



## Athena Alliance

Exploring the promise and pitfalls of the global information economy

### Crafting an Obama Innovation Policy

Kenan Patrick Jarboe\* and Stephen Merrill†

December 2008

Throughout the campaign and since his election, Barak Obama has made it clear that long-term economic growth—not just economic recovery—is a priority. He also understands the importance of technology in reaching that goal. The campaign advanced a well-thought-out list of technology policy recommendations. Among other measures, candidate Obama talked about the need to accelerate funding for research and development (R&D); support science, technology, engineering, and mathematics (STEM) education at all levels; make the Research and Experimentation (R&E) tax credit permanent; reform the patent system; deploy next-generation broadband networks; develop new manufacturing technologies; and double the investment in alternative energy technologies.<sup>1</sup>

In addition to carrying through on these commitments, President-elect Obama faces an opportunity and a challenge. The opportunity is to broaden his agenda into an innovation policy focused on other drivers of growth—not just science and technology. The challenge is to make the best use of existing and new institutions of government to design and implement that policy without getting in each others' way. The existing institutions, which under President Bush forfeited any serious role in technology and innovation policy, are for starters the Department of Commerce (DOC), the White House Office of Science and Technology Policy (OSTP), and the National Economic Council (NEC). The new institutions include the President's Council on Innovation and Competitiveness (PCIC) and the Office of the Intellectual Property Enforcement Coordinator (IPEC)—both created by the last Congress—

---

\* President, Athena Alliance

† Director, National Academies' Board on Science, Technology, and Economic Policy (STEP). The views expressed in this paper do not represent positions of the Academies, the STEP Board, or any of the institution's other appointed committees.

the proposed Chief Technology Officer (CTO), the Office of Health Reform, and the advisor for environment and energy.

The Obama Administration can meet this opportunity and challenge through a series of near-term and longer-range actions some of which we describe in this paper. The short-term actions would signal a commitment to a broad innovation agenda. The longer-range actions could significantly strengthen the nation's innovation capacity.

## Moving Toward a Broad Innovation Policy

Crafting an innovation strategy starts with an understanding that its scope extends beyond the support of science and the development of tangible technologies. As historian and educator Lawrence Husick put it in *From Stone to Silicon: A Brief Survey of Innovation*:

“Innovation” is not just inventions; it is a process of making changes by introducing valuable new methods, ideas, or products . . . . Innovations may of course be inventions, but they may also be beliefs, organizational methods, and discoveries. An innovation is a value-creation mechanism. It is the way we humans manage to extract more value, generate more economic surplus . . . .<sup>2</sup>

Similarly, when the *Financial Times* recently issued its FT Climate Change Challenge, it emphasized that, “[t]he innovation need not be technological . . . . [C]reativity could equally come in marketing, financing, analysis or in an entire business model.”<sup>3</sup>

George Mason University Professor Christopher Hill suggests in his article, “The Post-Scientific Society,” that, “the creation of wealth and jobs based on innovation and new ideas will tend to draw less on the natural sciences and engineering and more on the organizational and social sciences, on the arts, on new business processes, and on meeting consumer needs based on niche production of specialized products and services in which interesting design and appeal to individual tastes matter more than low cost or radical new technologies.”<sup>4</sup>

The need for an innovation policy, encompassing but not limited to a revitalized technology policy, is driven by changes in the economy and the basis of business competition.<sup>5</sup> Twenty years ago, the operational issues were product quality and labor productivity; now, they are customization, speed, product and service design, and responsiveness to customer needs. A generation ago, our focus was on individual integrated firms and discrete industries. Now, industries from computing to pharmaceuticals and biotechnology are organized in networks. Firms commonly specialize in one or a limited set of activities and contract with others that specialize in other activities, often in totally different industries. In the 1980s, the United States faced global competition in goods and loss of domestic manufacturing firms. Today, that international competition and global redistribution of activity have reached into services once thought to be rooted in a particular country or locality.

In addition to increased specialization, we see a greater fusion of manufacturing and services. Companies that make products rely as much on the “service” aspect of their business as on manufacturing activity. As knowledge gains importance as a factor of production, all companies must utilize their intangible assets—including the skills of their workforce—to improve both their service and their manufacturing capabilities.

