsidiaries of banks, insurance and securities companies. Many are viewed as lacking the in-house technology or business expertise needed to evaluate or help build up startup companies, or lacking incentive to do so—both of which are important roles played by venture capital in the U.S.

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[57] Kneller notes that for several Japanese venture companies in the non-biomedical sector he interviewed, validation of the technologies of the Japanese startups by foreign companies helped to get larger Japanese companies more inclined to innovate internally to take interest. Kneller, p. 113.

[58] Related to these issues, see ACCJ, pp. 44-45.

[59] OECD, "Policies for a Revitalization of Japan," p. 12.

[60] Shukla, Rohit K. "Supporting High Growth Entrepreneurs: The Network-Centric Approach to Entrepreneurial Assistance." Larta Institute, February 1, 2012. p. 18. Accessed on June 26, 2012 at http://www.larta.org/publications/Supporting_high-growth_entrepreneurs.pdf. PDF File.

[61] Ibata-Arens, Kathryn. *Innovation and Entrepreneurship in Japan: Politics, Organizations, and High Technology Firms.* Cambridge: Cambridge University Press, 2005. pp. 29, 40-41, 156-157. Kneller writes that overseas experience was important in the decision to become entrepreneurs of founders of nearly half of the Japanese non-biomedical companies interviewed in his research. Kneller, p. 113. Also see Noland, p. 14, and Rowen, Henry S., and Toyoda, A. Maria. "From *Keiretsu* to Startups: Japan's Push for High-Tech Entrepreneurship." Working Paper. Palo Alto, CA: Asia/Pacific Research Center, Stanford University, 2002. p. 22.

[62] OECD, "Policies for a Revitalization of Japan, p. 5, and OECD, *STI Outlook 2010*, pp. 196-197.

context.[63] Another issue raised is that the small size of venture capital in Japan reflects the relative lack of near-term and appealing exit strategies, such as through buyouts or initial public offerings.[64]

Additionally, angel investment, which is considered particularly important for early-stage startups that venture capital firms tend not to invest in, is miniscule in Japan despite government policies intended to encourage its growth.[65] More broadly, relatively weak linkages in Japan among venture capital firms with strong industry expertise, legal services, angel investors, and other important components of startup ecosystems are seen to perpetuate these trends.[66] Notably, in both Japan and the United States, SMEs cite personal funds as their most important source of funds for starting a business.[67]

There are also important implications for financing of global networks. Kneller notes that Japan-born engineers account for a relatively small percentage of foreign-born entrepreneurs in Silicon Valley, which could be a factor in considering why Japanese regional innovation centers have not grown in parallel with Silicon Valley-linked centers such as Hsinchu in Taiwan and Bangalore in India.[68] Moreover, research suggests that human networks among highly-educated immigrants across international borders—and particularly between specific regions, such as Silicon Valley and Hsinchu—can drive cross-border venture capital flows. This implies that entrepreneurial human networks between Japan and the United States could further facilitate flows of venture capital and entrepreneurship activities in Japan, filling gaps left by lack of investment by Japanese venture capital firms and challenges for foreign venture capital firms in investing in domestic Japanese startups.[69]

Labor and Workforce: The ability to deploy and reallocate talent and human capital to the most productive activities is important to an economy's ability to innovate. In this regard, limited labor mobility is considered a significant barrier to encouraging entrepreneurship and commercialization of innovations in Japan.[70] Japan rates markedly lower than the United States on indicators related to labor market flexibility—often the greatest gaps between the two countries on key innovation and competitiveness metrics.[71] In addition to the structural and cultural disincentives for mid-career job changes in this context, other effects include the expansion of non-regular employment—in which

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[63] Kneller, pp. 170-173.
[64] ACCJ, p. 27; large Japanese companies are not usually regarded as providing an "attractive" exit as they do not tend to consider acquisition of a startup as important for growth and survival the ways U.S. firms do. See also Kneller, p. 129 in regards to Japanese biomedical ventures.
[65] A 1997 law that reduced taxes on gains from angel investments and allowed losses to be deducted over a three year period was seen to have little effect, in part because of administrative burdens and paperwork involved for angel investors seeking the official government recognition required to qualify for the incentives. Kneller, p. 169.
[66] ACCJ, p. 27.
[67] Ministry of Economy, Trade and Industry and Japan Small Business Research Institute, *2011 White Paper on Small and Medium Enterprises in Japan,* pp. 207-209. Also Ortmans, Jonathan. Presentation. Washington Innovation Network, Kauffman Foundation, Washington, DC. May 30, 2012.
[68] Kneller, p. 336.
[69] Iriyama, Akie. "Will Cross-Border Human Networks Drive Entrepreneurship Activities in Japan? Implications of Venture Capital Globalization." Paper submitted to STAJE Conference 2011. Accessed on July 27, 2012 at http://spice.stanford.edu/catalog/will_crossborder_human_networks_drive_entrepreneurship_activities_in_japan_implications_of_venture_capital_globalization/. The paper summarizes two earlier papers co-authored by Iriyama and Madhavan; and by Iriyama, Li and Madhavan, exploring these topics.
[70] Beyond the private sector, lack of labor mobility in Japan has been cited as a key factor in the comparatively lower commercialization of innovations developed by university faculty, prior to TLO and other reforms during the past two decades. See Collins, p. 62. However, Kneller observes that the lack of job security in the United States—both in the private sector and in academia—gives more incentive for U.S. employees to become more mobile. Kneller, pp. 296-297.
[71] WEF, pp. 218-219, 362-363; Atkinson, et al, 2012 *Global Innovation Policy Index,* pp. 57-58.

lack of investment in training by employers is having detrimental effects on Japan's productivity, as noted above.

Intangible Assets: As noted above, indicators exploring investment in intangible assets find Japan at lower levels of investment compared to the United States in brand equity, firm-specific human capital, and organizational capital. Also, Japan's level of intangible investment, while as a percentage of GDP comparable to the United States, was significantly lower in terms of market capitalization as a percentage of GDP. These findings are consistent with those of other recent studies comparing intangible asset investments by Japan and the United States.[72] (Chart 10)

A recent study exploring reasons why firms in Japan under invest in intangible assets, despite the value for enhancing firm performance, found that investments in intangible assets are more sensitive to internal cash flows compared to investments in tangible assets, and that SMEs and young firms feature more sensitivity in this regard than large companies due to severe constraints faced in external financial markets. These results suggest that policies in Japan to remove market failure, such as improvements in financial intermediaries' ability to evaluate intangibles and the expansion of transaction markets for IPR, as well as investment tax credits and financial support for SMEs and startups focused on intangible investments, would be helpful.[73]

INNOVATION APPROACHES IN JAPANESE AND U.S. GROWTH POLICIES

From the above review of Japanese and U.S. performance on various indicators and metrics related to innovation policy, a list of core areas around which there are tangible differences between the two countries emerges. These include university-industry collaboration, barriers and attitudes towards entrepreneurship, trade and FDI, labor market flexibility, education, and financing including venture capital availability, among others. Might some of these represent areas with merit for bilateral cooperation aimed at fostering innovation and economic growth? In fact, this is already taking place in several respects, as will be explored below. Before exploring that, it is useful to consider ways in which these issues have been approached in the context of recent domestic economic growth policies in both countries.

Recent Japanese and U.S. policy approaches to innovation have become more integrated with economic growth and competitiveness strategies, reflecting perhaps increased understanding of the broader nature of the innovation ecosystem and the important role of framework policies.[74] In the United States, the Obama administration's *Strategy for American Innovation* focuses on investment in strengthening research, physical infrastructure, education, and an advanced information technology ecosystem at the foundation, built upon which are specific policies to promote market-based innovation and to spur breakthroughs for national strategic priorities—such as clean energy and space—for which innovation is core but market failures often present challenges.[75] The strategy

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[72] Athena Alliance, pp. 99-103. Also see Fukao, "Service Sector Productivity," pp. 9-10.

[73] Morikawa, Masayuki. "Financial Constraints in Intangible Investments: Evidence from Japanese Firms." Research Institute of Economy, Trade and Industry. RIETI Discussion Paper Series 12-E-045. July 2012. Accessed on July 27, 2012 at http://www.rieti.go.jp/jp/publications/dp/12e045.pdf. PDF file.

[74] Kahin, Brian and Christopher T. Hill. "United States: The Need for Continuity." *Issues in Science and Technology Online.* Spring 2010. Accessed on May 13, 2012 at http://www.issues.org/26.3/kahin.html.

[75] The White House, National Economic Council, Council of Economic Advisors, and Office of Science and Technology Policy. "A Strategy for American Innovation: Securing Our Economic Growth and Prosperity." February 2011. pp. 2-6. Accessed on June 18, 2012 at http://www.whitehouse.gov/innovation/strategy.

explicitly identifies the role of government as "innovation facilitator" that "seeks to harness the inherent ingenuity of the American people," with the private sector recognized as "the engine of innovation."[76] Kahin and Hill describe the strategy as the first by a U.S. administration to approach innovation comprehensively instead of focusing on developing technology or competitiveness.[77]

This broader strategy is augmented by other U.S. federal government programs supporting R&D and early-stage commercialization. Long-established programs with measurable results and track records, such as SBIR, have recently been joined by new initiatives aimed at encouraging entrepreneurship and supporting startup businesses. One is Startup America, a public-private partnership launched by the White House and private sector partners in 2011 that aims to provide resources and connections—including mentorship—to help startup enterprises grow; support regional startup ecosystems across the United States; and increase awareness and recognition of startups as drivers of the U.S. economy.[78] The Jumpstart Our Business Startups (JOBS) Act, enacted in April 2012, aims to increase financing opportunities for young firms, including through reducing regulatory burdens such as relaxing some Sarbanes-Oxley reporting requirements and authorizing "crowdfunding," allowing startups to solicit equity financing from a broad group of unaccredited investors.[79]

Other new U.S. federal government initiatives undertaken by individual agencies have focused on building new focus around innovation and enhancing human capital. For example, in September 2009 the U.S. Department of Commerce created the Office of Innovation and Entrepreneurship with the purpose of "spearheading the federal government's efforts to promote innovation-based, high-growth entrepreneurship in pursuit of job creation and economic growth." It launched initiatives including the i6 Challenge, a multimillion-dollar competition funding teams of organizations across the United States to develop new approaches and solutions to commercialize new technologies.[80] Another example is the National Science Foundation's Innovation Corps (I-Corps), a public-private partnership launched in 2010 to foster entrepreneurship leading to the commercialization of technology resulting from previous NSF-funded research, including through the creation of startup companies founded by program participants. Reflecting awareness that bringing technology out of university labs and into the market calls for different skills sets, the program incorporates not only financing but also mentoring resources to participating project teams. Businesses that emerge from this program are in many cases eligible to apply for SBIR grants, thus reinforcing and building a broader ecosystem among these initiatives."[81]

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[76] The White House, National Economic Council, Council of Economic Advisors, and Office of Science and Technology Policy. "A Strategy for American Innovation." pp. 2-6, 10.

[77] Kahin and Hill, ibid.

[78] A summary of initiatives under Startup America and accomplishments to date is available on the White House website. Accessed on June 18, 2012 at http://www.whitehouse.gov/economy/business/startup-america/progress-report Activities of the private-sector led Startup America Partnership are listed on the organization's website. Accessed on August 3, 2012 at http://www.s.co/.

[79] For a summary of key JOBS Act provisions and differing views on its financial provisions, see Markovich, Steven J. "U.S. Entrepreneurship and Venture Capital." Blog post. Council on Foreign Relations. June 5, 2012. Accessed on June 6, 2012 at http://www.cfr.org/united-states/us-entrepreneurship-venture-capital/p28433.

[80] Information on the i6 Challenge is available at http://www.eda.gov/challenges/i6/default.htm. Accessed on August 3, 2012.

[81] National Science Foundation. "I-Corps: Questions and Answers." Accessed on February 13, 2012 at http://www.nsf.gov/news/special_reports/i-corps/qanda.jsp. Mentorship is an important component of the program; while still relatively new, NSF has listed publicly several lessons learned including that mentors need to be intimately involved with the teams for successful outcomes, and that teams coming in with a "point of view" on where technology developed from the research can be deployed to make more progress, as compared to platform technologies looking for

Within the U.S. federal government, however, there is no institutionalized entity with the responsibility to coordinate and implement innovation policy. In the absence of this, vertically-organized government agencies have tended to pursue their own initiatives individually and directed towards the needs of traditional constituencies.[82] Fuerth observes the challenge that the interagency system within the U.S. government "is especially ill-suited for managing complex priorities that involve strong interactions among formerly isolated policy domains," citing as one example climate policy, which intersects with energy, trade, defense, and fiscal policy, among other areas.[83] Innovation similarly is in this category of complex and cross-cutting issues. How most effectively and efficiently to coordinate networks among government organizations—and with private sector, non-government, and international stakeholders—across the spectrum of policies that comprise the innovation ecosystem will remain an important challenge for the U.S. government moving forward.

Recent Japanese government strategies have, likewise, taken a comprehensive approach to innovation policy. The Innovation 25 strategy, developed by a council of private sector and academic experts convened by the Shinzo Abe administration in June 2007, put forward a roadmap for innovation policies looking ahead to the year 2025. This strategy reflected a clear recognition of the broad nature of the innovation ecosystem and specified the role of government as a facilitator rather than director. It identified human resources as "the base of creation of innovation" and the need for removing cultural and institutional barriers in order to transform science and technology achievements into practical innovations. It targeted challenges related to demographics, advance of an information-based society, globalization, and energy and environmental sustainability. The strategy included short and long-term goals to foster an environment conducive to innovation, enhance human capital and education, address regulatory bottlenecks and barriers, attract global talent, and address other challenges to Japan's innovation environment.[84] Many elements of the Innovation 25 strategy were incorporated into Japan's 3rd Science and Technology Basic Plan.

