Athena Alliance

Strengthening Innovation Policy:

Response to Request for Comment on the *Strategy for American Innovation*

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The following is a response to the Request for Information (RFI) (FR Doc. 2014-17761) issued on July 29, 2014 issued by Office of Science and Technology Policy and the National Economic Council request public comments to provide input into an upcoming update of the *Strategy for American Innovation.* This response contains four sections with specific comments on questions raised within the RFI:

- Understanding How Intangible Assets Fuel Economic Growth (Question 2)
- Enhancing Policy Development and Implementation (Question 4)
- Evaluating Administration Initiatives (Question 4)
- Foster Design Thinking (Question 6)
- Financing Innovation Through Intellectual Property (Questions 15 & 17)

Understanding How Intangible Assets Fuel Economic Growth

Response to Question (2) which asks "What are the biggest challenges to, and opportunities for, innovation in the United States that will generate long-term economic growth, increased productivity, sustained leadership in knowledge-intensive sectors, job creation, entrepreneurship, and rising standards of living for more Americans?"

The biggest opportunity is to build upon our intangible capital. Our biggest challenge is understanding how to carry out that task. Increased investment in intangibles is not enough.

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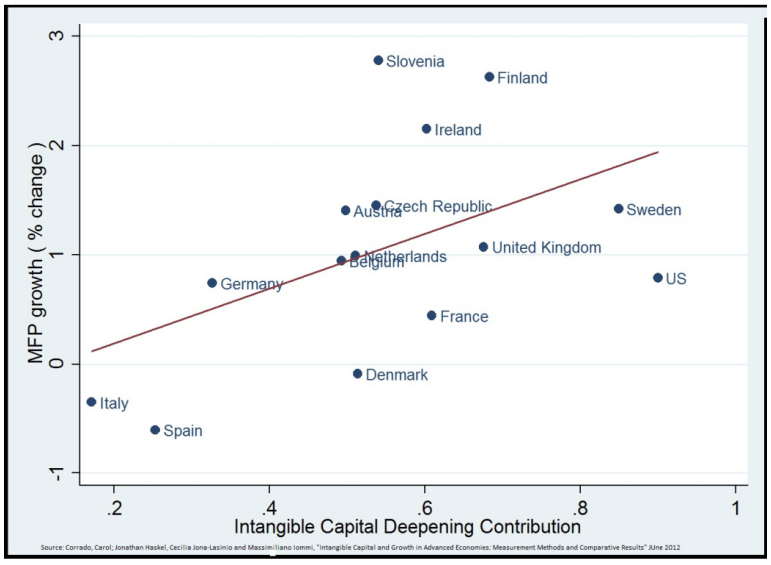
Investments must be effective in raising productivity. **We propose a research agenda to understand why the U.S. lags other nations in translating intangibles investment into productivity gains.**

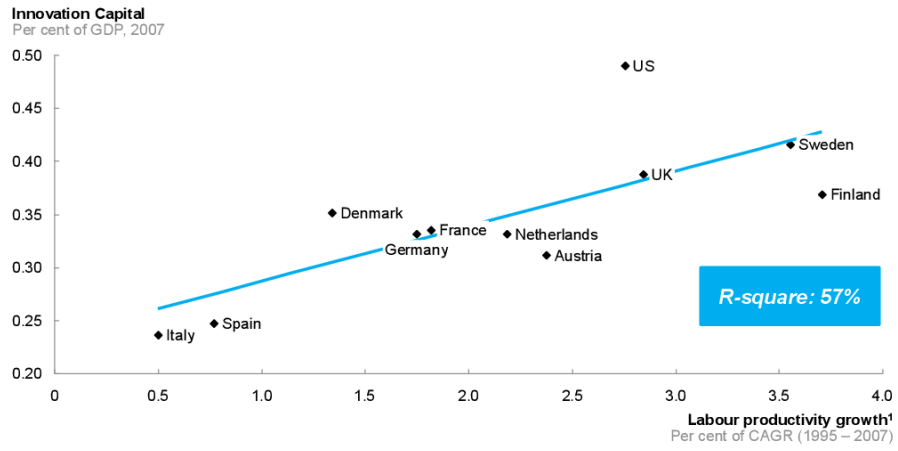
The Organization for Economic Cooperation and Development (OECD) has recently concluded a large study on impact of intangible assets—what they refer to as Knowledge Based Capital (KBC).[1] As the OECD notes:

> Business investment in KBC helps boost growth and productivity. Studies for the European Union and the United States show business investment in KBC contributing 20% to 34% of average labour productivity growth.[2]

However, we do not understand how intangibles raise productivity and what are the most effective policies for fostering investment and raising productivity. We propose a research project to survey of efforts in other countries to advance the understanding of intangibles and their role in corporate performance and economic growth, promote financial investments in intangible assets, and foster the utilization of intangibles.