The new environment highlights the fact that innovation is not a linear process flowing from basic research to final product but rather a network process with many “feed-in” and feedback opportunities. Observers have coined a number of terms to describe this: *open innovation*, *user-driven innovation*, and even *design thinking*. Lewis Branscomb, in a recent *Science* article, refers to relational networks with a series of nonlinear feedback loops with “dynamic links based on trust and orchestration.”<sup>6</sup>

Further, innovation depends on people and organizations. Skills, not just education, are critical. Tacit and experiential knowledge—not just codified and science-based knowledge—are important. To put those skills and knowledge to productive use, organizational structure comes into play. The old hierarchal systems of the industrial age are no longer adequate or appropriate. New adaptive organizations—what we used to call *high-performance work organizations*—are needed to make effective use of worker skills and knowledge.<sup>7</sup>

## Organizing for Innovation Policy

Crafting an innovation policy cognizant of these changes is a daunting job: It requires recognizing, evaluating, and using a variety of government policy levers, many of them not usually associated with research and technology development, and it entails coordinating disparate parts of government. For this, there is no playbook comparable to the National Academies’ report, *Rising Above the Gathering Storm*, which distilled recommendations for science and technology policy from a number of previous efforts.<sup>8</sup>

Development of an innovation policy roadmap may be feasible and valuable to undertake (provided that, like technology roadmaps, it is revisited and revised over time). Nevertheless, organizing for innovation policy—in the first instance at the White House level—won’t wait. That proposition raises two questions. The first—why lodge responsibility for policy development and coordination in the White House—is more easily answered. It is because innovation is central to the economy’s restructuring and long-term growth prospects—the President’s chief preoccupations for the foreseeable future.

The second question—where to assign responsibility within the White House—has, as we suggested earlier, several possible answers, including the OSTP, the NEC, the CTO, and conceivably other configurations. We favor the NEC, the entity with the broadest jurisdiction and highest level reporting to the President. The alternatives are unlikely to take the broad view of innovation required.

There may be concern that innovation policy will be lost in an institution necessarily preoccupied with financial restructuring and designing an effective economic stimulus program. That is a risk, but it was not the history of the NEC when it was established at the outset of the Clinton administration, when economic recovery—if not a severe crisis—dominated policymaking. It was early in the Clinton term that knowledgeable NEC deputies with high-level support fashioned the last “innovative” technology policy initiatives, including the National Nanotechnology Initiative.

To help craft and carry out a broad innovation agenda, the NEC could make effective use of a mechanism created by the previous Congress. Section 1006 of the America COMPETES Act provides for a President’s Council on Innovation and Competitiveness made up of the heads of 16 departments and agencies (a nonexclusive list).<sup>9</sup> The law gives the President latitude in organizing, using, and certainly in staffing this Council. For example, it would be consistent with congressional intent for the President himself or the head of the NEC to chair the PCIC and for an NEC deputy director to serve as chief of staff.

Regardless of the location, it is important not to proliferate entities concerned with innovation policy, such that the result is an information technology (IT) innovation policy, a biomedical innovation policy, and an innovation policy for energy and climate change mitigation. Sectoral differences are, of course, important but should not dominate to the exclusion of initiatives that promote innovation across the economy. As a general proposition, the Administration should favor consolidation, not proliferation, of jurisdictions that often appear to be advocates of particular constituencies—an appearance that weakens rather than strengthens their influence in the White House setting. Among the remaining White House agencies, the risk of fragmentation can be mitigated in part by joint appointments—for example, to the NEC *and* the OSTP. Already, there is a precedent in the appointment of the Secretary of Health and Human Services as the Director of the White House Office of Health Policy. This device has the further advantage of containing the size of the White House staff and budget; but its success depends of course on the ability of White House agency heads to work effectively together.

## Short-Term Actions

The Obama Administration could take any of several actions, beyond the organizational decisions, to both signal a commitment to a broad innovation policy and lay the groundwork for longer-range actions. The following actions would advance this agenda:

- Renaming the Baldrige Quality Award the *Baldrige Quality, Productivity, and Innovation Award*. Over the years, the criteria for the Baldrige Award have changed with the times. As these criteria have shifted and broadened, the award has become much more productivity and innovation focused. Much of this shift, however, has not been recognized. The change in the name would both better advertise the broader nature of the award and provide an opportunity to review and modify the criteria to

reflect this broader view. In addition to changing the name, the award should be given greater visibility by the President. By presenting the awards personally, the President could use it as an opportunity to showcase innovative American companies and collaborations. The National Science and Technology medal criteria could also be broadened to recognize a small number of individual contributions to innovation that are not solely technology based.