The New Growth Strategy introduced by the Naoto Kan administration in 2010 aimed to generate annual economic growth of 3 percent by the year 2020 through focusing on domestic demand-led growth beyond traditional focus on exports, and in turning environmental and demographic challenges into economic opportunities. Building upon several themes included in the Innovation 25 strategy, it emphasized promotion of "green innovation" (sustainable energy and environmental innovations), "life innovation" (health care-related innovations), information technology, and infrastructure systems as major export items. Other core elements included framework policies such as education and human resources, as well as encouraging regional economic integration through trade agreements.[85] Missing, however, was an emphasis on encouraging entrepreneurs and SMEs, such as through reducing administrative burdens and

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applications. Additionally, unexpected outcomes by teams are regarded not only by NSF as normal, but that "this understanding represents a significant value in and of itself.

[82] Kahin and Hill, ibid.

[83] Fuerth, pp. 37-38.

[84] Cabinet Office, Government of Japan. "Innovation 25 – Long-term Strategic Guidelines." June 1, 2007. p. 7. Accessed on June 18, 2012 at http://www.cao.go.jp/innovation/en/pdf/innovation_final.pdf.

[85] At the same time, Noland notes that a continued tendency to target specific sectors in this proposal reflects either views that market forces are not sufficient to direct resources to these activities, or "political capture" factors. Noland, p. 16.

providing mentorship opportunities, and fostering a business friendly environment across all economic sectors, not just those industries targeted in the strategy.[86]

In November 2010 the Kan Cabinet announced additional policy decisions intended to bolster the New Growth Strategy including by advancing agriculture sector reforms and boosting Japan's participation in economic partnership agreements, including the Trans-Pacific Partnership (TPP) negotiations. Before significant progress could be made, however, the response to the March 11, 2011 earthquake, tsunami and disaster at the Fukushima Daiichi nuclear facility took priority. While some goals outlined in the strategy have seen action, a May 2012 review of related projects indicated satisfactory progress on only 36 out of 409 target programs generated significant criticism.[87] Subsequent revisions to the New Growth Strategy, including the "Strategy for the Rebirth of Japan," released by the Cabinet Office in December 2011 and revitalization strategy rolled out in July 2012, build upon the themes of the New Growth Strategy. Both of these updated strategies crystallize issues often identified by stakeholders as the greatest challenges in Japan's innovation and economic growth policies. The December 2011 strategy asserts that "it is necessary to recognize that there is great risk in doing nothing than there is in embarking on something new. Japan must get ready to take actions;"[88] the latter that people "need to change their way of thinking by themselves" to lay the foundation for the future.[89]

Similar to the United States, Japan lacks a central coordinating entity for innovation policy. In practice individual ministries carry out their own policies, sometimes in competition with each other,[90] though in recent years ministries have increased coordination around key policies, such as by METI and the Ministry of Education, Culture, Science and Technology (MEXT) on university-industry collaboration. While Japan does have bodies such as the Council on Science and Technology, which is designated under Japan's Science and Technology Basic Plans to lead coordination on science and technology-related policies, the role and authorities of these organizations have heretofore been limited and are still evolving, both within the government and in relation to the ministries whose policy initiatives they are tasked with coordinating.[91]

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[86] Jones, Randall S., and Byungseo Yoo. "Japan's New Growth Strategy to Create Demand and Jobs." OECD Economics Department Working Papers, No. 890. OECD Publishing, 2011. pp. 29-30. Accessed on June 26, 2012 at http://dx.doi.org/10.1787/5kg58z5z007b-en.

[87] "Most of Kan's Growth Measures Fail to Produce." *Yomiuri Shinbun*, May 12, 2012. Accessed on May 14, 2012 at http://www.yomiuri.co.jp/dy/national/T120511005577.htm.

[88] Cabinet Office. "Strategy for the Rebirth of Japan." December 24, 2011. p. 8. Accessed on June 28, 2012 at http://www.npu.go.jp/policy/pdf/20120127/20120127_en1.pdf.

[89] National Strategy Council, National Policy Unit, Government of Japan. "The Frontier Subcommittee Report (Overview): Toward a "Country of Co-Creation" which Generates New Value by Manifesting and Creatively Linking Various Strengths." July 6, 2012. Accessed on July 27, 2012 at http://www.npu.go.jp/policy/policy04/pdf/20120706/en_hokoku_gaiyo1.pdf. pp. 1, 2, 5.

[90] Collins relates examples from the development of the biotechnology sector in Japan during the 1980s, including an instance where two national government entities built separate biotechnology research centers within ten kilometers of each other. Collins, pp. 74, 128-130.

[91] The Council on Science and Technology (CST) was created within the Cabinet to coordinate science and technology policy among all Japanese government agencies. Collins notes that from its early years, its lack of budgetary authority, separation from other science and technology bodies within the Japanese government, focus on basic research as compared to applied research, and the vertical organization of government agencies have all presented challenges to CST in achieving its mission. Collins, pp. 70-73. Also, the 4th Science and Technology Basic Plan called for the creation of a Science, Technology and Innovation Strategy HQ building upon the CST in order to strengthen its intended role as a "control tower" for science, technology and innovation policies in the Japanese government. Leading business organizations such as Keizai Doyukai have called for implementation of this, which had yet taken place at time of writing. See Keizai Doyukai (Japan Association of Corporate Executives). "Strengthen a True "Control Tower"

These approaches to innovation in economic growth policies demonstrate the degree to which Japan and the United States are grappling with similar challenges, and exploring similar solutions in their domestic contexts. Common principles include a focus on the broader innovation framework beyond traditional science and technology-focused policies, a facilitator role for government, and greater efforts for a whole-of-government approach to innovation. While specific policies and related difficulties in implementation differ based on the context in each country, related outcomes and experiences may offer mutual learning opportunities and reveal potential areas for cooperation and synergy.

U.S.-JAPAN COOPERATION AROUND INNOVATION

The above sections identified core components of the innovation ecosystem as challenges Japan must address in order to boost productivity and economic growth, including trade and FDI, education and training, regulatory infrastructure, labor and human resources, and finance, among others. In recent years several bilateral initiatives have been launched around a number of these issues, which are examined below.

National Government-Level Collaboration

Cooperation at the national government-level between Japan and the United States on science and technology R&D has been ongoing for decades.[92] A more explicit focus on innovation and economic growth areas has accelerated under the Obama administration and Japan's Democratic Party of Japan-led governments. In November 2010, then-Prime Minister Kan and President Obama announced several new bilateral economic and energy-related initiatives.[93] These initiatives included the Energy-Smart Communities Initiative, U.S.-Japan Clean Energy Policy Dialogue, U.S.-Japan Economic Harmonization Initiative, U.S.-Japan Policy Dialogue on Innovation, Entrepreneurship and Job Creation, U.S.-Japan Policy Cooperation Dialogue on the Internet Economy, and U.S.-Japan Nuclear Security Working Group. These expanded upon or reframed existing policy dialogues, with increased emphasis on cooperation around emerging issues and industry sectors in which innovation is the central or an important component. The April 30, 2012 Noda-Obama joint statement built upon this by outlining new components of these and other dialogues in which innovation is an integral component.[94] Following is a brief summary of some of these initiatives that focus on innovation-related issues.

Entrepreneurship: In May 2010 the U.S. and Japanese governments held the initial U.S.-Japan Policy Dialogue on Innovation, Entrepreneurship and Job Creation to identify ways to improve the environment for new businesses in both countries through bilateral cooperation. This dialogue has focused specifically on the role of entrepreneurship and startup businesses within the innovation

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Function to Drive Further Innovation in the Field of Science and Technology" (Summary). Policy paper. February 22, 2012. Accessed on August 7, 2012 at: http://www.doyukai.or.jp/en/policyproposals/2011/120222.html. PDF file.

[92] To offer just one example, NASA and JAXA had as of November 2011 45 memorandums of understanding.

[93] The White House. "Fact Sheet on New Initiatives." Press Release. November 12, 2010. Accessed on January 31, 2012 at http://www.whitehouse.gov/the-press-office/2010/11/12/fact-sheet-new-initiatives.

[94] New initiatives included a Bilateral Commission on Civil Nuclear Cooperation and expanded activities on cyber security, space, and critical materials R&D. The White House. "Fact Sheet: United States-Japan Cooperative Initiatives." Press Release. April 30, 2012. Accessed on May 1, 2012 at http://www.whitehouse.gov/the-press-office/2012/04/30/fact-sheet-united-states-japan-cooperative-initaitives.

ecosystem. Meetings in February 2011 at Stanford University in California and January 2012 in Tokyo were held with concurrent symposiums including private sector, academic, and research community experts. Topics taken up in this dialogue have included the role of high-growth firms in economic growth and of venture capital in entrepreneurial ecosystems, trends of new enterprises, and opportunities for cooperation on smart grid development.[95] Outcomes have included statements by the two governments identifying entrepreneurship education, encouragement of cross-border networking, and development of supportive policies as areas on which the two governments and private sector organizations can work together. In January 2012, the two governments established a joint council of Japanese and U.S. government officials and outside experts to explore and present recommendations on cooperative activities the two countries could take in these areas.[96]

Trade and Investment: Japan and the United States have a long history of bilateral economic policy dialogues aimed at addressing regulatory and other business environment issues, which can also serve as a channel for discussing issues integral to innovation ecosystems and framework policies. The U.S.-Japan Economic Harmonization Initiative (EHI) cited above, launched in November 2011, built upon the U.S.-Japan Regulatory Reform Initiative that had served as a primary channel during the previous decade for bilateral government-level discussions on regulatory and non-tariff barriers affecting two-way trade and investment. The EHI includes commitments to promote "harmonization of U.S.-Japan cooperation in the economic field" and "collaboration on common regional and global challenges."[97] One early outcome of the EHI that demonstrates its potential for fostering U.S.-Japan cooperation around innovation-related issues was the issuing in January 2012 of joint trade principles for information and communications technology rules and regulations.[98] These build upon similar provisions in the U.S.-Korea Free Trade Agreement and parallel those likely to be raised in the Trans-Pacific Partnership (TPP) negotiations.

Energy: Energy is an important area for Japanese and U.S. policy initiatives related to innovation. Longstanding cooperation related to energy, with particular focus on nuclear energy,[99] has broadened in recent years to an increased focus on renewable energy and energy efficiency. This reflects in part both countries' innovative and technological leadership in these fields, together with converging interests on green energy and climate change-related policies and issues in global arenas.

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[95] Stanford Project on Japanese Entrepreneurship, Stanford University. "Promoting Innovation and Entrepreneurship: Opportunities for U.S.-Japan Cooperation." Symposium Summary. February 23, 2011, Jen-Hsun Huang Engineering Center, Stanford University, Palo Alto, California. Accessed on June 28, 2012 at http://iis-db.stanford.edu/evnts/6546/20110223_IEJC_Symposium_Feb_23_2011_Summary.pdf. Also see Embassy of the United States, Tokyo, Japan. "U.S.-Japan Dialogue to Promote Innovation, Entrepreneurship and Job Creation." Press Release, January 30, 2012. Accessed on January 31, 2012 at http://japan.usembassy.gov/e/p/tp-20120130-01.html.

[96] This report is to be submitted to the two governments within 2012.

[97] Office of the United States Trade Representative. "Record of Discussion: U.S.-Japan Economic Harmonization Initiative, January 27, 2012." Accessed on June 19, 2012 at: http://www.ustr.gov/webfm_send/3301

[98] Office of the United States Trade Representative. "United States-Japan Trade Principles for Information and Communications Technology Services." Issued January 27, 2012. Accessed on June 19, 2012 at http://www.ustr.gov/webfm_send/3292. Also see Gresser, Ed. "Lines of Light: Data Flows as a Trade Policy Concept." Paper. Progressive Economy. Issued May 8, 2012. Accessed on July 24, 2012 at: http://www.globalworksfoundation.org/Documents/data.paper.final.pdf. PDF file.

[99] While Japan-U.S. cooperative activities related to nuclear energy, safety, and security are not discussed in this paper, these areas have been identified by Japanese and U.S. government officials, and members of the Japanese business community interviewed over the course of this research as particularly important areas for bilateral cooperation moving forward.

In November 2009, then-Japanese Prime Minister Yukio Hatoyama and U.S. President Obama agreed to initiate new activities to strengthen cooperation on clean energy technologies, with the goal of making needed scientific advancements through joint efforts that would expedite technology breakthroughs and reduce costs. The action plan developed by METI and the U.S. Department of Energy (USDOE) covered an extensive range of clean energy activities, including cooperation on basic research on clean energy technologies and processes; efforts to address risks, costs, and technology and investment considerations related to carbon capture and storage; developing energy efficient vehicles and building technologies; smart grid technologies and policies, including standards development and sharing best practices; collaboration on solar, wind, and biomass technologies; and research related to nuclear energy. It also called for close cooperation in multilateral frameworks including APEC and the Major Economies forum on Energy and Climate, among others.[100]

Outcomes of this agreement included the U.S.-Japan Clean Energy Policy Dialogue and Energy-Smart Communities Initiative noted above, the latter of which was established to support the development of energy-efficient buildings, transportation, and electricity supply in the Asia-Pacific region. The Clean Energy Dialogue was launched in February 2011 to convene officials and experts from both countries to exchange information and discuss policies on the deployment of clean energy technologies and develop cooperative projects.[101] New initiatives announced in April 2012 included a Tohoku Green Communities Alliance to encourage cooperation in developing green energy solutions in revitalizing communities in the Tohoku region. As Japan moves forward with efforts to encourage the deployment of renewable energy through its feed-in tariff (FIT) that entered into effect on July 1, 2012, and begins to explore broader regulatory reforms to its energy sector, this dialogue and related activities will be important for coordination and exploring cooperative opportunities with the United States.