Our lack of understanding can be summarized by analyzing the following two charts. The first is from Corrado, et. al. "Intangible Capital and Growth in Advanced Economies: Measurement Methods and Comparative Results" which uses the now widely accepted framework for measuring intangible capital. [3] The second is from a McKinsey report on *Innovation Matters: Reviving the Growth Engine*.[4] The McKinsey report introduces an index of "Innovation Capital" as a combination of "Physical Capital" (i.e. ICT infrastructure), "Knowledge Capital" and "Human Capital" which builds on (but is different from) the work of Corrado, Haskel and others.





1 2005 real prices

SOURCE: Corrado, Carol, Jonathan Haskel, Cecilia Jona-Lasinio and Massimiliano Iommi (2012), "Intangible Capital and Growth in Advanced Economies: Measurement Methods and Comparative Results" available at www.INTAN-Invest.net; McKinsey analysis

From: McKinsey, *Innovation Matters: Reviving the Growth Engine*, June 2013

In both cases, the graphs confirms that innovation capital (or intangible capital) is important for productivity growth. The striking feature, however, is that the U.S. gets less productivity growth from its investments in innovation capital than other nations. The first graph shows that other nations, such as Finland, Ireland and even Slovenia get greater productivity growth from their investments in intangible capital than the United States. The second graph tells the same story. The U.K. gets the same amount of labor productivity growth as the U.S. from a smaller investment in innovation capital and Finland gets a much higher rate of labor productivity growth with about the same level as the U.K. investment. [Note the axis are reversed in this graph from the McKinsey graph.]

The data presented here makes an important point: increasing investment in intangibles is not enough. Policy must also look at the effectiveness of that investment in raising productivity. Why is it that the U.S. does so badly in the productivity return on its intangible asset investments compared to other nations (as point out in the first chart)? This will require a new line of research as to how intangibles actually work in boosting productivity in the economy.

We suggest the research agenda include at least the follow items:

- Creation of a more refined set of metrics about investment in specific types of intangible assets.
- An evaluation of whether the composition helps account for the national differences.
- An expansion and augmentation of current efforts to collect data on these investments with better official data.

- A more detailed understanding of policies in those more effective countries. A great deal of cross country studies have been done on innovation policy but there are no studies that look specifically at the particular country policies that affect how investments in intangible assets translate into productivity increases.

Enhancing Policy Development and Implementation

Response Question (4) which asks "How can the Federal Government augment its overall capacity for analysis of both the forces that determine the competitiveness of specific sectors and the impact of Federal policies—including, but not limited to, science, technology, and innovation policies—on sector-specific productivity and competitiveness?"

We propose the creation of a new system for the review and implementation of U.S. economic competitiveness policy. Specifically, we support an earlier proposal from the Center for American Progress (CAP) report *A Focus on Competitiveness: Restructuring Policymaking for Results* to create the following review structure[5]:

- A Quadrennial Competitiveness Assessment by an independent panel of the National Academies whose objectives are to collect input and information from many sources and perform a horizon scan that identifies long-term competitiveness challenges and opportunities;
- A Biannual Presidential Competitiveness Strategy that lays out the president's competitiveness agenda and policy priorities, and captures the attention and buy-in of cabinet principals;
- An Interagency Competitiveness Task Force led by a new deputy at the National Economic Council that develops the biannual strategy, oversees White House coordination of competitiveness initiatives, and monitors their implementation by agencies; and,
- A Presidential Competitiveness Advisory Panel of business and labor leaders, academics, and other experts who assist the administration in developing policy details.

As an alternative to the last point, we note that there was an independent organization carrying out this task. The Competitiveness Policy Council was created in the Omnibus Trade and Competitiveness Act of 1988 (specifically the Competitiveness Policy Council Act, 15 U.S.C. §4801 et seq.). However, it has not had an appropriation since FY 1996.