- Expanding and renaming the Manufacturing Extension Partnership (MEP) the *Innovation and Productivity Extension Partnership* (IPEP). The MEP program has been a successful mechanism for increasing quality and productivity in small- and medium-sized manufacturing companies. We should build on that success by expanding the scope of MEP's services to include both innovation activities and to encompass service companies as well as manufacturing companies. Doing so would require a phased expansion of the program's budget and staffing into areas of marketing, finance, and business model development beyond simply new product development and process adoption.
- Enabling the National Science Foundation's (NSF) Engineering Research Centers program to support the creation of Design Research Centers as well as promote research and teaching of integrated design thinking. Innovation success is heavily reliant on design as a key component but not simply involving the physical appearance of products. A new approach to applied problem solving and innovation is emerging under the rubric of *design thinking*. Successful models include the Stanford Design School and the Institute of Design at the Illinois Institute of Technology (IIT), among others.
- Implementing the America COMPETES Act call to study of how the federal government could support research and teaching related to the services industries and service functions in the manufacturing sector. Some suggest that there is already a well-defined discipline of "service science" that merits support and replication across more higher education institutions. Whether or not that is the case could be answered by such a study, which, like other provisions of the 2006 Act, has not been implemented.
- Endorsing, operationalizing, and funding the recommendations of Commerce Secretary Gutierrez's Advisory Committee on Innovation Measurement in the 21st Century.<sup>10</sup> Among other things, this means supporting and accelerating efforts of the DOC's Bureau of Economic Analysis to revise the national economic accounts by converting intangible business assets (R&D, software, intellectual property, human capital, brand identification, and organizational capacity) from expenses to investments with future returns. Although Federal Reserve Board staff studies—corroborated by similar analyses in the UK and Japan—find that intangible investments exceed spending on plants and equipment and account for a significant

portion of economic and productivity growth, that fact is unlikely to be given full weight in economic policymaking until reflected in the nation's official accounting.<sup>11</sup>

- Undertaking a number of measures, outlined below, to enhance disclosure and utilization of intangibles:<sup>12</sup>
  - The Securities and Exchange Commission (SEC) should be asked to undertake a study examining barriers to disclosure of intangible assets on corporate financial statements, assess past disclosure requirements (such as the 2003 guidance on the Management's Discussion and Analysis [MD&A] section in financial statements), and the merits of a safe harbor for limited disclosure of financial information on intangibles not currently allowed in financial statements.
  - As proposed at a June 2008 conference sponsored by the Bureau of Economic Analysis (BEA) at the National Academies, a broader study of intangibles could include (1) a 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; (2) an inventory of federally owned intangible assets and how to exploit them for economic growth; and (3) recommendations of policies to accelerate private investment in and management of the types of intangible assets most likely to contribute to growth.
  - To foster best practices for management of intellectual assets and intangibles in the United States, the relevant federal agencies—such as SEC, Department of the Treasury, and DOC—should establish an advisory committee to make recommendations on ways of providing investors with an improved method for assessing the impact intangibles have on the accuracy of a company's financial picture and supporting industry trade associations in an effort to adopt guidelines for intellectual asset management and intangible disclosure appropriate to particular industry sectors.
  - Undertake a budgetary cross-cut of government investments in intangible. The federal government is a major investor in intangibles, but we don't know the size of that investment or even where it really goes. For some time the federal budget, as prepared by the Office of Management and Budget (OMB), has included a capital budget that includes physical capital, R&D, and education and training.<sup>13</sup> The budget documents also include a separate analysis of funding of statistical agencies, which is not included in the investment budget. These and other budget analyses already undertaken by OMB can serve as the starting point for a cross-cutting budgetary analysis of federal investments in intangible assets.
- As part of the effort to enact a permanent R&E tax credit, adding an incumbent worker training tax credit that would transform the provision into a knowledge generation *and* acquisition incentive. We already support training of unemployed workers, but not for those who have a job. A corporate tax credit would reduce the incentive firms now

have to lay off workers in a recession and rehire different workers with higher skills when the recovery comes, with an attendant loss of company-specific knowledge. Instead of sending some workers to the unemployment line in a recession, we could be sending them to the classroom.