This brief summary of bilateral initiatives do not include additional ongoing discussions on space, environment, health, education, and other important areas closely related to innovation framework policies. This comprehensive range of activities presents opportunities that, perhaps, have not been fully explored by the two governments for cross-fertilization and new synergies, particularly as innovation and related issues cross the boundaries of traditional sectors. This is particularly the case for government-level dialogues, which often are driven or linked to particular ministries and agencies and not necessarily coordinated among them.

Private Sector-Level Collaboration

Japan-U.S. private sector collaboration is a leading driver of innovation and growth in both countries. One prominent recent example of bilateral cooperation in bringing innovative

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[100] This agreement followed memorandums of understanding signed by METI and the National Institute of Advanced Industrial Science and Technology (AIST) with five USDOE national laboratories in May 2009. Ministry of Economy, Trade and Industry and U.S. Department of Energy. "Japan-U.S. Clean Energy Technologies Action Plan." Statement. November 2009. Accessed on March 27, 2012 at http://www.meti.go.jp/english/policy/energy_environment/global_warming/e20091113a02.html.

[101] Among issues taken up in the dialogue include exchanging information on electric vehicle and plug-in hybrid demonstration projects, a workshop on research related to rare earth elements and alternatives, shale gas development in the United States, and policy financing. METI. "Summary of the First Japan-U.S. Clean Energy Policy Dialogue." Press Release. February 14, 2011. Accessed on March 27, 2012 at http://www.meti.go.jp/english/press/2011/0214_02.html. Another initiative prioritized within this dialogue, the Hawaii-Okinawa Partnership on Clean and Efficient Energy Development and Deployment, will be discussed below in more detail as it provides a potential model for new forms of cooperation by Japanese and U.S. local-level governments.

technologies to market is Boeing's 787 commercial jet, of which 35 percent—including core technologies such as the wing box and highly advanced composite materials—was made by Japanese manufacturers and suppliers. While Japanese manufacturers have for decades been major suppliers for Boeing commercial jets, their role in producing some of the most innovative technology and components in the 787 stands out. The aerospace sector in Japan may be unique in its long experience of private sector-partnership with U.S. firms due to historic factors, but major reasons that have been articulated by the Japanese aerospace industry for cooperation with U.S. companies could easily apply to other industry sectors. These include risk sharing, enhancing capabilities, participation in development and market entry, and mutual profit taking.[102]

There are many longstanding and new partnerships between the Japanese and U.S. private sectors to bring innovations and technologies developed in Japan to market. Some examples include:

- Battelle Japan, a subsidiary of Battelle Memorial Laboratories which manages seven U.S. national laboratories, has for more than forty years partnered with Mitsubishi to invest in and bring innovations developed in Japan to market. One example of a successful outcome from Battelle's partnerships in Japan was a joint venture with NTT, Mitsubishi and Mitsubishi International Corporation on opto-electronics through a company called Photonic Integration Research, Inc. (PIRI). PIRI was formed to produce technology developed by Battelle and NTT utilizing patterned glass films on a silicon wafer that made possible the integration of complex optical circuits and components in large-scale fiber optic networks on a single circuit chip. When PIRI was sold by the venture partners in 2000, it was the largest single commercial transaction in Battelle's history.[103]

- General Electric launched in 2004 a Japan Technology Initiative to form partnerships with Japanese companies to commercialize and deploy globally made-in-Japan innovations and technologies. This has led to a broad range of technology and business partnerships, ranging from cooperation with Honda on business jet engines and several large Japanese manufacturers on next generation steam turbines and gas power generators, to an agreement with the National Institute for Materials Science to explore technology collaboration opportunities such as researcher exchanges and joint seminars focused on materials science and energy and environmental technologies.[104] In one of the most recent partnerships launched through this initiative, GE will conduct joint research with Clino, a Tohoku University-based venture firm, to develop diagnostic medicine with the goal of preventative intervention of Alzheimer's disease.[105] GE also created a joint venture with Nippon Carbon and Safran this year to manufacture and sell silicon carbide continuous fiber, an important material for next generation high performance aircraft engine components.

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[102] Society of Japanese Aerospace Companies. *Aerospace Industry in Japan 2011*. Tokyo: Society of Japanese Aerospace Companies, 2011. p. 13.
[103] Battelle Japan website. Accessed on January 31, 2012 at http://www.battelle-japan.com/commercialization/examples.aspx.
[104] General Electric. "GE and Japan's National Institute for Materials Science Sign MOU to Strengthen Technological Ties." Press Release. Accessed on January 17, 2012 at http://www.genewscenter.com/Press-Releases/GE-and-Japan-s-National-Institute-for-Materials-Science-NIMS-Sign-MOU-to-Strengthen-Technological-Ties-2317.aspx.
[105] "GE Healthcare Strengthens R&D Efforts in Alzheimer's Disease." *Business Wire*, April 13, 2012. Accessed on August 4, 2012 at http://www.businesswire.com/news/home/20120412006738/en/GE-Healthcare-Strengthens-Efforts-Alzheimer%E2%80%99s-Disease.

- Intellectual Ventures partners with a broad network of Japanese inventors to commercialize and deploy their technologies globally, and announced in May 2012 a partnership with the Kobe International Medical Alliance Foundation to develop and commercialize next-generation medical equipment technologies.[106]

- Building upon its existing partnerships in Japan, Boeing announced in June 2012 plans to conduct joint research on aircraft production with Mitsubishi Heavy Industries, Kawasaki Heavy Industries, and Fuji Heavy Industries—its main Japanese partners in the 787—and the University of Tokyo on developing efficient cutting and drilling technologies for carbon-fiber composites, titanium, and aluminum. Goals of the project include developing practical suggestions for commercializing technologies, as well as developing manufacturing techniques requiring less electricity.[107]

Local and Non-Government-Level Collaboration

There is great potential for increasing cooperation between Japanese and U.S. stakeholders at the local government, university, and non-governmental organization level on activities related to innovation and fostering innovation-related growth. As with national-level and private sector activities, there is a long history of engagement and exchange between Japanese and U.S. stakeholders on cultural, economic, and science and technology activities that provide strong foundations and networks for this.

U.S. states often lead the way in policy experimentation that, if successful, can present models both for other states and for the federal government. Japanese local governments may not have the same levels of authority or resources to launch initiatives, though there are multiple local-level activities in Japan with the potential to play a similar role as models for other communities.

Japan's efforts to promote regional economic growth have, in recent years, been heavily influenced by the regional clusters concept, with mixed results. Japanese policymakers at the national and local government levels often look to U.S. regional high-tech clusters as models to aspire to. One common finding of studies on the most successful clusters is that bottom-up, organic development and adoption of innovation is an essential element.[108] These same characteristics will also be important for building and sustaining Japan-U.S. cooperation around innovation that involves local-level and non-governmental stakeholders. The national governments can play a helpful role including through sharing information about success stories and best practices in each country, facilitating contacts between stakeholders in both countries, and—particularly in Japan—encouraging entrepreneurial mindsets[109] and increased local-led efforts.

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[106] A summary of Intellectual Ventures' Japan-specific programs is available at http://intellectualventures.com/Libraries/Worldwide_Documents/Program_for_Inventors.sflb.ashx. Accessed on July 27, 2012. Also see Intellectual Ventures and Kobe International Medical Alliance Foundation. "*Kobe Kokusai Iryo Koryuu Zaidan, Innovation no sokushin wo mezashite Intellectual Ventures to teikei*." Press release. May 18, 2012. Accessed on August 4, 2012 at http://www.intven.com/Libraries/Worldwide_Documents/Press_release_-_Kobe_IMDA.sflb.ashx.

[107] Nikkei Shinbun. "Boeing To Conduct Research With Univ. of Tokyo, Mitsubishi Heavy." *Nikkei Shinbun*, June 29, 2012. Accessed on June 29, 2012 at http://e.nikkei.com/e/ac/tnks/Nni20120628D2806F03.htm?GID=58.

[108] For example, since METI has shifted its cluster policies in recent years to recognize this "bottom-up" characteristic.

[109] This important theme has been emphasized by leading Japanese entrepreneurs and experts. See, for instance, Saito, William. "Initial Proposal to National Strategy Commission (Part 3 of 3)." Blog Post. Accessed August 7, 2012 at http://www.saitoblog.com/search?updated-min=2012-01-01T00:00:00%2B09:00&updated-max=2013-01-01T00:00:00%2B09:00&max-results=6.

Following are summaries of recent local-level cooperation activities, and public-private partnerships that bring together Japanese and U.S. stakeholders and could present models for future initiatives: the Hawaii-Okinawa Partnership on Clean and Efficient Energy Development and Deployment, and the TOMODACHI Initiative.

Box 1: Hawaii-Okinawa Clean Energy Partnership

The Hawaii-Okinawa Partnership on Clean and Efficient Energy Development and Deployment was launched in June 2010 by the State of Hawaii and Okinawa Prefecture, together with the U.S. Department of Energy (USDOE) and the Japanese Ministry of Economy, Trade and Industry (METI). The goals of this partnership are to develop and disseminate renewable energy and conservation information and technology solutions to island and other remote communities in both countries and globally, including through discussing policies, sharing best practices, and conducting joint projects.

Cooperation is focused around energy efficient buildings, smart grid, renewables, and people-to-people exchanges.[110] Activities under this initiative to date have included energy evaluations jointly conducted by a team of U.S. and Japanese energy efficiency experts of the Hawaii State Capitol building and of Itoman City Hall in Okinawa; visits by Okinawa Prefectural Government delegations to Hawaii in 2010 and 2011 to learn more about formulating guidelines for subtropical energy efficient buildings; and exchanges between Okinawa Enetech Co., Inc. and the Hawaiian Electric Company, which intend to finalize an agreement on the Molokai Renewable Energy Integration Initiative in 2012. Additionally, the USDOE, Oak Ridge National Laboratory, and Southern University jointly developed and launched an online curriculum on energy efficient building technologies for middle school students from Punahou Middle School in Honolulu and University of Ryukyus Junior High School in Okinawa.[111]

One significant component is a joint smart grid demonstration project on Maui, following a memorandum of understanding signed between the State of Hawaii and NEDO on November 22, 2011.[112] This project is being implemented in tandem with an existing Maui Smart Grid Project funded by the USDOE and led by the Maui Electric Company and the Hawaii Natural Energy Institute at the University of Hawaii, to demonstrate and evaluate new smart grid technologies and improve the efficiency of power grid operations.[113] The joint Japan-U.S. project includes the participation of USDOE and led by the Maui Electric Company and the Hawaii Natural Energy Institute at the University of Hawaii together with the Hawaii Department of Business, Economic Development and Tourism, the Hawaiian Electric Company, and NEDO. NEDO selected Hitachi, Ltd., Mizuho Corporate Bank, Ltd., and Cyber Defense Institute, Inc., to participate in the project, for which NEDO will provide $37 million in funding along with additional U.S. and Japanese private sector funding.

The goals of the joint demonstration project are, first, to develop and install smart utility system controls to improve adaption and full integration of renewable energy sources and electric vehicles in Maui's electric system. Additionally, to connect advanced electric vehicle charging management systems to electric utility system controls and charging stations island-wide in order to enable utility operators to manage electric vehicle charging to balancing power supply and demand. Japanese project partners will also collaborate with the USDOE-funded project in installing identical

[110] METI. "Hawaii-Okinawa Partnership on Clean and Efficient Energy Development and Deployment." Press Release. March 28, 2012. Accessed on April 2, 2012 at http://www.meti.go.jp/english/press/2012/0328_01.html.
[111] METI. "Hawaii-Okinawa Partnership on Clean and Efficient Energy Development and Deployment."
[112] Also see: Governor of the State of Hawaii. "Governor Abercrombie Signs Memorandum of Understanding for Japan-U.S. Smart Grid Demonstration Project." Press Release. November 22, 2011. Accessed January 31, 2012 at http://hawaii.gov/gov/newsroom/press-releases/governor-abercrombie-signs-memorandum-of-understanding-for-japan-u.s.-smart-grid-demonstration-project.
[113] Maui Smart Grid Project website. Accessed February 2, 2012 at http://www.mauismartgrid.com/faq/.

smart control systems in the project site.[114] Other aspects of the project involve evaluating cyber security activities related to the smart grid system, and establishing and assessing related business models. The project follows and is in alignment with Hawaii's existing renewable energy plan.

Through this demonstration, participants hope to develop the most advanced smart grid system for remote islands in operation, and to verify business model issues in managing system stability. Ensuring full interoperability is a primary project goal. This is an important issue in smart grid development not only in Japan and the United States, but also in the Asia-Pacific region as several countries aim to develop and deploy their own national smart grid systems and technologies.

Also important is the engagement with the local businesses and stakeholders that will be customers and users of the broader smart grid system. The Maui project represents one of the first attempts to bring a demand-supply management system for smart grid into practice at a practical level, and if successful the system could be replicated in other remote communities.

While still at an early stage, this project could present models for other local governments in both countries to partner in exploring ways to encourage and harness innovation to develop solutions for community needs and spur new economic growth opportunities. Success of this initiative is a priority of both the Japanese and U.S. governments,[115] and other Japanese prefectural governments have reportedly indicated interest in similar activities with Hawaii.[116]

Core questions for consideration is whether these models develop replicable systems and reduce costs, in order to facilitate their broad, practical deployment, as opposed to "showcase" demonstration projects that may be impractical and prohibitively expensive to deploy elsewhere. Additionally, whether these models are in line with and support local goals, engage the local community constructively, and help generate local benefits and economic opportunities in order to obtain buy-in and sustained support for the maintenance of these kinds of systems. This will be important as similar projects in both countries are launched, such as a recently inaugurated smart grid demonstration project in New Mexico with the engagement of NEDO and a consortium of Japanese companies.[117]

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[114] New Energy and Industrial Technology Development Organization (NEDO). "Participants Selected for a Smart Grid Demonstration Project in Hawaii – Commencement of a Japan-U.S. Collaborative Demonstration Project for World-Leading Remote Island Smart Grids." Press Release. November 2, 2011. Accessed January 31, 2012 at http://www.nedo.go.jp/english.html.jp. Also Maui Smart Grid Project. http://www.mauismartgrid.com/smart-grid-demonstration -project-to-launch-in-2012/.

