

DEFINITION AND ANALYSIS OF THE AMERICAN INNOVATION WORKFORCE WITH SIX POLICY RECOMMENDATIONS[©]

By Susan Allard, Chairwoman, Allard Institute Inc.TM
with the University of California, Davis

ABSTRACT

It is a fact that innovation is still the engine of economic growth and increasing productivity for the American economy, and that the factors leading to innovation are therefore considered to be critical to policy makers. In order to better understand these factors, our work defined the American Innovation Workforce in a new way, measured its value as a national asset, and identified strategies for wise investment in innovation going forward.

To get our results, we analyzed 25 years of holistic data chronicling the schooling, training and development of the American Innovation Workforce, which emerged in the 1980's with the transfer of scientific predictive models into the financial services industry, especially via the universities, the government, Fair Isaac, and the SAS Institute.

We learned that over the 25 years of its existence, the Innovation Workforce in fact created a new knowledge industry in America. By building and installing proven applications of science- and technology-based tools into business, its workers commercialized collective knowledge within financial services and other knowledge-using sectors, thereby earning a high return on human capital, which attracted further investment. However, the Innovation Workforce has never grown fast enough to meet expanding demand for its proven performance capacity, and it is under-leveraged due to gender biases, trade restrictions on foreign talent, lack of widespread leadership development and coaching programs, and a failure to ramp up the supply pipeline coming out of our best Masters, MBA, and Ph.D. programs.

Focused investment in entrepreneurial centers (especially around universities wanting to monetize inventions), and conscientious crossover of Innovation Workforce know-how into new sectors (like health care), will speed the spread of innovation-driven productivity, both at home and exported.

By looking at the workforce in a new way, as a defined population with very specific characteristics and segments, we thereby identified six policy recommendations and investment strategies to nurture American innovation (*page 4*).

THE ALLARD INSTITUTE DATABASE

The Allard Institute Database for the American Innovation Workforce was originally started in 1983, to gather qualified candidates for the financial services industry, which was rapidly creating new jobs in the young knowledge economy, and needed recruiting services. As the expanding industry evolved, so did Allard, becoming a trusted expert, listener, facilitator, aggregator, and complete repository of information about the industry, its talents (careers, compensation, achievements, desires), and the dynamics of its supply lines. Drawing on relationships and a reputation spanning 25 years, and viewing the Innovation Workforce as a tangible and valuable national asset, Allard thereby transformed this repository (which has grown to 32,000 records) into a unique "Bank of Intellectual Capital", from which knowledge and know-how can now both be withdrawn.

Working for an evolving concentration of companies newly investing in knowledge applications, the members of Allard's Innovation Workforce helped develop such useful, exportable, productivity-enhancing, business tools as risk management, data mining, advanced analytic solutions, automated platforms, new payments infrastructures, customer relationship

management (CRM), rules-based engines, networks and knowledge exchanges, advanced fraud and anti-terrorism technologies, and e-commerce.

The Innovation Workforce has two components: the highly educated, quantitative core ("Expert Creators"), who are hired to create and test new business models, and the business leaders and workers who install and manage them, thereby earning high returns on their cumulative intellectual capital.

Averaging over 17 years of work experience each, the 32,000 members of Allard's database possess more than 500,000 years of collective learning, know-how, and leadership, which they continue to leverage in a sustainable and socially responsible way.

CONCENTRATIONS IN THE AMERICAN INNOVATION WORKFORCE

Concentration of Value

The total US workforce is 138.5 million. If the Innovation Workforce has 64,000 members (assumes Allard has 1/2 of the total in its database of 32,000), then it is concentrated in just .04% of the total (64,000/138.5 million). If GDP is 13.84 trillion, then the average productivity per worker is \$99,928



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(13.84 trillion divided by 138.5 million).

Innovation Workers deliver a higher return on intellectual capital, because their primary job responsibility is to improve productivity through the innovative use of information. In 73 Innovator companies studied, average productivity per worker was \$416,753 (annual revenues/number of employees), while the average in the top ten was \$1,062,608 (namely WellPoint, Visa, Consec, United Health, Google, Priceline, Capital One, Amazon, MasterCard, and Allstate). Therefore, successfully deploying the Innovation Workforce can increase ROI (Return on Intellectual Capital Investment) by 4.17x on average, and 10.06x in the “best-in-class”. We called this the “knowledge multiplier.”