## Longer-Range Activities

Over the longer term, the following ongoing activities might be considered as part of a broad innovation policy:

- Analyzing regulatory activities with an innovation impact. As Stuart Benjamin and Arti Rai suggest, the White House could review of some executive branch decisions and legislative proposals from the standpoint of their effects on innovation.<sup>14</sup> There is unlikely to be agreement on a standard methodology for such analysis (e.g., cost–benefit analysis) and thus not a high degree of consensus about its conclusions, but there could be broad agreement about which decisions merit scrutiny and discussion from an innovation perspective.
- Better managing the allocation of R&D spending among and within federal agencies. More could be done here—perhaps jointly by OSTP and OMB—to review agency spending plans in key areas and make mid-course adjustments. Had it been done consistently, this process might have partly averted the steep decline in the government’s physical science and engineering investment for nearly a decade following the end of the Cold War. The prospective expansion of investment in alternative energy sources is a prime candidate for close monitoring and adjustment in light of changing market conditions and security needs—a function that should not be left solely to the Department of Energy (DOE) if this is a presidential priority.
- Strengthening the White House role in reviewing and balancing intellectual property policy as broadly defined. The merits of infinitely expanding and strengthening intellectual property protection—patents, copyrights, trademarks, and trade secrets—to accelerate innovation and promote investment are no longer the articles of faith they were for a generation beginning in 1980. Witness the pending patent reform legislation—most of the provisions of which command broad private sector support—and recent Supreme Court and Federal Circuit Court of Appeals decisions in patent cases involving injunctions, patentable subject matter, obviousness, and willful infringement. But there has been no White House leadership on these issues, contributing to a congressional stalemate on patent reform. Moreover, within the Executive Office of the President there is a growing need for balancing the views of the Office of the U.S. Trade Representative (USTR), which has consistently favored ratcheting up intellectual property protection and enforcement—a stance likely to be reinforced by the new Office of the Intellectual Property Enforcement Coordinator.

- Considering establishment of a National Foundation for Science, Technology, and Creativity. Such a foundation might be patterned after the United Kingdom’s National Endowment for Science, Technology and the Arts (NESTA). Unlike many technology and innovation programs, NESTA takes a broad view of innovation. Its mission is to “invest in early-stage companies, inform and shape policy, and deliver practical programmes that inspire others to solve the big challenges of the future.”<sup>15</sup> Its portfolio of programs covers a variety of areas, including science awareness, early stage investments in technology companies, open innovation projects, design, and arts and cultural fellowships. NESTA is an independent organization; it complements but does not replace government funding of science, technology, and innovation. A United States version of the endowment could be seeded as a public–private partnership, with initial funding from both sources. It would then use income from the endowment and returns from strategic investments to support most of its activities. Other models of an innovation-oriented government-sponsored foundation have been proposed in recent years. It is timely to reconsider them.
- Using government procurement to push new business models. New collaborative work tools, such as Virtual Worlds, offer the potential for creating innovative new business models.<sup>16</sup> Demonstration projects employing this new technology could be sponsored by federal agencies to improve collaboration among suppliers, manufactures, and end users. This is just one example of how government procurement could actively be used to support innovative new business models. Another example is offering what is in essence a prize for new software applications for government use, as the local Washington, D.C., government recently did.<sup>17</sup>

## Conclusion

We have described some challenges in moving beyond a technology policy to an innovation policy. The hurdles are high, but we must leap them if the government is to help create a globally competitive economy that provides high-quality domestic jobs. Other countries, localities, and regions are not standing still: They understand that innovation is a principal driving force in economic prosperity and are inventing new ways to promote it. The Obama Administration has a remarkable opportunity to chart an even more ambitious and successful path.

## Notes:

<sup>1</sup> Barack Obama: Connecting and Empowering All Americans Through Technology and Innovation. Fact Sheet: Innovation and Technology. [http://www.barackobama.com/pdf/issues/technology/Fact\\_Sheet\\_Innovation\\_and\\_Technology.pdf](http://www.barackobama.com/pdf/issues/technology/Fact_Sheet_Innovation_and_Technology.pdf). Accessed Dec. 19, 2008.

Investing in America's Future: Barack Obama and Joe Biden's Plan for Science and Innovation. Obama Science Plan. <http://www.usinnovation.org/files/ObamaSciencePlan111208.pdf>. Accessed Dec. 19, 2008.

<sup>2</sup> Husick, L. A. From Stone to Silicon: A Brief Survey of Innovation. *Footnotes: The Newsletter of FPRI's Wachman Center for International Education*, Oct. 2008. <http://www.fpri.org/footnotes/1325.200810.husick.stonetosilicon.html>. Accessed Dec. 19, 2008.