[115] The project was referenced in the April 30, 2012 fact sheet released with the Noda-Obama joint statement and has frequently been highlighted to U.S. stakeholders by officials from METI and the Japanese Ministry of Foreign Affairs as representing solid economic ties and cooperation on shared goals.

[116] On August 21, 2012, the governors of Hiroshima, Saga, and Shizuoka Prefectures in Japan met in Honolulu with Hawaii Governor Neil Abercrombie to discuss collaboration on clean energy innovation and commercialization, and signed a memorandum of understanding for cooperation in the development of renewable energy and energy efficiency. See U.S.-Japan Council. "State to Prefecture Collaboration Meeting & Reception in Hawaii." August 21, 2012. Accessed on September 3, 2012 at www.usjapancouncil.org/events/event-page/state-to-prefecture-hawaii.

[117] "Nine Japanese Companies Launch Japan-U.S. Collaborative Smart Grid Demonstration Project in Business District of Albuquerque, New Mexico." *Bloomberg*. May 21, 2012. Accessed on August 5, 2012 at http://www.bloomberg.com/article/2012-05-21/aHv84VTA28RQ.html.

Box 2. TOMODACHI Initiative

The TOMODACHI initiative is led by the U.S. Embassy Tokyo and the U.S.-Japan Council, a non-governmental organization of leading members of the Japanese-American community active in strengthening U.S.-Japan relations, with support from the Japanese government along with a diverse range of Japanese and U.S. companies and organizations. Established to support the recovery of Japan's Tohoku region devastated by the March 2011 disasters, TOMODACHI also aims to deepen long-term bilateral cultural and economic ties, through building partnerships among businesses, organizations, communities, and individuals.[118]

TOMODACHI activities include educational programs, and activities to foster leadership and entrepreneurship, that relate closely to innovation framework policies. While still in early stages, envisioned education programs include virtual classrooms to supplement English education among Japanese students, scholarships and student exchanges, and collaborative research and educational partnerships. Among programs already announced as part of this initiative is a healthcare academic program for universities in the Tohoku region sponsored by the GE Foundation, with university courses to develop health information specialists and seminars for health practitioners, care providers, and local government to promote regional health collaboration.[119]

Leadership and entrepreneurship programs aim to incorporate development, fellowship and internship programs. In conjunction with these efforts, in April 2012, the U.S.-Japan Council established an Entrepreneurship Leadership Board (UE-LAB) made up of prominent Japanese and American entrepreneurs, investors, and experts active in promoting entrepreneurship in Japan. As a first project, UE-LAB launched the TOMODACHI Tohoku Challenge, a business competition for entrepreneurs to introduce proposals for "entrepreneurial enterprise-based solutions" to addressing economic and recovery challenges in Japan's Tohoku region. The top ten finalists in the competition will develop a detailed business plan or current operating results and future business plan, which will be introduced to venture capitalists and potential funders. The top three finalists will present their proposals to UE-LAB at the U.S.-Japan Council annual meeting in October 2012. The winners will receive placement at incubators, including Global Venture Habitat based in Silicon Valley and Venture Generation, a Tokyo-based venture community, along with additional introductions to funding, and consulting with expertise in operations, finance, and business development.[120]

As this initiative grows, it will provide a framework and serve as a laboratory of a broad range of test cases for collaborative activities that could serve as models for future initiatives related to innovation. It could also serve as a coordinating entity for future new bilateral cooperative activities in these areas.

[118] Information on the TOMODACHI Initiative is at http://www.usjapantomodachi.org/tomodachi-e-about.html. Accessed June 27, 2012.
[119] Information on TOMODACHI Initiative educational programs is at http://www.usjapantomodachi.org/tomodachi-e-programs-edu.html. Information on TOMODACHI Initiative leadership and entrepreneurship programs is at http://www.usjapantomodachi.org/tomodachi-e-programs-el.html Accessed June 27, 2012.
[120] U.S.-Japan Council. "2012 USJC Entrepreneurship Initiatives." Accessed on June 28, 2012 at http://www.usjapancouncil.org/entrepreneurship. Also see the TOMODACHI Tohoku Challenge competition description (accessed June 21, 2012 at http://usjapantomodachi.org/tomodachi-e-ttc_pressrelease_06042012.html).

OPPORTUNITIES FOR U.S.-JAPAN COOPERATION

The complex and dynamic nature of innovation manifests itself in an equally diverse range of issues, sectors, and stakeholders involved in crafting, influencing, and executing innovation policy. Just as technology convergence has generated important new fields and emerging economic growth sectors in recent years—such as ICT, nanotechnology, and health IT—new convergence and collaboration among actors involved in innovation ecosystems has the potential to generate new policy approaches, models, and benefits. Facilitating and generating new synergies among a broadening set of stakeholders at every level in both Japan and the United States that are engaged on innovation and related framework components offers significant potential implications to deepen and strengthen the bilateral economic relationship and global competitiveness of both economies. Presented below are some ideas for potential ways to approach this kind of cooperation.

National-Level: Potential Venues for Increasing Cooperation

Facilitate increased bilateral private sector cooperation, including by removing regulatory and other barriers to introducing innovative technologies, services and business models. The examples of Japan-U.S. private sector cooperation cited above represent just a sampling of a far broader range of partnerships across virtually all sectors of both economies. This reflects the fact that bilateral private sector-level cooperation will drive itself where there are mutual interests and benefits. From a policy perspective, the Japanese and U.S. governments should work to further facilitate this cooperation, including through identifying and addressing in-country regulatory and other barriers in both countries that exist—or may emerge in the future—to the introduction of innovative technologies, services, and business models.

To provide one example of the kinds of actions that could be taken, in December 2011 the Japanese government decided to relax its longstanding "three principles" policy prohibiting exports of materials that could potentially be used for military purposes. These policy changes are seen by both the Japanese and U.S. Governments and business communities as opening the door for new private sector cooperation and technology co-development related to the aerospace sector, which has a lengthy history of Japan-U.S. partnership. This policy shift comes at a significant time in relation to the space sector, with the U.S. government shifting towards private sector-led low-Earth orbit spaceflights and recent reforms by the Japanese government to its space policy framework that integrate previously divided scientific research and security aspects. Given overlap between defense and space-related technologies, these policy changes could help facilitate cooperation and partnerships that may previously have been restricted in a sector both governments have identified as strategically important.

Many of these kinds of barriers are, fundamentally, also impediments to Japanese inventors, innovators and entrepreneurs working to bring new technologies and services to their domestic market. For example, the Japanese government's July 2012 announcement that it plans beginning in 2016 to expand public nursing care insurance to include service robots for assisting elderly and disabled people could help encourage commercialization and deployment of these technologies. Japan has significant capabilities in robotics, including service robots such as the HAL robot suit developed by a Tsukuba University-linked startup firm, Cyberdine. The national government has prioritized robotics as an important growth sector. It is also a sector with potential for cooperation with U.S. partners, given the advanced state of U.S. robotics and significant demographic shifts and related challenges within the health care sector also underway in U.S. society. However, due in part to high costs, administrative burdens and testing procedures, and other entry barriers to market,

related commercialization of these technologies in Japan is still at an early stage.[121] While insurance coverage might not appear at first glance to relate to innovation policies, it is these kinds of regulations and barriers that also need to be carefully considered in exploring ways to get new technologies out of the lab and into practical use.[122]

The above examples illustrate the important role that governments can play to encourage innovation, and create entrepreneurial opportunities, by eliminating regulatory barriers and reducing the risks involved for entrepreneurs. As these challenges also exist in the U.S. market around emerging technologies, there are important learning opportunities between the two countries as both governments grapple to keep regulatory frameworks up to speed with technological development. These issues cross all economic sectors as well as the broad range of existing bilateral Japan-U.S. economic and innovation-related dialogues, making it important to share information among these and to coordinate approaches.

Engage through bilateral and multilateral trade, investment, and related frameworks to eliminate barriers for innovation. Cooperation and competition are both important drivers of innovation. As noted above, trade and FDI play an important role in innovation framework policies by fostering a competitive environment and level playing field in which firms both small and large can introduce innovative products, services and business models to markets. Yet the linkages between trade, FDI, and innovation often seem to be neglected in public discourse in both Japan and the United States.

Until recently the primary focus within most trade agreement negotiations has been the elimination of tariffs. However, emphasis has increasingly shifted to addressing regulatory and non-tariff barriers to trade and investment that affect many areas considered fundamental building blocks for environments conducive for innovation. These include regulatory coherence and transparency; standards and testing, particularly related to high-tech and emerging industry sectors; intellectual property rights protections and enforcement; competition policy; e-commerce; and at a more fundamental level simplifying and harmonizing trade rules in order to open new doors—including for entrepreneurs with innovative new products and services—to access global markets. These provisions are core components of U.S. trade agreements concluded during the past decade, most significantly the U.S.-Korea Free Trade Agreement, and are at the heart of the ongoing TPP trade negotiations.[123]

In this regard, a broad range of bilateral and multilateral trade and investment framework dialogues offer important venues for Japan and the United States to cooperate in crafting competitive domestic and regional environments conducive to fostering innovation. At the bilateral level, these include the EHI and Internet Economy Dialogue referenced above. As demonstrated by agreements like the Anti-Counterfeiting Trade Agreement, Japan and the United States are already in alignment on many framework issues related to innovation under discussion in agreements such as

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[121] For example, the HAL robot suit had not yet been approved as medical equipment in Japan in part due to the significant amount of time necessary to complete required tests, limiting its usage by medical institutions. "Revitalizing Japan-Creative Use of Land/Industry, Academia Must Boost Collaboration." *Yomiuri Shinbun,* April 18, 2012. Accessed on August 6, 2012 at http://www.yomiuri.co.jp/dy/national/T1204217005894.htm.

[122] "Public Insurance To Cover Nursing Care Robots From FY15." *Nikkei Shinbun*, July 30, 2012. Accessed on July 30, 2012 at http://e.nikkei.com/e/ac/tnks/Nni20120729D2907F02.htm. See also ACCJ, p. 36.

[123] The Office of the U.S. Trade Representative has increasingly highlighted the potential of TPP to promote innovation and entrepreneurship. Office of the U.S. Trade Representative. "Important Progress Made at TPP Talks in San Diego." Press statement. July 10, 2012. Accessed on July 11, 2012 at http://www.ustr.gov/about-us/press-office/press-releases/2012/july/important-progress-tpp-talks-san-diego.

the TPP.[124] This convergence of interests represents an important area for cooperation in establishing rules and best practices on innovation framework policies within regional and multilateral frameworks on trade and investment, including APEC (as examined below) and TPP negotiations that include the participation of both the United States and Japan.

Box 3. APEC, Trade, and Innovation

In recent years APEC has increased emphasis on the linkages between trade, investment and innovation as a driving factor in regional economic growth. Because APEC has often served as an incubator of ideas for economic policies pursued by its member economies, including the concept of a free trade agreement covering the entire Asia-Pacific, it is an important venue in which Japan and the United States cooperate to advance shared goals within the region.

The APEC Leaders' Growth Strategy agreed upon at the 2010 Yokohama APEC Leaders' Meeting identified "innovative growth" as one of five growth attributes APEC would seek to achieve. It encouraged policy actions to achieve this, including through fostering ICT use and applications adopting globally accepted standards, developing skilled workforces including on ICT and energy efficiency experts, enhancing information sharing on innovation policies, and promoting cooperation on IPR protections and standards.[125] APEC Leaders built upon these commitments at the 2011 Honolulu summit, including an annex to the Leaders' Statement that agreed "encouraging innovation—the process by which individuals and business generate and commercialize new ideas—is critical to the current and future prosperity of APEC economies" and committed to promote "effective, non-discriminatory and market-driven innovation policy" in the region.[126] A key factor in APEC's ability to report positive results towards implementation of these policies by the target year of 2013 is to increase awareness of how implementation of these policies "will contribute to an open trade and investment environment that will assist economies in generating and adopting new technologies and business models—increasing the efficiency and speed of innovation."[127]

To advance this process, Japan led an APEC conference on April 4-5, 2012, in Singapore to discuss "specific steps for utilizing a free and open environment for trade and investment for the promotion of cross-border innovation." Conference participants agreed on the importance, to achieve these goals, of establishing free, open, and transparent trade and investment systems in the region; facilitating economic integration; establishing environments in which inventive ideas are not restricted by national borders or organizations' frameworks in IPR and business environment issues; and promoting the establishment of ICT network technologies and enhancing interconnectedness through effective government and private sector activities.[128] These points were reinforced at the June 2012 meeting of APEC Ministers for Trade in Kazan, Russia, whose statement called for a

[124] An overview of U.S. business community perspectives on Japan's positions in relation to fifteen core principles of the TPP negotiations as identified by the U.S. Business Coalition for TPP is available in U.S.-Japan Business Council. *Japan's Successful Participation in the Trans-Pacific Partnership (TPP) Agreement: Preparing for a 21st Century, WTO-plus Free Trade Agreement.* Washington, DC: The U.S.-Japan Business Council, Inc., 2011.
[125] APEC. "The APEC Leaders Growth Strategy." Yokohama, Japan, November 14, 2010. Accessed on June 13, 2012 at http://www.apec.org/Meeting-Papers/Leaders-Declarations/2010/2010_aelm/growth-strategy.aspx.
[126] APEC. "Annex A. Promoting Effective, Non-Discriminatory, and Market-Driven Innovation Policy." Honolulu, HI, November 13, 2011. Accessed on June 13, 2012 at http://www.apec.org/Meeting-Papers/Leaders-Declarations/2011/2011_aelm/2011_aelm_annexA.aspx.
[127] METI. "The "APEC Conference on Innovation and Trade" Held in Singapore for Promoting Cross-Border Innovation through a Free and Open Environment for Trade and Investment." Press release. April 12, 2012. Accessed on June 28, 2012 at http://www.meti.go.jp/english/press/2012/0412_01.html.
[128] METI, ibid.

meeting of APEC chief science officers in 2013 to reinforce discussions on the linkages of science, innovation, and economic growth and other efforts within APEC to increase focus and discussion on innovation policy and emerging sector issues.[129]

Building upon this and possible outcomes of the APEC Leaders Meeting in Vladivostok in September 2012, APEC can through Japanese and U.S. efforts play an important role in generating constructive discussion that reinforces these principles among regional partners.

