



Athena Alliance

Exploring the promise and pitfalls of the global information economy

New Building Blocks for Jobs and Economic Growth: Intangible Assets as Sources of Increased Productivity and Enterprise Value

Conference Observations

Kenan Patrick Jarboe

September 2011

On May 16 and 17, 2011, Athena Alliance organized a conference on the role of intangible assets in job creation and economic growth, co-sponsored by the OECD, The Conference Board, Kauffman Foundation, and US National Academies and hosted by the Georgetown Center for Business and Public Policy.¹ The purpose of the conference was to raise public awareness about the growing importance of intangibles in driving economic growth and job creation and to identify key research and policy areas that can help governments and businesses develop growth strategies that better utilize intangible assets.

As with many such gatherings, the conference yielded a richness of conversations and insights that are impossible to completely convey in this working paper. Although the conversations initially focused on four topics, cross-cutting discussions quickly emerged, both convergent and divergent. This paper aims to highlight some of those discussions based on the author's personal observations and is not a full report on the conference. For more on the conference, including links to conference documents and materials, visit www.newbuildingblocks.org.

Conference Overview

Intangible assets—information, workforce skills and know-how, effective management and marketing, business models, relations with suppliers and customers, and software and databases as well as traditional intellectual property (patents, copyrights, and trademarks)—are the building blocks of future economic growth. According to the available evidence, business investment in intangible assets is increasing in most advanced economies and, in a

number of countries, intangible investment matches or exceeds investment in tangible assets such as buildings, equipment, and machinery. Investment in intangibles also accounts for a significant fraction of labor productivity growth in countries such as Finland, Sweden, the United Kingdom, and the United States. And evidence is accumulating that intangible investments are growing in importance in emerging economies.

The conference brought together global business leaders, policymakers, and researchers to better understand how investments in innovation, intangible assets, and intellectual capital can be harnessed to generate sustainable growth, high-wage employment, and improved living standards. The workshops were organized around the following four topics:

- **Global Competition and Collaboration:** How are intangibles and intellectual capital defining the new global competition and what are the implications of their increasing importance in terms of government policy in both developed and emerging economies?
- **Boosting Competitiveness, Jobs, and Growth:** How do companies successfully use investments in innovation and intangibles to create competitive advantage in both manufacturing and services and how do these investments translate into economic growth and job creation?
- **Emerging Measures for Strategic Management:** How can intangibles become quantifiable factors and what new metrics—financial, operational, performance—strategies, and management tools are needed in both the private and public sector?
- **Driving Next-Generation Innovation Ecosystems:** How can intellectual capital and intangible assets fuel the innovation process of the future and, in turn, drive economic growth?

A background paper was prepared for each of the topics. To facilitate a cross-flow of information and discussion, conference participants were briefed on all of the topics, not just on the sessions they attended. In addition to the conference discussions, the background papers revealed a wealth of insights. The briefing summaries of the papers are included as appendices at the end of this paper. The full background papers are available at www.newbuildingblocks.org. The conference agenda is also listed in the appendix.

A Broad View of Intangibles and Innovation

From the very beginning, the conference discussions highlighted the importance of intangibles. As Federal Reserve Chairman Ben Bernanke said in his opening remarks, the topics of innovation and intangible capital “are central to understanding how we can best promote robust economic growth in the long run.”

The conference also embraced a role for government in fostering innovation and intangibles. Bernanke discussed the particular importance of government support for research and development (R&D). In his introductory remarks, Richard Boucher, OECD deputy secretary

general, noted the importance of getting the framework conditions correct for innovation and economic growth. These conditions include competitive markets for goods, services, and labor; regulations and administrative conditions that facilitate the creation of businesses; and access to various stages of business finance. Likewise, government actions can create networks and marketplaces, including direct demand pull. Governments can aggregate information, ideas, and data to create a platform for further innovation and development in the private sector. Finally, governments also own many intangible assets—everything from radio spectrum to the innovative ideas that come from national labs.

The conference embraced a broad perspective of innovation and intangibles. As Lisa Lynch of Brandeis University noted in the opening panel, companies are thinking about innovation in multiple dimensions. Throughout the conference, participants stressed that investments are being made in a range of intangibles, including reputation, technology, new business models, and organizational innovations such as worker education and training, teamwork, and workers' voices in the production process. This expansive vision goes well beyond the traditional emphasis science, technology, engineering, and mathematics (STEM) to include all inputs to the process of innovation. The discussion also focused on bringing more people into the innovation ecosystem in addition to scientists and university researchers. The discussions also went beyond issues of traditional education to underscore the need to help individuals already in the workforce continually updating their skills.

Insights on Metrics and Measurement

At the end of his remarks, Bernanke stressed the importance of measurement: “Finally, as someone who spends a lot of time monitoring the economy, let me put in a plug for more work on finding better ways to measure innovation, R&D activity, and intangible capital. We will be more likely to promote innovative activity if we are able to measure it more effectively and document its role in economic growth.”