In addition, the average market P/E ratio today is 15. The average for the 73 Innovator companies studied was 21.6, and for the top ten it was 66.6, demonstrating that the market anticipates higher future earnings from the knowledge industry (top ten P/E companies are Salesforce.com, Cybersource, MedAssets, Concur Technologies, Sears, Pegasystems, Berkshire Hathaway, Amazon, VISA, and VMware).

Concentration of Expert Creators and Foreign Talent

Within the Innovation Workforce is a unique sub-population that Allard calls “Expert Creators.” Expert Creators (15.4% of the Innovation Workforce) make up its scientific core, and are distinguished by multiple quantitative degrees from America’s best schools, a concentration of employment in pioneering companies, and chronic talent supply shortages.

Foreign Talent makes up 3.6% of the Innovation Workforce, but 30.1% of the Expert Creators. Foreign Talent is anxious about immigration status and its potential impact on employability in the United States or outside country of origin, and America does not have a consistent strategy to welcome these talents into our economy.

Concentration of Education

The Innovation Workforce holds an average of 1.7 degrees per person; Expert Creators hold 2.3 degrees per person; and Foreign Expert Creators hold 2.6 degrees per person.

Innovation Workforce degrees generally fall into two concentrations: 47% *technical / quantitative* (74% for Expert Creators) e.g. economics, engineering, statistics, mathematics, psychology, science, and computer/information science; and 53% *business* (26% for Expert Creators) e.g. management, finance, and marketing.

The biggest school factories producing the most Innovation talent over the past 25 years include the University of California (977 degrees), the California State University system (751 degrees), the State University of New York SUNY (379 degrees), and New York University (361 degrees). Schools with high concentrations of degrees issued to Expert Creators and Foreign Talents include the University of Cincinnati (61.2%), North Carolina State (61.1%), Iowa State (54.2%), Texas A&M (50.8%) and Virginia Tech (48.5%).

Concentration of Gender

The Innovation Workforce is male-oriented, with 2.1 males to every female. The Expert Creator population is even more male-concentrated, at 2.4 males to every female. Males hold 72.8% of the MBA’s, 71.6% of the master degrees, and 81.5% of the Ph.D.’s. Women in the Innovation Workforce on average earn 85.7% of what men earn.

Some sectors are hirers of females, like new economy companies (1.9 males to every female vs 2.1 average), processors/bureaus (2.0), financial services (2.4), and insurance (2.8); others are hirers of males, like consumer package goods (7.1 males to every female vs. 2.1 average), manufacturing (5.8), education (5.3), and alarmingly, the government (4.2).

Concentration of Innovator Employers

Innovation employers are found across many sectors of the American economy, including the whole financial services industry (spurred by deregulation in the 1980’s), the education sector (mostly in research and teaching positions performed prior to entering the workforce), processors/bureaus (like VISA, Experian, and First Data), and business services (e.g. Accenture, McKinsey, Deloitte). Especially inventive and entrepreneurial sectors with many start-ups and new business models include data/analytics (e.g. Fair Isaac, Acxiom, Readers Digest), the technology sector (e.g. IBM, HP, Microsoft), and the new economy sector (e.g. Intuit, Google, PayPal). Government, retail, telecommunications, health care, and consumer package goods are also participants.

Citibank, Bank of America, Wells Fargo, American Express, Chase and GE created the most jobs (10,422 total). Among non-financial services companies, VISA, MasterCard, First Data, Sears, AT&T and Fair Isaac created the most jobs (2,903 total). Capital One (56.9%), Fair Isaac (41.3%), HSBC (38.9%), AT&T (34.5%) and Citibank (36.4%) had the highest concentrations of Expert Creator and Foreign Talents.

Cluster Concentrations

As we searched for concentrations, clarity, and illuminations within the data, we found groupings of interrelationships, which we segregated into five clusters. We defined a cluster as a concentration of partners with shared and overlapping hubs:

Innovation Clusters – (e.g. the great California economic gold mine): Stanford and UC Berkeley + Wells Fargo, Bank of America, Provident, Fair Isaac, the Silicon Valley, New Economy companies.

Volume Clusters – (e.g. the huge financial centers with New York at the hub): SUNY, CUNY, Columbia, New York University + Citibank, Chase, American Express, GE, IBM, AT&T.