Emphasize innovation as a national priority for the bilateral economic relationship in both countries. Recent statements by the Japanese and U.S. governments have placed increased emphasis on the importance of innovation in economic growth, not only in their own countries but also within the bilateral relationship. U.S. Ambassador to Japan John Roos has made encouraging innovation and entrepreneurship in Japan a signature issue during his tenure. Continuing to clearly articulate innovation as a top priority within Japan-U.S. economic relations, and to frame key related trade, investment and other policies as part of the innovation agenda, will help to reinforce broader public awareness of its importance, and support entrepreneurs in both countries working to build cross-border linkages.[130]

Explore and facilitate synergies among various bilateral dialogues related to innovation. The bilateral policy dialogues and initiatives listed above, as well as others not listed above, cover various components of the broader innovation ecosystem and framework policies in both Japan and the United States. In some cases, these dialogues overlap and complement each other, given the complex and multifaceted characteristics of the topics under discussion. For example, opportunities for cooperation on smart grid have been taken up within both the Innovation, Entrepreneurship and Job Creation dialogue as well as within the Clean Energy Dialogue. Likewise, the EHI and Internet Economy Dialogue have both explored ICT-related issues important in bilateral and multilateral trade negotiations.

Similar to the whole-of-government approach called for in domestic innovation policy frameworks, approaching these various initiatives as components of a broader, comprehensive network of bilateral engagement on innovation-related policies would increase opportunities to explore cross-fertilization of ideas while mitigating risks of stovepiping. It could also encourage flexibility for these initiatives to evolve as initial goals are met and new issues arise. Because several different government ministries and agencies in both countries are engaged in each of these dialogues, how most effectively to manage this coordination merits careful consideration—though perhaps could generate new ideas for ways to manage this coordination more effectively even within often-fragmented domestic contexts.

This cross-cutting approach could be particularly useful related to the energy sector, one in which market structures and extensive regulations crossing several government agency jurisdictions can inhibit the introduction of new technologies and business models.[131] Japan's introduction of an FIT has spurred announcements of several new renewable energy power generation facilities, including commitments by foreign firms to manufacture solar cells in Japan, and added momentum to domestic R&D to develop more efficient and cost-effective technologies. As these progress, it

[129] APEC. "2012 Meeting of APEC Ministers Responsible for Trade." Kazan, Russia. June 4-5, 2012. Statement. Accessed on June 28, 2012 at http://www.apec.org/Meeting-Papers/Ministerial-Statements/Trade/2012_trade.aspx.
[130] Also see ACCJ, pp. 32-33.
[131] Hargadon, Andrew. "Policy Levers for Fostering Innovation and Entrepreneurship in Clean Technology." *Kauffman Thoughtbook 2011*. Kansas City, MO: Ewing Marion Kauffman Foundation, 2011. p. 137.

will be important to monitor successes and unanticipated outcomes that emerge—whether technological, or regulatory, or related to the existing energy market structure in Japan in which regional utilities control both electricity supply and distribution. Innovative business models may have just as important a role in spreading the use of renewable energy technologies and reducing their costs as the policy measures themselves.[132] The outcomes of Japan's FIT, over time, could also present learning opportunities for U.S. states which have followed largely different policy approaches to promote the use of renewable energy resources. Some of these issues may fall outside the boundaries of existing bilateral energy initiatives, and thus could present merit for bringing together these dialogues with others exploring these related issues.

Engage a diverse range of stakeholders in both countries through regional-level outreach. Dialogues would benefit through engagement with a diverse range of stakeholders in both countries in order to encourage cross-fertilization of ideas and introduce new information and perspectives that might not otherwise enter into these discussions. To an extent this is already occurring. For example, the Innovation, Entrepreneurship and Job Creation dialogue has to date held symposiums with broader stakeholder groups in Silicon Valley and Tokyo. Perhaps future sessions could be held in other Japanese and U.S. cities with robust entrepreneurial communities representing a diverse range of new growth industries, such as Kyoto, Fukuoka, Kitakyushu, Seattle, or Boston. This has precedent in bilateral trade negotiations and APEC ministerial meetings, which routinely take place in different locations in host countries.

Outreach programs in locations across both countries to increase awareness about the importance of the Japan-U.S. economic relationship and the role of innovation within it would also present opportunities for the governments to connect with local-level stakeholders who may become inspired to take action, or themselves have success stories that the governments can help communicate widely.[133] This has precedent in the U.S.-Japan Investment Initiative led by the U.S. Department of State and METI during the 2000s, as part of which business conferences were held at least annually in different cities across both countries with a focus on benefits and success stories of FDI. These initiatives may be more appropriately organized and led by private sector and local organizations, with which the two governments can coordinate to develop and execute a more expansive and sustained set of programs.

Engage legislative branch stakeholders on innovation within economic-focused dialogues. Given the increasing importance that policy makers in both countries are placing on innovation to encourage domestic economic growth, engaging members of the U.S. Congress and Japanese Diet could contribute constructively to bilateral discussions on these topics. Legislative leadership has often played a key role in the development of national innovation policy both in Japan and the United States. For example, changing views among Japanese Diet members during the mid-1990s of the importance of science and technology policy not only for economic growth but also within the context of Japan's foreign relations led to the establishment of Japan's First Science and Technology Basic Plan in 1995.[134]

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[132] For a U.S. example, see Bailey, Elizabeth M. and Catherine Wolfram. "A Whole Different Kind of Innovation." *Wall Street Journal*, June 18, 2012. Accessed on June 20, 2012 at http://online/wsj.com/article/SB10001424052702304203604577395943820313450.htm.

[133] The author was personally involved in developing and coordinating educational outreach activities around the U.S.-Korea Free Trade Agreement, which included efforts to partner with local organizations to develop programs and to identify local SMEs with successful trade and FDI experiences with Korea in order to increase local and national-level awareness of potential benefits of the agreement.

[134] Collins, pp. 75-76.

Moreover, focus on Japan by the U.S. Congress has in recent years centered almost exclusively on security alliance and trade policy issues, as reflected in Congressional hearings on Japan and major topics on the agendas of bilateral inter-parliamentary exchanges. Japanese stakeholders have, in the meanwhile, expressed concern about the perceived drift in interest by Congress in Japan, including a significant decline in the level of interaction between members of Congress and the Japanese Diet through parliamentary exchange dialogues and visits.[135]

Incorporating innovation, entrepreneurship, and science and technology within the context of economic growth into existing inter-parliamentary exchanges, or possibly as a stand-alone focus topic, could provide a new platform for sharing of ideas, best practices, and network-building related to these policy areas. This could also bring legislators with expertise in these issue areas—including those with entrepreneurial or R&D experience themselves—but who are not otherwise engaged on Japan-U.S. relations to the table, along with fresh perspectives and ideas. Energy technologies offer one potential focus topic, given ongoing efforts in both countries to deploy these technologies and promote the sector as source of economic growth.[136]

Ensure sustained dialogues, and facilitate channels to sharing information and best practices on emerging innovation policies. Because innovation policies are long-term in nature and take years to show effect, a sustained approach to exploring these issues is important for follow-through and information-sharing. Leaders, officials, and specific initiative foci and formats change over time, so ensuring continuity in some form within bilateral dialogues and initiatives is important to build upon achievements and not lose knowledge that has been acquired. In this regard, it would be particularly beneficial for Japan and the United States to explore through these activities foresight activities and efforts to anticipate new and potentially disruptive technologies and developments. Some of this is already beginning to take place, for example within the Internet Economy Dialogue on issues such as the global deployment of Internet Protocol Version 6 (IPv6). A joint foresight exercise focused around innovation, such as on the potential economic and broader security ramifications of emerging disruptive technologies, for instance, may be worthwhile for Japan and the United States to consider.

Harmonize performance metrics and conduct comparative program assessments. Performance measurements of programs and initiatives related to innovation are sometimes difficult to compare at international levels as different countries—and sometimes different government ministries and agencies within the same country—use different kinds of statistics, data and definitions. This has been identified as a challenge by both the Japanese and U.S. governments, and by private sector

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[135] The Japan Council for International Exchange (JCIE) reviews the history of U.S.-Japan parliamentary exchanges since it established the first such program in 1968, including the trend of decline in these initiatives since the 1990s. Japan Council for International Exchange. *Reinvigorating U.S.-Japan Policy Dialogue and Study*. Tokyo: Japan Council for International Exchange, 2010. pp. 21-25. JCIE in its report acknowledges the increasing financial difficulties for conducting these kinds of activities, as foundations reduce funding and as rules related to travel by members of U.S. Congress and their staff have become more strict in recent years.

[136] There is precedent for this as there existed at one time a United States-Japan Parliamentary Committee on Science and Technology, which was no longer active by 2010. JCIE suggests, for example, climate change and clean energy as potential candidates for issue-oriented bilateral exchanges, Japan Council for International Exchange, pp. 25, 44. Additionally, the International Foundation for Entrepreneurship Science and Technology has called for a Legislators Innovation Policy Exchange Program from members of the U.S. Congress and Congressional staff to meet with Asian counterparts to jointly examine policy initiatives promoting innovation and entrepreneurship. International Foundation for Entrepreneurship Science and Technology Website. Accessed on April 27, 2012 at http://www.ifest.info/offerings.html.

stakeholders measuring innovation policies.[137] Given patterns of policy modeling between Japan and the United States, including the existence of similar initiatives such as SBIR and Bayh-Dole, there could be merit in identifying harmonized or consistent approaches to performance measurements of these and other programs in order to enhance assessment. Additionally, there does not appear in recent years to have been comparative analyses of the performance of similar programs in both countries such as SBIR, which could be useful.

Increase cooperation around patent systems. Patents have been identified as one important area for increased Japan-U.S. cooperation. The Japan Patent Office and U.S. Patent and Trademark Office have a permanent patent prosecution highway, under which an applicant receiving a ruling from either patent office that at least one claim in an application is patentable may request that the other office fast track the examination of corresponding claims in corresponding applications.[138] Business and academic experts have suggested that finding ways to further standardize and harmonize patenting among Japanese and U.S. offices would foster commercialization, including by improving the quality of patent examinations.[139] Additionally, encouraging international sharing of databases, and creating a new bilingual, searchable and publicly accessible database of user-generated uploads for underutilized technology have been put forward as other suggestions for Japan that would also be applicable within the context of Japan-U.S. cooperation.[140]

Box 4: The BIRD Foundation – A Potential Model for Japan-U.S. Cooperation on Commercialization of Innovation?

The Israel-U.S. Binational Industrial Research and Development Foundation (BIRD) presents one potential model for Japan-U.S. cooperation initiatives aimed at commercializing innovative research, particularly by startup companies. BIRD was founded by the U.S. and Israeli governments in 1977 to "generate mutually beneficial cooperation between the private sectors of the U.S. and Israeli high tech industries, including startups and established organizations." Under the program, any pair of Israeli and U.S.-based companies may jointly apply for grants for the purpose of defining, developing, manufacturing, and bringing to market innovative products based on industrial R&D. Key criteria for project selection include the ability by each participating corporate entity to carry out its part of the joint development of the project, and willingness to share the financial risks of development as well as the gains from commercialization. The project must also have "significant technological innovation" or introduce an innovative business or marketing concept.[141]

BIRD awards grants of up to 50 percent of each company's R&D expenses for the joint project. The two companies are obligated to repay the grant to BIRD following successful commercialization of the product. However, if the project fails, the grant does not need to be

[137] United States Department of Commerce. *The Competitiveness and Innovative Capacity of the United States*. January 2012. Washington, DC: U.S. Department of Commerce, 2012. p. 3-18. Accessed on June 28, 2012 at http://www.commerce.gov/sites/default/files/documents/2012/january/competes_010511_0.pdf. PDF file. Also Ortmans, ibid., and Stewart, Luke. "We Have a Sharing Problem." *The Innovation Files*. Information Technology and Innovation Foundation. Accessed on June 19, 2012 at http://www.innovationfiles.org/we-have-a-sharing-problem/.
[138] United States Patent and Trademark Office. "Patent Prosecution Highway Between USPTO and JPO (Permanent)." USPTO website. Accessed on August 5, 2012 at http://www.uspto.gov/patents/init_events/pph/pph_jpo.jsp.
[139] Author's conversation with U.S. companies. Also see Nagaoka and Flamm, p. 16.
[140] ACCJ, pp. 37-39. Also see Nagaoka and Flamm, p. 16.
[141] Israel –U.S. Binational Industrial Research and Development Foundation. "What is BIRD." Accessed on February 2, 2012 at http://www.birdf.com/?CategoryID=317&ArticleID=374&print=1.

repaid—offering significant risk-mitigation to program participants. Also, BIRD does not acquire any equity or rights to intellectual property from projects it supports, nor does it become involved with the relationship between the participating U.S. and Israeli partners. Project proposals are reviewed by experts at the U.S. National Institute of Standards and Technology (NIST) and the Office of the Chief Scientist in Israel's Ministry of Industry and Trade—giving implicit endorsements by science and tech experts in both governments of the project.[142]

An analysis by the Economic Strategy Institute conducted on behalf of BIRD and two related U.S.-Israel bilateral science and technology foundations—the Binational Science Foundation, which focuses on basic research, and the Binational Agricultural Research and Development Foundation (BARD)—estimated that BIRD's investment of $290 million in grants to 826 approved projects (as of 2011) had generated $8 billion in cumulative direct and indirect sales of resulting products. These resulted in an estimated combined U.S. and Israeli profits of $1.6 billion, tax payments of $320 million, and the generation of between 12,000 to 30,000 jobs in the United States and a return on investment of 600 percent.[143]

Beyond these statistics, several innovations brought to market through BIRD support have had global impact in electronics, life sciences, and semiconductors, among other sectors.[144] Moreover, participants of the program in both countries have pointed to its importance in forming strong partnerships and fostering additional collaboration. Senor and Singer observed that BIRD support enabled entrepreneurial Israeli high-tech companies to learn how to do business in the United States, and that in the absence of equity financing served as a shortcut to the U.S. market and learning opportunities.[145]

The success of BIRD has generated two related initiatives. One is BIRD Energy, which was launched in 2007 and focuses specifically on collaborative bilateral U.S.-Israeli projects in renewable energy and energy efficiency industrial R&D. A second is the TRIDE Fund, a parallel trilateral initiative between the United States, Israel and Jordan launched in 1996 and managed by BIRD (in partnership with the Jordanian government) to advance regional cooperation and economic development through projects with significant R&D content.