A key point was made about the need to view intangibles from multiple perspectives and frameworks. Two frameworks have already emerged in recent years: a macroeconomic policy framework and a business strategy framework.

The macroeconomic framework comes out of gross domestic product (GDP) and growth accounting, as outlined in the research of Nakamura (2003) and Corrado, Hulten, and Sichel (2005).² This macroeconomic framework is based on available data on corporate spending on intangibles and includes computerized information (software and databases); innovative property (scientific and non-scientific R&D, copyrights, designs, and trademarks); and economic competencies (brand equity, human capital, networks, know-how, advertising, and marketing).

The business strategy framework comes out of the Intellectual Capital framework, including work on corporate reporting. It is driven by a need to understand the resulting assets created

by corporate investment and how they are used to finance innovation and economic growth. This micro classification includes human capital (management and staff competencies, experience, and attitudes); relational capital (customers, partners, suppliers, brands, and reputation); and structural capital (process capital, intellectual property [IP], organizational knowledge, and culture).³

Complicating matters, however, is an elephant-and-the-blind-men problem. In that parable, a number of blind men try to describe an elephant—each believing that the small part of the elephant that he can feel constitutes the whole. Like the blind men, people experience intangibles from different points of view depending on their role and expertise, whether they are business managers, accountants, lawyers, risk managers, investors, or public policymakers.

Nevertheless, these different frameworks are actually being used to varying degrees of success. As was noted by Tony Clayton, of the UK's Intellectual Property Office, great progress is being made on the policy side. He specifically mentioned that in the UK, the macroeconomic policy framework is being used to craft innovation policy. Rebecca Blank, of the US Department of Commerce, described how new data are being gathered on intangible investments in the US based on the macroeconomic policy framework.

Yet, as Brian MacAulay expressed at the end of the conference, the intangible framework is “too important to be left in the hands of macroeconomists.” Progress on the macroeconomic policy side needs to be leveraged to make progress on the business strategy side. In the opening panel, Allen Howell, CEO of Corporate Flight Management, specifically described the consequences of the lack of business specific metrics. He said he had trouble raising capital from banks even though he was expanding his business by investing in intangible assets. That is because using traditional accounting, those assets do not show up on the balance sheet and bankers therefore question the value of those investments. As a result, traditional metrics actually worked against him telling his investment story. The story also illustrates how existing accounting makes it difficult to incorporate intangible assets into the financial system.

The challenge, therefore, is creating a set of useful metrics that complement each other as well as work with traditional metrics. It may be impossible—and probably undesirable—to create one framework to describe and measure intangibles; each perception has its own needs and uses. Rather, efforts should focus on refining the various metrics and looking for mechanisms to bridge the different frameworks and perceptions.

Moving Beyond Issues of Measurement

As one participant explained, the task goes beyond measurement to “helping managers organize information on intangibles, and understand how intangibles lead to innovation, service improvements, reputation, and business.” To accomplish this task, both the public and

private sectors need to envision how the intangibles framework links to business outcomes and economic growth. Measures of innovation and investments in intangibles need to show a direct and concrete path to beneficial outcomes.

To begin with, business needs better tools to understand and manage intangibles. As noted above, there is a variety of different perspectives on intangible assets. Each of these perspectives generally deals with intangibles in a narrow silo. On a framework level, accountants do not talk to macroeconomists. Within a business, human capital (i.e., human resources or personnel) concerns do not touch on IP issues. Accountants do not discuss intangibles with business strategists. Few individuals within a company are looking at an overall approach to the subject. Although CEOs are theoretically responsible for this overview, they lack the mechanisms to integrate the various perceptions into a coherent vision.

Understanding, however, is not enough. We need to make the business case for investments in intangibles. Unfortunately, analytical tools for assessing intangibles, where they exist, are narrowly focused on areas such as the potential return on investment (ROI) for licensing patents. In many cases, the tools—if they even exist—are difficult to find and/or are not widely understood. For example, the ROI of investing in organizational change can be difficult to calculate. Finally, existing tools tend to look at intangible assets individually rather than at the synergies among intangibles.

The same can be said for external analyses of intangibles from outside the company, especially by the financial system. Since intangibles do not show up on the balance sheet, they are often overlooked as sources of equity value and as collateral in debt transactions. Investors see intangibles as a non-liquid asset that they cannot value accurately and that they cannot see as contributing to future benefits. Thus, for investors, there is a two-step problem. Linking intangibles to future business outcomes is the first step, which can be solved through better internal metrics. The second step is to develop valuation standards and secondary markets so that the financial system can treat intangibles as a recognized asset class. As Athena Alliance has noted in earlier reports, a number of public policy steps can help resolve these issues, including the creation of a pilot program for a US Small Business Administration IP-based loan facility.⁴

Making the public policy case for intangibles faces a challenge similar to the one related to making the business case. A great deal of economic research over several decades has shown the societal value of government investment in R&D, a point made by Bernanke in his opening remarks. Some research has shown the value of education. But economic and public policy research on investments in other types of intangibles is not as well developed. Understanding the microeconomics of intangibles (i.e., the social return on investment) and better identifying market failures and government advantages are key to the creation of successful policies.