Evaluating Administration Initiatives

Response to Question (4)

In the past six years the Administration has instituted or expanded several measures to promote innovation and improve our understanding of it. A partial list includes:

- The Science of Science and Innovation Policy (SciSIP) program (NSF)
- STAR METRICS (NSF, OSTP, and NIH)
- The Advanced Research Projects Agency-Energy (ARPA-E) (DOE)
- The National Nanotechnology Initiative (multiple agencies)
- Innovation prize competitions (multiple agencies)
- The JOBS Act (multiple agencies)
- Regional Innovation Cluster Initiative (SBA and other agencies)
- The America Invents Act patent reforms (USPTO)
- The National Center for Advancing Translational Sciences (NIH)
- Capitalization of more intangible assets (e.g., R&D) in the national economic accounts (DOC/BEA)
- National Network for Manufacturing Innovation (DOC/NIST and other agencies)

A full evaluation of many of these initiatives is premature, yet the history of innovation measures in previous Administration is not encouraging. They are often temporary and tend to be under-resourced. **We propose that the Administration strengthen its legacy by commissioning an independent interim assessment of good practices as well as the shortcomings of the most important measures.** In a few cases such evaluations have been mandated by Congress and are underway (e.g., NNI, ARPA-E). There should be an effort to capture the lessons of other important measures, such as the many prize competitions and challenges carried out across the government.

Foster Design Thinking

Response to Question (6) which asks "How has the nature of the innovation process itself changed in recent years and what new models for science and technology investment and innovation policy, if any, do these changes require?"

Two of the major shifts in the innovation process have been the increasing importance of non-technological aspect especially the role of design and the emphasis on user input in an iterative process. These two have combined to create an innovation process know as design thinking. **To foster design thinking, we propose funding 5 colleges or universities to create design schools (d.schools) similar to the Stanford d.school (Hasso Plattner Institute of Design).**

The proposal builds upon the "manufacturing universities" proposal to grant 25 universities $5 million each per year for four years to revamp their engineering teaching and research activities toward manufacturing and engage in greater joint industry-university research projects. At $5 million per year for 5 schools, the total budget for creating new design schools would be $25 million.

The linkage between design and manufacturing is well established. Both are key elements in sustaining competitive advantage as the MIT Production in the Innovation Economy (PIE) project has pointed out.[6] The National Academy of Engineering (NAE) report of a workshop on *Making Value: Integrating Manufacturing, Design, and Innovation to Thrive in the Changing Global Economy* makes a similar point. As one workshop participant said, "The new model is that we are all producers, we are all designers."[7]

But design is more than the physical and visual attributes of a product. Design thinking is an approach to problem solving and the innovation process involving iterative proposals and prototypes in close interaction with the ultimate user. Rather than a linear analytical flow from problem definition to final optimal solution, the process involves feedback and rapid prototyping of possible solutions. Design thinking integrates analytics with experimentation and iterative learning. Following the design thinking view, innovation is the process of crafting solutions to customer needs rather than creating a product or a service. Those solutions can be customer-specific or scalable to a large number of like customers.

This new model of innovation calls for people trained in the interface of design-engineering-business. Which is exactly what the Stanford d.school does:

> The d.school is a hub for innovators at Stanford. Students and faculty in engineering, medicine, business, law, the humanities, sciences, and education find their way here to take on the world's messy problems together. Human values are at the heart of our collaborative approach. We focus on creating spectacularly transformative learning experiences, and inevitably the innovations follow. Along the way, our students develop a process for reliably producing creative solutions to nearly any challenge. This is the core of what we do.[8]

As the New York Times noted in a story last year on the Stanford d-school:

> In the eight years since the design school opened, students have churned out dozens of innovative products and start-ups. They have developed original ways to tackle infant mortality, unreliable electricity and malnutrition in the third world, as well as clubfoot, a common congenital deformity that twists a baby's feet inward and down.[9]

Other examples of similar institutions include the Rotman School of Management at the University of Toronto[10] and the Institute of Design at the Illinois Institute of Technology.[11] As the Wall Street Journal reported in a 2012 article "Forget B-School, D-School Is Hot," "more and more business schools are incorporating courses on "design thinking."[12]

More to the point was this statement in the New York Times story: "Sarah Stein Greenberg, a D.school alum and managing director, says she receives inquiries every week from universities looking to mimic the D.school curriculum."[13] It is time to push the envelope on this new approach to innovation by helping fund these efforts and create five new d.schools.

It should also be noted that Question (9) of the RFI asks "What additional opportunities exist to develop high-impact platform technologies that reduce the time and cost associated with the 'design, build, test' cycle for important classes of materials, products, and systems?" The overarching answer to that question lies in changing the mindset of those using those platforms. Using new technologies (platforms) in the old linear process defeats the purpose. Design thinking needs to be incorporated into these platforms.

Thus, other steps beyond the 5 new d.schools could be taken as well. The Manufacturing Extension Partnership (MEP), EDA and SBA services should be expended to explicitly include design thinking assistance. Some portion of the numerous programs to help fund STEM education should go to support design thinking, especially in K-12.