The BIRD approach tackles many issues that can present challenges to Japanese startups and entrepreneurs looking to enter the U.S. and global markets. Whether an initiative like this is appropriate at the national government-level between Japan and the United States merits discussion. A private sector-led foundation, local government-led initiative, or public-private partnership structure may present a better fit for Japanese and U.S. firms.[146]

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[142]Israel –U.S. Binational Industrial Research and Development Foundation. "What is BIRD." Accessed February 2, 2012 at http://www.birdf.com/?CategoryID=54&ArticleID=375&print=1.

[143] The Economic Strategy Institute estimated that the three binational programs combined had, based on a U.S. investment of $160 million, generated total economic benefits of $11 billion, $7 billion of which accrued to the United States, and conservatively that between 18,000 to 50,000 jobs had been created as a result of this activity. Economic Strategy Institute. *A Certain Future for the U.S.-Israel Technology Partnership.* pp. 22-23, 40. Accessed on June 28, 2012 at http://www.birdf.com/_Uploads/dbsAttachedFiles/BinationalFoundationsReportPrestowitzDec2011.pdf. PDF file.

[144] Economic Strategy Institute, ibid., pp. 24-25.

[145] Senor, Dan and Saul Singer. *Start-Up Nation: The Story of Israel's Economic Miracle.* New York: Twelve, 2009. pp. 163-164.

[146] For example, the Cross Pacific Innovation Network, announced in July 2010 by the Innovation Network Corporation of Japan and the U.S.-based Center for Venture Education Kauffman Fellows Program, has announced plans to implement joint projects around commercialization of innovation and related activities that are components of BIRD. Innovation Network Corporation of Japan and Center for Venture Education. "Kauffman Fellows Program and

Local/Non-Government Level Opportunities

Following are some ideas for areas of Japan-U.S. cooperation at the local and non-governmental level that relate to the key topics noted above, and distinct from national government-level initiatives.

Facilitate information sharing among local-level governments of local best practices related to innovation. Similar to national-level policy dialogues cited above, sharing of information by local-level groups on best practices, success stories, and policy and project models would be beneficial and create grounds for new ideas. At the state, prefecture and local government levels across Japan and the United States, there already exists an extensive network of relationships and connections. At the local government level, these include sister city and state relationships, and in some cases representative offices in either country that work to promote trade, investment, and cultural ties.

With increasing discussion of decentralization of government authority in Japan, dialogues on successful state and regional-level initiatives to foster innovation and entrepreneurship in the United States would be informative to Japanese counterparts. This is already starting to occur through groups such as the Midwest U.S.-Japan Association and Southeast-U.S. Japan Association that bring together local government and business leaders from multiple states and prefectures for discussions on economic issues, which have broadened to include innovation in recent years.[147] Visits by governors and mayors often incorporate trade and business missions; these exchanges present good venues for discussions on innovation and potentially new activities that states and prefectures could take together.

There are interesting, locally-led initiatives in Japan that could present ideas and opportunities for local-level U.S. partners. For instance, the Tsukuba City Government launched in 2011 an initiative aimed at bringing robotics technologies developed in the cluster of national research institutes concentrated there out of the labs and into use by the broader community, including to encourage the development of the city as a test bed for these technologies.[148] Moreover, Japanese and U.S. local governments should not limit their exploration of collaborative activities around innovation to the bilateral context. For example, Kitakyushu City has for many years collaborated with the city of Surabaya, Indonesia, and other cities across Southeast Asia to share and help introduce innovative environment and waste management practices.[149] More recently Kitakyushu has begun cooperation with Surabaya to install smart community and energy cogeneration facilities there. These represent just a couple of the kinds of initiatives Japanese local-level stakeholders are taking to deploy locally-developed technologies and systems relevant also in the U.S. context.

Important in local-level projects of this nature is follow through and sustained engagement. This can be challenging for the reasons outlined above, as well as language barriers and limited capacities and resources. The engagement of local chambers of commerce and related business and

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Innovation Network Corporation of Japan will Jointly Promote Global Innovation Ecosystem." Press statement. July 23, 2010. Accessed on August 7, 2012 at http://www.incj.co.jp/PDF/e_20100723-1.pdf.

[147] The Midwest U.S.-Japan Association featured sessions focusing on innovation on the agenda of its 2011 and 2012 annual meetings.

[148] Robotics Tsukuba website. Accessed on August 7, 2012 at: .http://www.rt-tsukuba.jp/.

[149] Detailed information about this initiative is available in Institute for Global Environmental Strategies. *Kitakyushu Initiative for a Clean Environment: Final Report.* Hayama, Japan: Institute for Global Environmental Strategies, 2010.

non-governmental organizations can play a helpful role in this regard. The national governments can also potentially play a helpful role in connecting local governments with national government resources that may be available to support these efforts.

Bring together Japanese and U.S. partners around fostering cross-border innovation and entrepreneurship initiatives. One challenge for Japan in spurring domestic innovation and commercialization of new technologies and services is to increase the number of new entrepreneurial startups and raise their success rate. Yet, as initiatives like Startup America demonstrate, these are also important challenges in the United States. As going global is increasingly seen as essential to success for entrepreneurs, opportunities that bring together startups, investors, and experts from both Japan and the United States to build the networks necessary for success would be beneficial.

Momentum is increasing on this front, particularly in relation to prize competitions and mentoring activities. Prize competitions are seen as having a positive track record in innovation by private sector and philanthropic stakeholders, and in the United States the Obama administration has actively encouraged all federal government agencies to pursue prizes to advance their core missions.[150] Moreover, entrepreneurs and other business leaders familiar with Japan have pointed to the need for stronger entrepreneurship education and mentoring—citing lack of understanding of the mentorship process as a particularly weak factor for Japan.[151] As explained by Jonathan Ortmans, senior fellow at the Kauffman Foundation and president of Global Entrepreneurship Week, leaders need strategies to inspire and smooth paths—not created plans for new top-down programs. Governments should instead focus on best rules and incentives, and encourage firms to get involved in communities of startups that are private sector-led.[152]

In recent years, several new business plan competitions and prizes have been established to help promote innovation and entrepreneurship in Japan. Many of these include U.S. government and business community support. In addition to the TOMODACHI Tohoku Challenge listed above, entrepreneurship awards are offered by the U.S. Ambassador to Japan and the American Chamber of Commerce in Japan; the Tokyo American Center and Keio University Shonan Fujisawa Campus Innovation & Entrepreneurship Platform Research Consortium; the U.S.-Japan Innovation Award by the Japan-America Society of Northern California; and a competition sponsored by the Massachusetts Institute of Technology (MIT) Enterprise Network in Japan, among others.

Also, numerous private sector initiatives bringing together Japanese and U.S. experts and stakeholders have emerged to help foster and encourage entrepreneurship in Japan. These groups include IMPACT Japan, a Japanese organization aiming to catalyze an innovative and entrepreneurial culture and mindset including through programs, events, and projects and bringing together a network of individuals and organizations that span business, academia, government, and the civil society sectors to collaborate in achieving these goals.[153] To provide another example, Sunbridge, an

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[150]The White House, Office of Science and Technology Policy. "Implementation of Federal Prize Authority: Progress Report. A Report from the Office of Science and Technology Policy in Response to the Requirements of the America COMPETES Reauthorization Act of 2010." March 2012. pp. 4-6. Accessed on June 28, 2012 at http://www.whitehouse.gov/sites/default/files/microsites/ostp/competes_report_on_prizes_final.pdf.

[151] ACCJ, pp. 31-32. Also Ortmans, ibid.

[152] Ortmans, ibid.

[153] IMPACT Japan partners with the Kauffman Foundation in the United States to organize Global Entrepreneurship Week Japan, among other activities. Information on IMPACT Japan is available at: http://impactjapan.org/what-we-do/areas-of-focus/. Accessed June 27, 2012.

early-stage IT investor with operations in Japan and the United States, hosts "JANNOVATION Week," a week-long immersion program for Japanese entrepreneurs that introduces them to the Silicon Valley ecosystem, including a venture capitalist moderated pitch competition.[154]

Initiatives like these should be further encouraged, with the aim of spurring similar programs and opportunities led by the private and non-governmental sectors. These initiatives could, over time, help the national and local governments in pinpointing additional areas where such activities engaging the public in both countries could potentially help to advance other shared policy goals—and help to identify local champions in both countries that could take leadership roles in this process. Given similar elements of the Startup America initiative in the United States, including a focus on local-level engagement, it would be useful for national and local-level governments in both countries to share information about ongoing entrepreneurial education and mentorship programs in case there are potential models or synergies.

Expand and explore opportunities for university-level cooperation on innovation. There are extensive, longstanding networks among Japanese and U.S. universities and graduate programs, which range from undergraduate study-abroad programs to extensive collaboration in cutting-edge science and technology-related fields and research. Some universities with particularly fertile resources and deep expertise have initiated programs and cooperation specifically focused on innovation, beyond traditional cooperation on science research. For example, in the United States, the Stanford University Project on Japanese Entrepreneurship conducts an active program of work to support research and conferences on innovation and entrepreneurship in contemporary Japan. Among other activities, it has partnered with the United States and Japanese governments in helping to coordinate the Innovation, Entrepreneurship, and Job Creation policy dialogue. [155]

In Japan, there is increasing attention on the importance of promoting entrepreneurship education, in order to encourage students to explore entrepreneurial opportunities and address what is widely perceived as a shortcoming of Japan's innovation ecosystem. Kyushu University's Robert T. Huang Entrepreneurship Center (QREC) has introduced a comprehensive entrepreneurial education curriculum inclusive of both undergraduate and graduate students across other university departments. For several years the Center's QREP program has taken students to Silicon Valley for a short-term immersive program including meetings with startups and researchers, which among other results has encouraged students to connect with networks bringing together students in similar entrepreneurship programs in Asia and North America. It aims to expand its course offerings to other departments within Kyushu University and the outside community through broadcast and on-line courses, including eventually in English.[156]

During the last two decades, dozens of Japanese universities have introduced TLOs and similar offices to help facilitate commercialization of innovation resulting from university research through university-industry collaboration, based on successful such policies and programs in the United States. The mixed performance and learning curve that universities and their TLOs continue to encounter in both countries presents another venue for continued learning opportunities as institutions explore new approaches to maximize the effectiveness of these systems. For example, the University of North Carolina's Carolina Express License Agreement—which lowered barriers

[154] See http://www.sunbridge.com/habitat/jannovation/. Accessed June 27, 2012.
[155] Information on this program is available at: http://sprie.stanford.edu/research/staje. Accessed on June 19, 2012.
[156] Information on QREC is available at: http://www.qrec.kyushu-u.ac.jp/en/. Accessed June 27, 2012. Waseda University is a partner with Kyushu University in the Silicon Valley program. Additionally, the author attended Kyushu University's International Workshop for Entrepreneurship Education on July 19, 2012 in Tokyo, Japan.

for academic researchers to commercialize their technologies through an expedited licensing process—presents one model for Japanese universities and TLOs examining ways to reduce the complexity and bureaucracy involved in this process.[157]

As technological advances and decreasing costs of information and communication technologies enable "virtual classes" and other exchanges among students, faculty, and researchers, creative avenues to fully utilizing these resources should be explored. Recent momentum growing in the United States around on-line education networks, some of which already include major European universities, could present new models for Japanese universities as well as opportunities for their faculty and students to participate proactively in these emerging networks.[158]

Discussed above was the declining number of students from Japan traveling to study in the United States, which Japanese and U.S. groups are working to address through a broad range of initiatives aimed at reversing this trend. One potential model to explore with a focus on innovation and entrepreneurship is the Work, English, Study and Travel (WEST) Program between South Korea and the United States. Launched in 2008 by the South Korean and U.S. governments, WEST is a professional development program through which Korean university students spend twelve to eighteen months in the United States for intensive English-language studies and six to twelve-month professional-focused internships in a U.S. office environment. While still in an incipient phase, this program could over time build a network between Korean WEST participants and their U.S. contacts similar to that which has emerged around the JET Programme.[159] WEST provides one example of a future-oriented exchange initiative that Japan and the United States could undertake to build connections among Japanese students and young professionals with U.S. companies and organizations, and shape to focus around innovative fields and new growth industries. Such a program would benefit from extensive early-stage engagement and buy-in by Japanese universities, businesses, and entrepreneurs in order to ensure broad recognition of the importance of the initiative in an environment in which some Japanese students and their families may be questioning the benefits of overseas study for future career goals.

Utilize local-level and people-to-people networks in new, creative ways to foster collaboration around innovation. There is a vast, and increasing, set of networks and connections among people across Japan and the United States. In addition to the extensive linkages among Japanese and U.S. local governments and universities noted above are ties among business organizations such as the American Chamber of Commerce in Japan and other trade and industry associations; Japanese and U.S. companies that have invested and created jobs in communities in each other's countries; think tanks and research organizations; civic organizations including Japan-America Societies and Japanese-American organizations; and vast people-to-people networks such as those of U.S. alumni of the Japan Exchange and Teaching (JET) Programme.