<sup>3</sup> Crooks, E. Call for innovators. *Financial Times*, Nov. 12 2008. <http://www.ft.com/cms/s/0/e686b6e0-b0de-11dd-8915-0000779fd18c.html>. Accessed Dec. 19, 2008.

<sup>4</sup> Hill, C. T. The Post-Scientific Society. *Issues in Science and Technology*, Fall 2007. [http://issues.org/24.1/c\\_hill.html](http://issues.org/24.1/c_hill.html). Accessed Dec. 19, 2008.

<sup>5</sup> Jarboe, K. P. Info Age: Recast Issues Demand New Solutions. *New Technology Week*, June 7, 2004. <http://www.athenaalliance.org/apapers/Compet.html>. Accessed Dec. 19, 2008.

<sup>6</sup> Branscomb, L. Research Alone Is Not Enough. *Science*, Vol. 321, No. 5891, 2008, pp. 915–6.

<sup>7</sup> Jarboe, K. P., and J. Yudken. Time to Get Serious About Workplace Change. *Issues in Science and Technology*, Vol. XIII, No. 4, Summer 1997, pp. 65–71. <http://www.issues.org/13.4/jarboe.htm>. Accessed Dec. 19, 2008.

<sup>8</sup> National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. 2005.

<sup>9</sup> *American COMPETES Act of 2007*, HR 2272, 110th Cong., Congressional Record 153 (2007): H9414–65. <http://thomas.loc.gov/cgi-bin/bdquery/z?d110:h.r.02272>. Accessed Dec. 19, 2008.

<sup>10</sup> U.S. Department of Commerce, Innovation Measurement: Tracking the State of Innovation in the American Economy—Report of the Advisory Committee on Measuring Innovation in the 21st Century Economy. Washington: Jan. 2008. <http://www.innovationmetrics.gov>. Accessed Dec. 19, 2008.

<sup>11</sup> Corrado, C. A., C. R. Hulten, and D. E. Sichel. Federal Reserve Board. *Measuring Capital and Technology: An Expanded Framework*, Aug. 2004. <http://www.federalreserve.gov/pubs/feds/2004/200465/200465pap.pdf>. Accessed Dec. 19, 2008. National Bureau of Economic Research. *Intangible Capital and Economic Growth*. Working Paper No. 11948, Jan. 2006. <http://www.nber.org/papers/w11948>. Accessed Dec. 19, 2008.

<sup>12</sup> For more on intangibles, see Jarboe, K. P. Reporting Intangibles: A Hard Look at Improving Business Information in the U.S. Working Paper No. 1, Athena Alliance, April 2005. <http://www.athenaalliance.org/apapers/ReportingIntangibles.htm>. Accessed Dec. 19, 2008.

Also, Jarboe, K. P., and R. Furrow. Intangible Asset Monetization: The Promise and the Reality. Working Paper No. 3, Athena Alliance, April 2008. <http://www.athenaalliance.org/apapers/IntangibleAssetMonetization.htm>. Accessed Dec. 19, 2008.

<sup>13</sup> Office of Management and Budget. *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2009*, 2008. <http://www.whitehouse.gov/omb/budget/fy2009/apers.html>. Accessed Dec. 19, 2008.

<sup>14</sup> Benjamin, S. M., and A. K. Rai. *Fixing Innovation Policy: A Structural Perspective*. Duke University School of Law, 2008. Duke Law School Public Law & Legal Theory Paper No. 218; Duke Science, Technology & Innovation Paper No. 29. <http://ssrn.com/abstract=1259850>. Accessed Dec. 19, 2008.

<sup>15</sup> National Endowment for Science, Technology and the Arts. <http://www.nesta.org.uk>. Accessed Dec. 19, 2008.

<sup>16</sup> Cohen, R. B. Virtual Worlds and the Transformation of Business: Impacts on the U.S. Economy, Jobs, and Industrial Competitiveness. Working Paper No. 4, Athena Alliance, Dec. 2008. <http://www.athenaalliance.org/apapers/VirtualWorldsandtheTransformationofBusiness.htm>. Accessed Dec. 19, 2008.

<sup>17</sup> Office of the Chief Technology Officer, District of Columbia. Mayor Fenty Announces Winners of Applications for Democracy Contest. Nov. 13, 2008. <http://newsroom.dc.gov/show.aspx/agency/octo/section/2/release/15427>. Accessed Dec. 19, 2008.