Financing Innovation Through Intellectual Property

Response to Question (15) which asks "What new or existing investment models should be explored to support entrepreneurship in new geographies, as well as in technologies and sectors that are capital-intensive, relatively high-risk, and require sustained investment over long periods of time?"
and to
Question (17) which asks "What tools, business model innovations, financial innovations, or other developments hold promise for reducing the cost of starting and scaling a business in capital intensive sectors like the life sciences, advanced materials, and clean energy?"

Both of these questions concern the development of new mechanisms for financing innovation. Our proposal is for a first step in better utilizing intellectual property (IP) in the lending process. **The Small Business Administration (SBA) and U.S. Patent and Trademark Office (USPTO) should convene a working group of lenders, regulators and other interested parties to develop a common template to be used when describing and valuing IP and intangible assets used implicitly or explicitly as collateral.** The Intellectual Property Office in the United Kingdom (UK IPO) is already undertaking such an activity.[14] Any U.S. effort should communicate, and to the extent possible coordinate, with that activity .

Companies have long been able to raise money based on their physical and financial assets. In contrast, intangible assets—such as patents, trademarks, and copyrights—are largely hidden, and therefore generally unavailable for financing purposes. That is not to say that intangibles are completely missing from financing activities. The first trade secrets case in the United States involved the debt on a bond secured in part by a secret chocolate-making process in 1837.[15] In 1884, Ara Shipman loaned Lewis Waterman $5,000 to start a pen-manufacturing business, secured by Waterman's patent.[16] More recently, William Mann found, based on USPTO filings of a creditor's security interest in a patent, "20% of patents held by domestic corporations during the 1990s had been used as collateral at some point in their lives."[17] Research by Maria Loumioti found that "twenty-one percent of U.S.-originated secured syndicated loans during 1996-2005

have been collateralized by intangibles, with intangible asset collateralization significantly increasing over this time period."[18]

Such deals, however, continue to be more like "one-off" activities. Intangibles are not yet part of the routine loan evaluation. A huge opportunity cost is imposed on the U.S. economy when such a large source of potential financing is locked up. Because intangible assets are not generally available as a source of investment and risk capital, innovative companies may face higher capital costs—or even a dearth of capital—to fund new ideas. Unable to use their intangible assets as a financial tool, prospective borrowers face a system that does not understand their true revenue potential and is unable to judge operational risks appropriately.

The failure to overtly include intangible assets in the underwriting process may also have the consequences for the stability of the financial system. Lack of transparence can result in both an underestimation in the amount of collateral a lending institution has to call on in case of default and a miscalculation of a lending institution's ability to recapture collateral if the lending institution is dealing with an asset it does not understand. Banks don't necessarily have an inventory of the IP collateral in their loan portfolios. Standard terms of loans are often all inclusive liens, which cover everything including the kitchen sink. IP is not necessarily explicitly listed. In some case, there may actually be a "negative pledge agreement" -- where the borrower is explicitly forbidden from using their IP as collateral (a condition a VC investor might put on a company in order to protect their investment). Likewise, the IP might be already somehow encumbered by previous liens or licensing agreements.

In the past year, both the UK IPO and the World Bank have issued reports calling for a more proactive public policy stance to foster the utilization of intangibles generally and IP specifically in the financing process.[19] Over the past few years we have also undertaken a number of studies of intangible asset backed financing.[20]

As noted earlier, the UK IPO has already begun and has established working groups in a number of areas. One group is focused on ways to increase awareness in the business and financial communities of the role of IP and to help the two sides of the financing process to better understand each other. The second is focusing on building templates building based on existing methods for describing and valuing IP to common language so that the process is more standardized.[21]

The US PTO and the SBA should undertake a similar activity.

Additional actions could be taken once a common template has been developed. Bank regulators could use this foundation take steps to study and collect information on the role of intangibles in the financial system—and to underscore the risks of ignoring them.

The information gained combined with a common template would serve as the foundation for the SBA to take the next step in developing underwriting standards for IP. SBA provides a vital role

in financing new and small businesses through loan guarantee programs—such as the 7a Program. SBA revised its Standard Operating Procedure (SOP) for the 7a Program to make it clear that loans can be used for the acquisition of intangible assets when buying an ongoing business. However, the rules are unclear as to whether intangible assets can be used as collateral. Building upon the SBA can working with commercial lenders to develop standards for the use of intangible assets as collateral, similar to existing SBA underwriting standards.