The interests and focus of these various stakeholders around Japan-U.S. relations are diverse. Few could be said to have much, if any, focus on innovation. However, this vast network represents a great potential reservoir of people and organizations that may have expertise and support to offer

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[157] Desimone, Joseph M. "Expediting University Startups. A Step Toward Advancing America's Prosperity." *Kauffman Thoughtbook 2011*. Kansas City, MO: Ewing Marion Kauffman Foundation, 2011. pp. 146-149.
[158] De Vise, Daniel. "U-Va. Takes Major Step in Online Education." Washington Post, July 17, 2012. Accessed on July 18, 2012 at http://www.washingtonpost.com/local/education/u-va-takes-major-step-in-online-education/2012/07/16/gJQAF3YOqW_story.html.
[159] The author had direct experience managing WEST Program participants in the United States and engaging with related U.S. organizations that work with the U.S. State Department to implement the program.

to bilateral innovation-focused activities. Moreover, the breadth and range of groups demonstrates that despite the relatively limited number of professional opportunities in either country for Americans and Japanese with extensive experience living and working in each other's countries related to Japan-U.S. policy, people-to-people networks between the two countries have expanded significantly in recent decades.[160] These linkages hold significant potential seeds for sharing and cooperation on innovative technology, business, and other ideas.

The challenge is how to foster these linkages, such as bringing together in new ways people and organizations that would not otherwise communicate with each other, and encouraging the participation of experts from both countries who are not otherwise engaged in Japan-U.S. relations. Language barriers are a primary challenge, ranging from people-to-people communications to the ability of U.S. businesspeople and scholars to access and utilize Japanese research not available in English. Also, in recent years fiscal challenges and tight budgets have led to the closure by some U.S. states of their overseas representative offices, and reduced funding available both for Japanese and U.S. foundations and non-governmental organizations to support educational and exchange programs. Many existing organizations have specific missions and goals, and limited human and financial resources, which make it challenging to expand or increase their activities.[161] A related question is the role that the national governments can play in helping to facilitate these linkages, without turning them into "top-down" programs.

One useful exercise would be to chart out these networks, relationships, and interconnections among local governments, institutions, non-governmental organizations, and other key stakeholders across both countries, particularly as relate to the innovation ecosystem. This would provide an opportunity to grasp the full extent of these kinds of bilateral activities and linkages, as well as to identify potential untapped synergies among them. The development of coordinating entities in either country that could help facilitate linkages among these various, disparate networks with a focus around innovation-related issues would be a logical next step. Perhaps as an initial approach, a consortium or coalition including national and local government, university, and non-governmental entities could be convened to perform this role, including by sharing information, facilitating introductions among stakeholders in both countries, and keeping track and disseminating information about new initiatives and successful cases. Potentially instructive in this regard is the experience of responses to the March 11, 2011 disasters, in relation to efforts to coordinate among a diverse range of stakeholders at local and national levels in both countries in connecting resources with needs and bringing together partners that might not otherwise come together on their own.

CONCLUSION

The above summary of innovation policies in Japan and the United States, and of potential areas for cooperation related to innovation and economic growth policies, in many ways just scratches at the surface of these broad and complex topics. However, it is evident that many challenges and goals are common to both countries—ranging from finding ways to promote new economic growth through bringing innovative products and services to market, and tackling demographic and environmental concerns at home and globally, to enhancing the institutional and policy framework needed to support entrepreneurial activity and commercialization. Possibly more

[160] Japan Council for International Exchange, pp. 33-34.
[161] Japan Council for International Exchange, p. 42.

than ever before, there are important and mutually beneficial opportunities for Japan and the United States to work together in addressing these issues in fully bringing their innovation resources and capabilities to bear.

Collectively, the dialogues, initiatives, and linkages explored above should be viewed as elements of a comprehensive Japan-U.S. agenda for partnership in innovation and growth, offering untapped possibilities for synergies and increased cooperation into the 21st century. As both countries work to advance their future economic growth and competitiveness through advancing innovation, and as integration among the two economies continues to accelerate, it makes sense to explore as fully as possible opportunities to engage with and learn from one another. This also includes through working together to ensure a bilateral and regional economic framework conducive to the healthy and fair competition essential to bringing new technologies, services, and business models to market. While existing initiatives are to a degree fragmented and disparate, their breadth and scope offer important potential for building synergies among them.

This review of innovation policies within the Japan-U.S. economic relationship presents several questions for additional research and exploration, particularly in relation to potential fields of cooperation. First, additional review and case studies of previous examples of Japan-U.S. cooperation—whether policies or government-led initiatives, or private sector or university-level activities—would provide valuable additional insights on success factors, challenges, and lessons learned that could inform future efforts. Many examples cited in this paper reflect relatively recent initiatives, of which it is too early to assess results and outcomes but which themselves will make for important case studies over time.

Second, additional examination of policies and models at both the national and local levels, including those not necessarily explored within existing dialogues linked to innovation, would be informative. Financing and workforce training have been identified by stakeholders in both countries as challenges to innovation, entrepreneurship, and economic growth. Despite significantly different contexts for these in Japan and the United States, there could be useful information to derive from these.

A third area for additional exploration is effective policy mechanisms at both the national and local government levels to help encourage synergies among innovation ecosystem stakeholders. This paper has suggested examining potential approaches that build upon and bring together in new ways existing initiatives and networks across Japan and the United States, including that cultivate organically-driven, people-to-people networks from which significant new ideas and activities often emerge. It does not explicitly call for establishing significant new government institutions or programs that may take significant time, funding, and political capital to establish, yet may not be able over the long term to maintain the agility and flexibility needed for managing policies around an issue as dynamic and complex as innovation. Structures within both the Japanese and U.S. governments for managing and facilitating innovation policy continue to evolve, and the two governments will be challenged to keep pace as new areas of shared interest and opportunities for cooperation may emerge that do not currently exist. In the near and medium-term, it will be important to monitor outcomes of current bilateral activities related to innovation, in order to observe trends, celebrate successes, and identify new opportunities to further advance the Japan-U.S. economic relationship through joining together the powerful energies of innovation and entrepreneurship in both countries.

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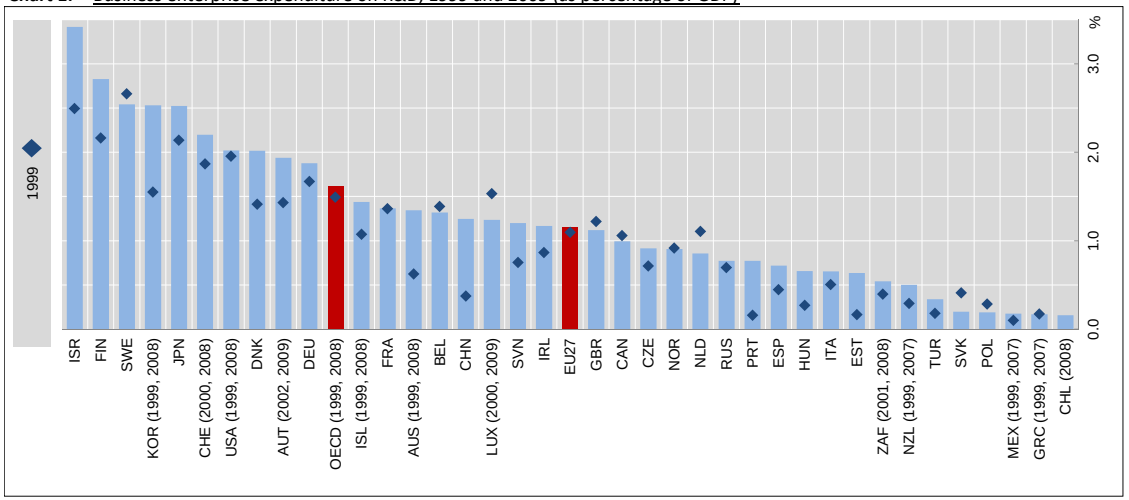
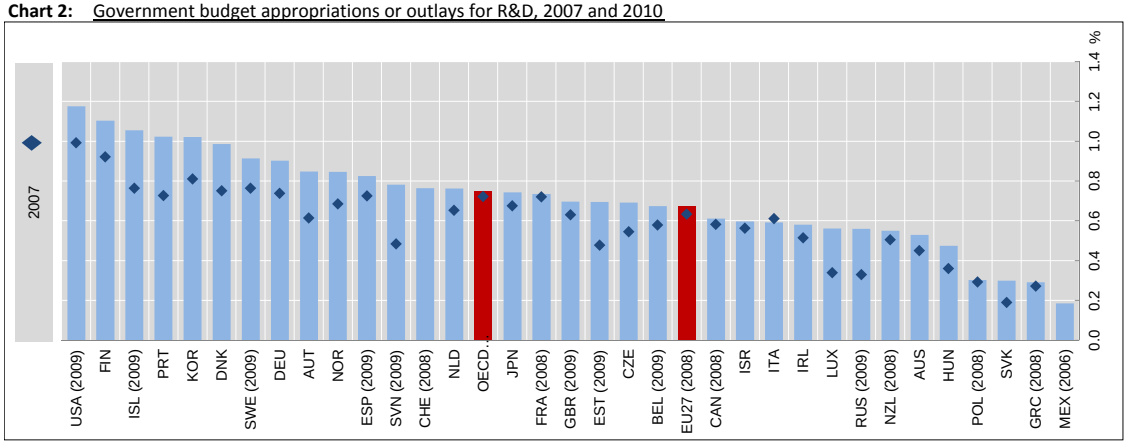
Innovation and Growth Policies in Japan-U.S. Economic Relations: Considering Areas for New Engagement - Charts

Chart 1: Business enterprise expenditure on R&D, 1999 and 2009 (as percentage of GDP)



Source: OECD, Main Science and Technology Indicators Database, June 2011
http://dx.doi.org/10.1787/888932486070

Chart 2: Government budget appropriations or outlays for R&D, 2007 and 2010



Source: OECD, Main Science and Technology Indicators Database, June 2011.
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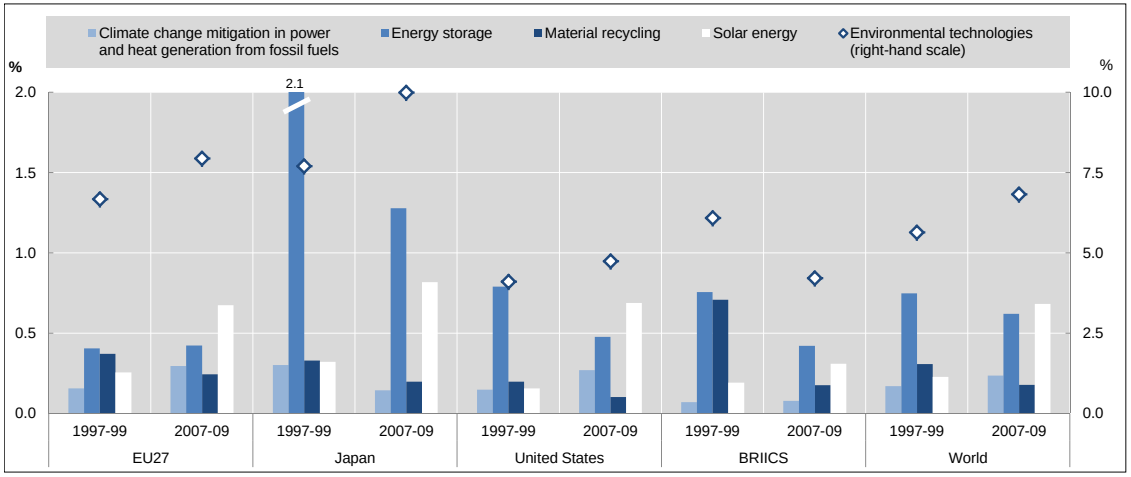
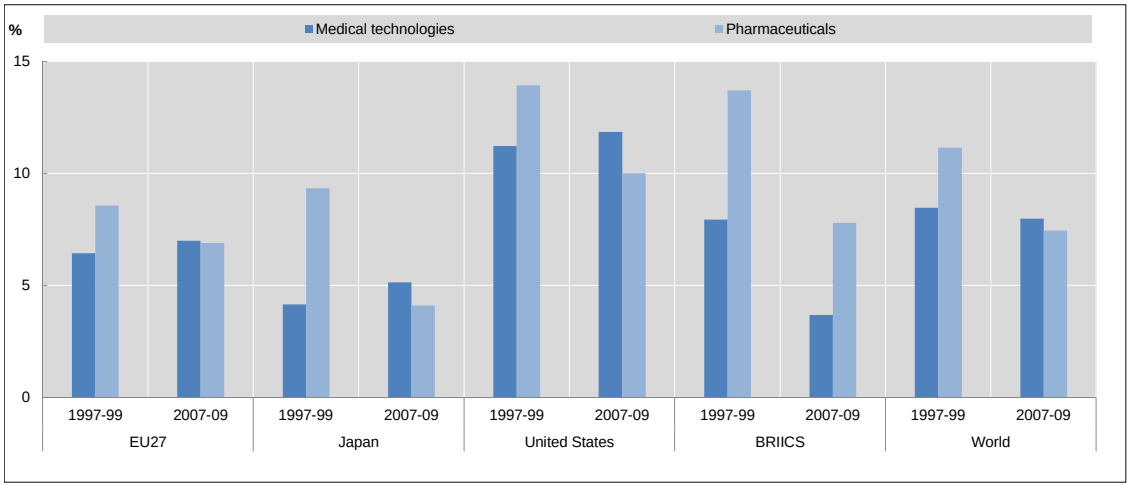
Chart 3 Patents in selected environmental technologies, 1997-99 and 2007-09 (as a percentage of total PCT patent applications)