Excellence Clusters – (e.g. superior hiring techniques): Capital One + Virginia Commonwealth University, University of Virginia, Virginia Tech, University of

Pennsylvania (esp. the Wharton School), Indian Institute of Technology, University of Texas (especially Austin), University of Richmond, Tsinghua University, University of Illinois, and Indiana University (Purdue).

Geographic Clusters – (e.g. supplying local industry)
University of Delaware + credit card industry companies centered in Delaware.

Acquisition Clusters – (e.g. have increased market share of cumulative Innovation Workforce and Expert Creator knowledge via acquisitions): Chase now has the most collective knowledge, having accumulated First Chicago / Bank One / First USA + First Deposit / Provident / Washington Mutual.

IMPLICATIONS FOR POLICY AND WISE INVESTMENT

It became clear to us as we “mapped the knowledge chromosomes”, and came to understand the “genetic makeup” of the Innovation Workforce, that it would be possible to positively manipulate the talent supply pipelines via policy (a kind of “genetic engineering”). Herewith, our observations:

Workforce Planning. Human Capital is the world’s most valuable natural resource, especially as world economies transform from agrarian (land-based), to industrial (capital-based), to knowledge (human capital-based). Therefore, investment must always begin at the beginning, by educating, training, coaching and expanding the human capital supply

lines to meet future workforce needs within the context of a safer world.

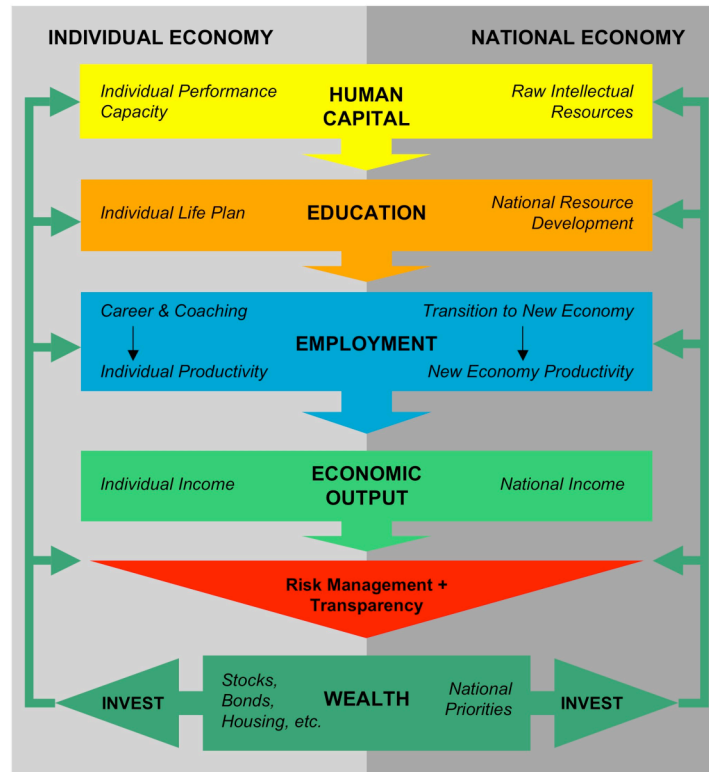
Women. Women represent 50% of the world’s talent, but are astonishingly under-represented in corporate boardrooms, executive leadership roles, scientific rosters, as holders of quantitative degrees, and on every other front where they should be contributing up to potential, and adding their diversity of perspectives to the conversation.

Foreign Talent. The Expert Creator population of the American Innovation Workforce is 30% Foreign. This is not because Foreigners get the jobs over American workers, but rather that there has always been a serious and growing shortage of Expert Workers, and the gap has always been filled with Foreign Workers who have earned advanced degrees from our best schools.

Risk Management, Transparency, Safety, and Health Care Reform. Managing risk and creating transparency are the keys to a safer and more predictable world. Health care automation and reform is a priority that can no longer wait. The American Innovation Workforce has the know-how and the will to drive these (and other) critical initiatives.

Innovation and Entrepreneurism. Science and technology-driven new ideas will continue to be the engines for American growth and American exports, and provide high-return, sustainable, socially responsible investment opportunities in the new economy.