Notes:

[1] See OECD, *New sources of growth: Knowledge-based capital*, http://www.oecd.org/sti/ind/newsourcesofgrowthknowledge-basedcapital.htm.

[2] OECD, *Supporting Investment in Knowledge Capital, Growth and Innovation*, Organization for Economic Cooperation and Development, Paris 2013, p. 17, http://www.keepeek.com/Digital-Asset-Management/oecd/industry-and-services/supporting-investment-in-knowledge-capital-growth-and-innovation_9789264193307-en.

[3] Carol Corrado, Jonathan Haskel, Cecilia Jona-Lasinio and Massimiliano Iommi, "Intangible Capital and Growth in Advanced Economies: Measurement Methods and Comparative Results," Co-Invest, June 2012, http://www.coinvest.org.uk/pub/IntanInvest/WebHome/Methods_and_Comparative_Data_-_June_2012-7.pdf.

[4] McKinsey, *Innovation Matters: Reviving the Growth Engine*, London, UK, June 2013, http://www.mckinsey.com/%7E/media/McKinsey%20Offices/United%20Kingdom/PDFs/Innovation%20matters%20v8_McKinsey%20branded.ashx.

[5] *A Focus on Competitiveness: Restructuring Policymaking for Results*, Center for American Progress, December 2010, http://www.americanprogress.org/issues/economy/report/2010/12/01/8730/a-focus-on-competitiveness/.

[6] http://web.mit.edu/pie/

[7] National Academy of Engineering, *Making Value: Integrating Manufacturing, Design, and Innovation to Thrive in the Changing Global Economy*, Washington, DC, 2012, http://www.nap.edu/catalog.php?record_id=13504.

[8] http://dschool.stanford.edu

[9] Nicole Perlroth, "Solving Problems for Real World, Using Design," *New York Times*, December 29, 2013, http://www.nytimes.com/2013/12/30/technology/solving-problems-for-real-world-using-design.html.

[10] http://www.rotman.utoronto.ca

[11] https://www.id.iit.edu

[12] Melissa Korn and Rachel Emma Silverman, "Forget B-School, D-School Is Hot," *Wall Street Journal*, June 7, 2012, http://online.wsj.com/article/SB10001424052702303506404577446832178537716.html.

[13] Perlroth, op. cit.

[14] *Banking on IP: An Active Response*, UK Intellectual Property Office, Newport, UK, March 2014, http://www.ipo.gov.uk/ipresearch-bankingip-2014.pdf.

[15] Appendix B. *Vickery v. Welch.* In R. Mark Halligan and Richard F. Weyard, *Trade Secret Asset Management,* Aspatore Books, Boston, 2007, pp. 181–186.

[16] Stephen van Dulken, *Inventing the 19th Century*. New York University Press, New York, 2001, p. 86.
Also, this transaction led to a major patent law case, *Waterman v. Mackenzie*, 138 U.S. 255 (1891), where the Supreme Court ruled that a licensee without title cannot sue for infringement. William J. Murphy, "A Proposal for a Centralized and Integrated Registry for Security Interest in Intellectual Property, Appendix 19—*Waterman v. Mackenzie*," *IDEA: The Journal of Law and Technology*, Vol. 41, Nos. 3 & 4, 2002, pp. 561–562.
http://www.idea.piercelaw.edu/articles/41/41_3-4/Appendices/19.Appendix.pdf.

[17] William Mann, "Creditor Rights and Innovation: Evidence from Patent Collateral," November 17, 2013, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2356015.

[18] Maria Loumioti, "The Use of Intangible Assets as Loan Collateral" November 1, 2012, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1748675.

[19] Martin Brassell and Kelvin King, *Banking on IP? The role of intellectual property and intangible assets in facilitating business finance*, UK Intellectual Property Office, Newport, UK, November 2013, http://www.ipo.gov.uk/ipresearch-bankingip.pdf.
Juan Mateos-Garcia, *Using intellectual property to raise finance for innovation*, Innovation Policy Platform, World Bank, 2014, https://innovationpolicyplatform.org/sites/default/files/rdf_imported_documents/Case_Study-IP_for_Financing.pdf.

[20] Ian Ellis, *Maximizing Intellectual Property and Intangible Assets: Case Studies in Intangible Asset Finance*, Athena Alliance Working Paper #07, November 2009, http://www.athenaalliance.org.
Kenan Patrick Jarboe and Roland Furrow, *Intangible Asset Monetization: The Promise and the Reality*, Athena Alliance Working Paper #03, April 2008, http://www.athenaalliance.org.

[21] Personal communications, Tony Clayton, Chief Economist, UK Intellectual Property Office, September 10, 2014.