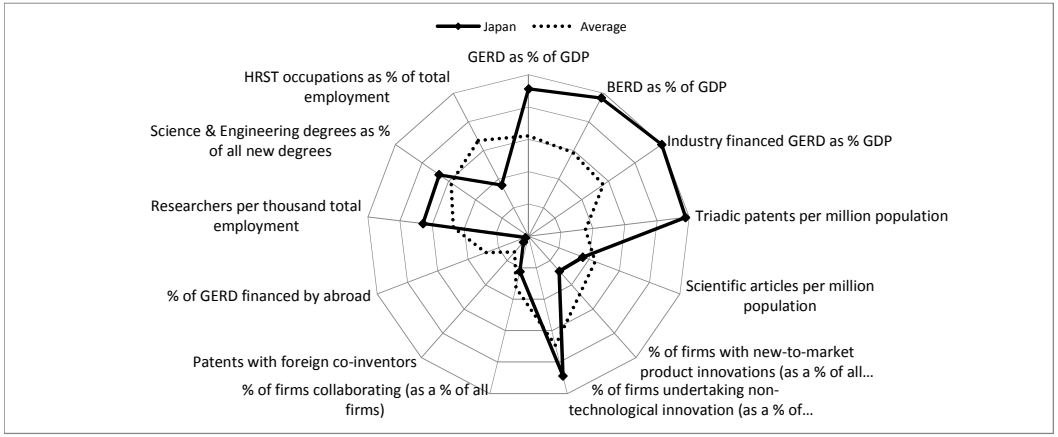
Source: OECD, Patent Database, May 2011.
http://dx.doi.org/10.1787/888932486811

Chart 4 Health-related patents, 1997-99 and 2007-09 (As a percentage of total PCT patent applications)



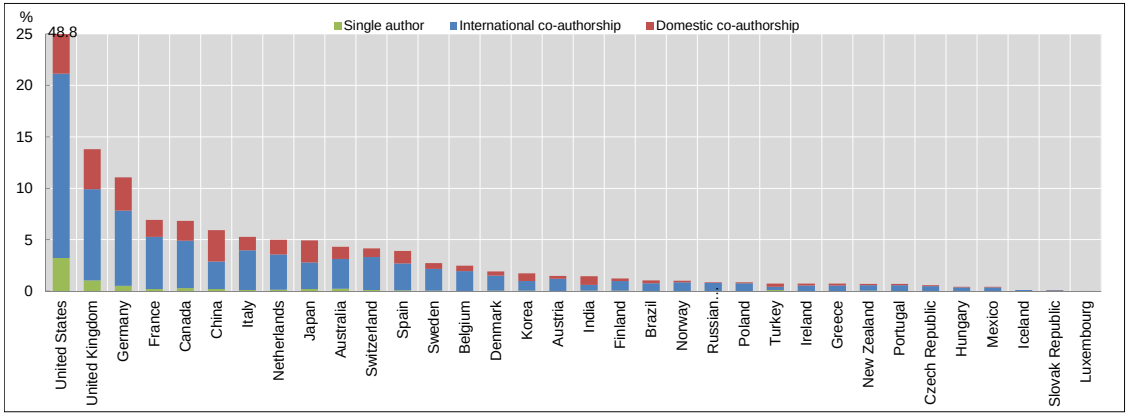
Source: OECD, Patent Database, May 2011.
http://dx.doi.org/10.1787/888932486754

Chart 5 Science and Innovation Profile of Japan



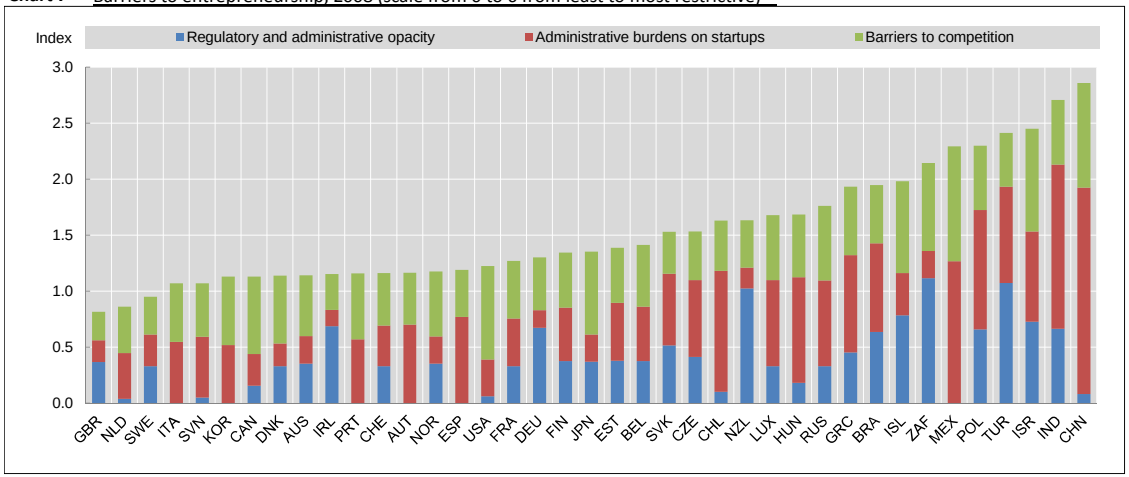
Source: OECD Science, Technology and Industry Outlook 2010
http://dx.doi.org/10.1787/888932334279

Chart 6 Highly cited (top 1%) scientific articles by type of collaboration, 2006-08 (as percentage of highly cited scientific articles worldwide)



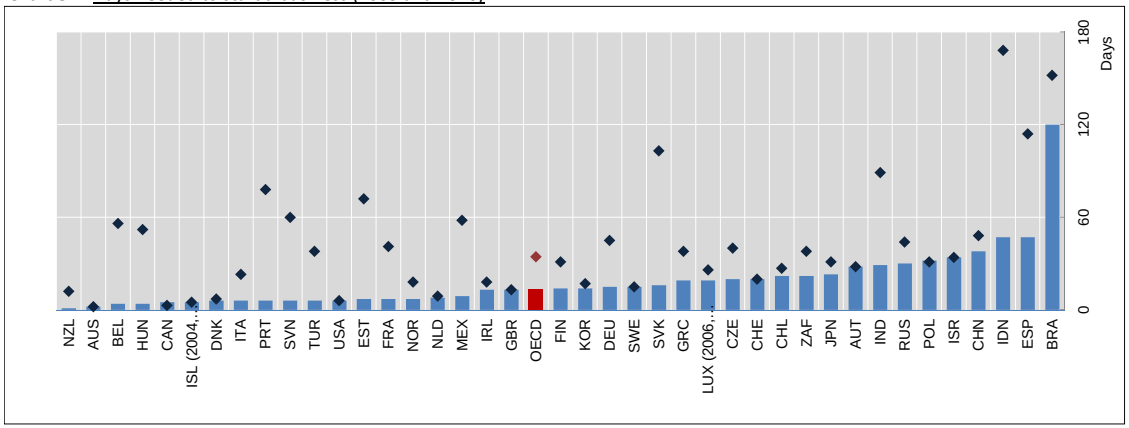
Source: OECD calculations, based on Scopus Custom Data, Elsevier, December 2009.
http://dx.doi.org/10.1787/836087047406

Chart 7 Barriers to entrepreneurship, 2008 (scale from 0 to 6 from least to most restrictive)



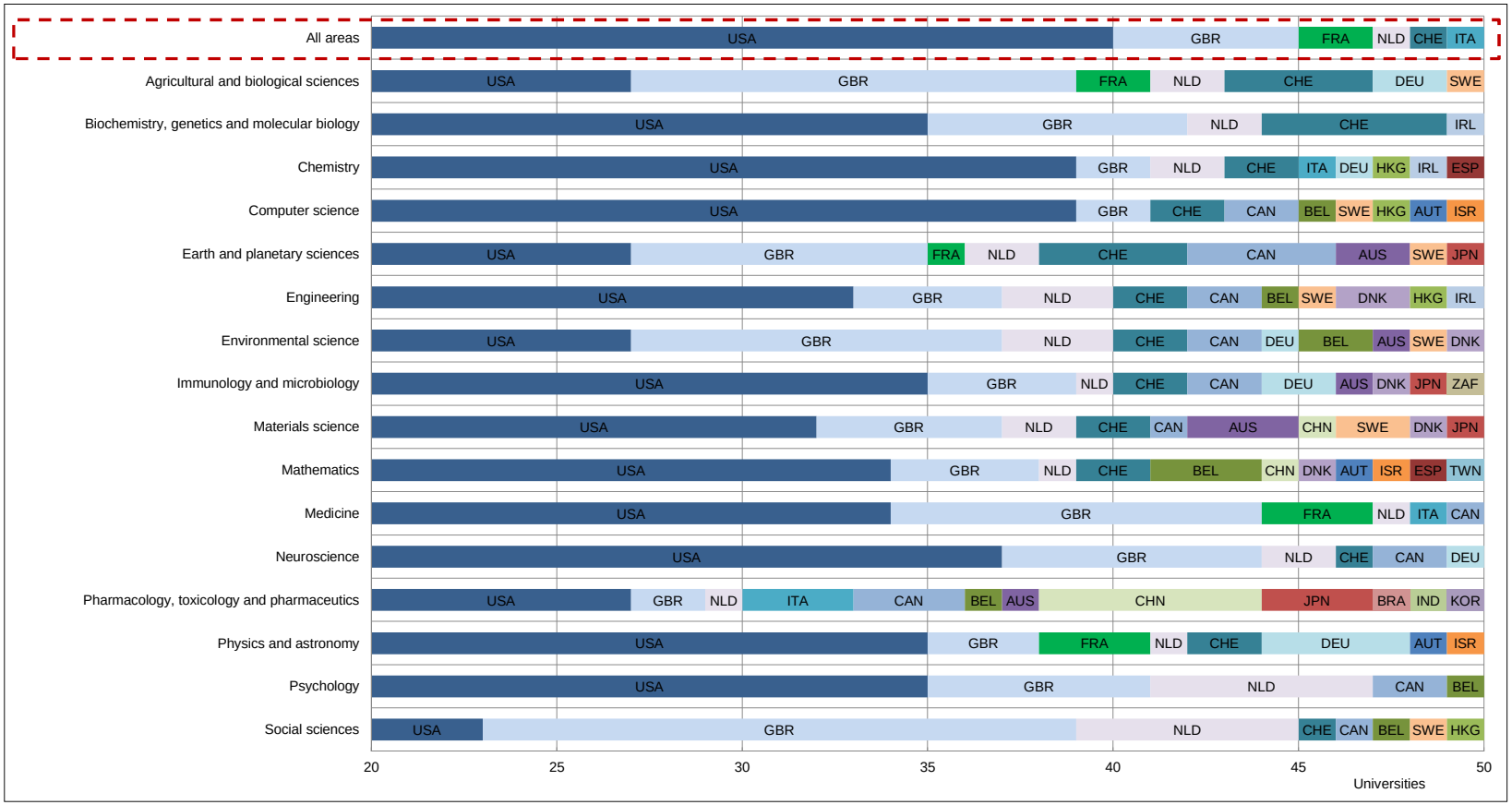
Source: OECD, Product Market Regulation Database, May 2011.
http://dx.doi.org/10.1787/888932487457

Chart 8 Days needed to start a business (2003 and 2010)



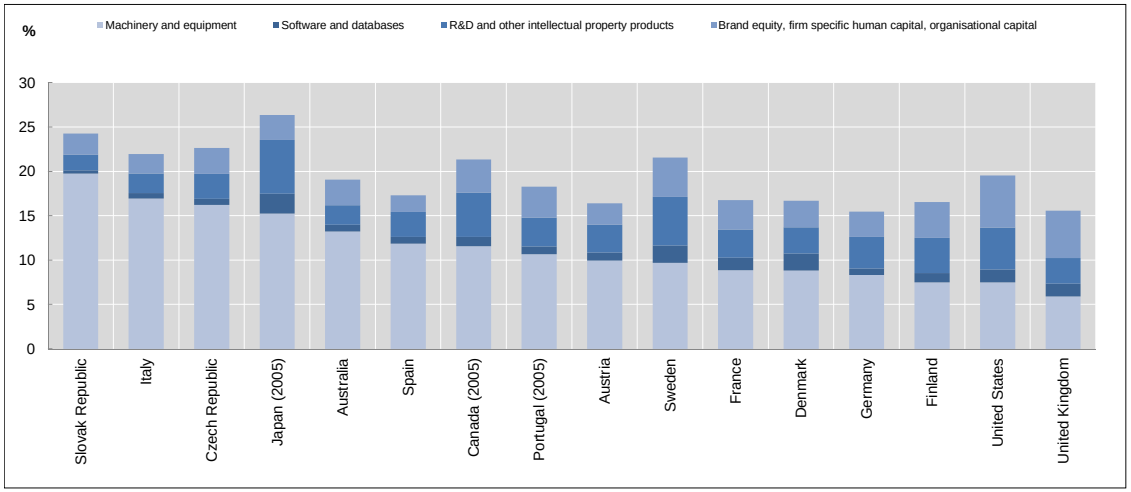
Source: World Bank, Doing Business Database 2011 (Cited by OECD)
http://dx.doi.org/10.1787/888932487438

Chart 9 University hotspots, geographical distribution of highest impact institutions, 2009 (Location of top-50 universities by main subject areas)



Source: OECD and SCImago Research Group (CSIC) (forthcoming), *Report on Scientific Production* , based on Scopus Custom Data, Elsevier, June 2011.
http://dx.doi.org/10.1787/888932485310

Chart 10 Investment in fixed and intangible assets as a share of GDP, 2006



Source: OECD, data on intangible investment are based on COINVEST [www.coinvest.org.uk] and national estimates by researchers. Data for fixed investment are OECD calculations based on EU KLEMS database and OECD, Annual National Accounts Database, March 2010.

http://dx.doi.org/10.1787/834532612432