ALLARD INSTITUTE INC. - HUMAN CAPITAL SUPPLY LINE INVESTMENT MODEL



SIX RECOMMENDATIONS FOR POLICY AND INVESTMENT

1. **Improve Risk Management, Transparency and Governance.** Wise investments cannot be made efficiently when personal and national wealth is dissipated by faulty risk management and poor governance. The Innovation Workforce is expert in risk management and transparency, and the current crisis is more about “who was steering the ship” - not about flaws in the techniques of modern risk management, but rather in its practice. Global safety and stability is at stake. We need to appoint more risk management experts to corporate boards and advisory boards, broadly teach the principles of risk management and corporate governance, and remember that risk management is a science and a sector onto itself, one which has been empirically proven over 25 years in the test-and-learn laboratories of our financial services and emerging knowledge industries. Our best risk management processes and tools need to be consolidated, systematized, and socialized to close the dangerous gaps that frustrate sustainable wealth creation.
2. **Install Coaching and Leadership Development Programs.** Education and skills are not enough. Coaching and leadership development is the great multiplier of workforce talent, the most powerful engine for growth ever invented. Coaching systematically increases the performance capacity of the whole organization by increasing the performance capacity of each of its individual members. Every organization should invest in coaching programs, and thereby develop human capital supplies to full potential. Personal productivity can then shift into overdrive, while at the same time the pool of talented and experienced leaders grows. It is especially important to develop the highly productive innovation workforce into senior leadership so they can facilitate the whole organization towards knowledge-based strategies.
3. **Replicate Centers for Innovation and Entrepreneurship.** Such “cluster concentrations” successfully invest in pioneering technologies (most famously, the Silicon Valley), and should be duplicated. For example, the University of California Davis has hired Steven Currall as Dean of the Graduate School of Management. He is a professor of management science and innovation, specializes in teaching entrepreneurship, and has founded centers for technology that work to commercialize university inventions. His mission is to be a catalyst for technological innovators, entrepreneurs, and members of the investment community, thereby making UC Davis what Stanford and UC Berkeley have been for the Silicon Valley. Every organization should be asking the question, “How can we partner to earn higher returns through the sustainable and socially responsible application of knowledge to opportunity?”
4. **Mobilize the Innovation Workforce to Reform Health Care.** Health care reform is a top priority for our country. It is said that health care today is 5-8% automated. Because of the American Innovation Workforce, the banks are 100% automated (it took 25 years to accomplish in banking; we can do it much faster in health care). The Innovation Workforce is passionate about bringing proven know-how and technologies to health care automation, and we must facilitate skill transfer from more traditional knowledge sectors into the new “urgent care” health care sector.
5. **Deal with Our Dependence on Foreign Talent.** Foreign Talent is at the heart of our country’s innovation engine, and Foreign Talent purchases a material portion of Masters, MBA’s and Ph.D.’s from our best institutions of higher learning. This group is especially smart and talented, because only the best from China, India and elsewhere are admitted. A national strategy and consistent policies around immigration must be achieved (concurrent with increasing our domestic talent supply). Everyone with a stake must join in the conversation, and search for creative solutions.
6. **Bring Women Up to Potential.** The National Academy of Science has produced [Women for Science: An Advisory Report](http://www.interacademycouncil.net/CMS/Reports/Women4Science.aspx), which is a proscriptio for how to bring women to potential in science, academia, government, and industry. Why reinvent the wheel? Our very best scientists put together this blueprint and agenda for change, starting with commitment from the top, diversity infrastructure, inclusivity, leadership training and mentoring, and attracting women and girls to science and technology. Most important, of course, is to include women in the academies’ own organizations. Every corporation, university, and government agency should adopt the Academy’s recommendations.
<http://www.interacademycouncil.net/CMS/Reports/Women4Science.aspx>

ACKNOWLEDGEMENT

This paper, based on 25 years of research data on the evolution of the American Innovation Workforce, is dedicated to the author’s father, Robert W. Allard, who founded the field of population genetics at the University of California, Davis in the 1950’s. In population genetics, massive amounts of data are analyzed to predict behaviors (traits) of populations over time. Among the many honors and awards earned over his distinguished career, Robert Allard was elected to the National Academy of Sciences in 1973, where his contributions focused on agriculture and sustainability; population, evolutionary and ecological genetics; plant breeding; and genetic resource conservation. (http://www.nasonline.org/site/PageServer?pagename=MEMOIRS_A)



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