The public policy case for intangibles also requires a better understanding and analysis of the complementarities between intangible assets. For example, we now understand that investments in information technology require concomitant investments in organizational change to effectively increase productivity. A similarly broad understanding of how intangibles work together is needed to inform business and government policies and actions that will effectively utilize our vast array of intangible assets.

This broad view of intangibles also helps governments in their own management activities. As was noted earlier, governments create a number of intangibles, both for their own use and as inputs to the rest of the economy. A better understanding of these intangibles will help in the process of creation, the process of utilization of these intangibles in government activities, and the process of transferring these intangibles to the private sector.

Innovation and Collaboration

A major cross-cutting conversation during the conference concerned the changing nature of the innovation ecosystem, especially the shift to a collaboration model. Competition and collaboration are both drivers of innovation. As David Stafford of Michelin Americas Research Company noted, whereas competition drives companies, collaboration, especially among users, drives innovation and speed to market. Sometimes competition and collaboration are in direct conflict; in certain circumstances, the benefits of collaboration need to be weighed against the potential for it to help competitors. In other cases, the higher level of competition is what drives companies to invest in organizational innovation that promotes greater collaboration.

A number of discussions throughout the conference stressed the need to better understand innovation and the collaborative process. For example, geography and culture play important roles due to the localized spillovers of knowledge and the tacit aspects of collective learning. Manuel Trajtenberg of Tel Aviv University stressed that, to a large extent, innovation entails the recombination of existing pieces of knowledge. As a number of others pointed out, innovation is often the adaptation of existing ideas and processes to new circumstances. Thus, access to knowledge is a key ingredient in innovation and competitive advantage. The many forms of collaboration—joint ventures, the open innovation model—are ways to access this wide array of knowledge. In general, public policies should create platforms and mechanisms to better facilitate the sharing of knowledge between organizations, disclose spending on intangibles, and support market transparency.

This interaction of competition and collaboration plays itself out in the global economy as nations jockey for position. Otaviano Canuto of the World Bank noted that although the bulk emerging economies' growth is still brick and mortar, these nations are increasingly seeking growth through innovation. He referred to this a *piggy frogging*—a combination of piggybacking on existing technology, but leapfrogging beyond it. As a result, the potential

providers of technology and other intangible assets in advanced economies will have to be ready to compete on the ground by learning how to adapt to this new frontier of growth.

The discussion pointed to some specific policy and research steps. To begin with, greater study is needed of institutions and framework conditions that are supposed to foster collaboration. This will require more in-depth analyses of the factors for successful collaborations, such as trust, communication (including overcoming cultural and language differences), and processes and agreed outcomes (to balance proprietary with shared interests). Case studies detailing successes and failures of collaborative activities and mechanisms would be especially useful. For example, are collocation activities of business parks and incubators successful in fostering collaboration? How do industry clusters maintain the balance of collaboration and competition?

The intersection of large firms and startups is another area of potentially fruitful research. With a greater shift by larger companies to both open innovation and user-driven innovation, there needs to be a better understanding of how innovation can be facilitated through information exchange, supplier relations, and other outside interactions. Specifically, the role of government actions and policy in fostering this type of innovation should be examined. For example, the current R&D tax credit does not effectively support collaborative research. Do other policies, such as technology transfer policies, need to be reexamined? Is there a role for government procurement in fostering open innovation? What about antitrust and competition policy?

One other specific area ripe for examination is IP policies, which were much discussed during the conference. These discussions mostly focused on balancing the need for protection with openness and whether or not the current system helped or hindered innovation. One powerful insight was that the current IP system was crafted in the time of the individual inventor and the self-contained industrial laboratory. As the innovation system moves to more of an outside-the-organization model, IP policies may need to be recrafted to better facilitate collaboration. However, the policy changes that might be necessary, if any, are unclear at this stage of our knowledge.

Notes:

¹ Athena Alliance would like to acknowledge the financial and in-kind support from the cosponsoring organizations and the work of the conference steering committee listed in the appendix.

² Leonard Nakamura, “A Trillion Dollars a Year in Intangible Investment and the New Economy,” in *Intangible Assets: Values, Measures, and Risks*, ed. J. Hand and L. Baruch (Oxford University Press, 2003); and Carol A. Corrado, Charles R. Hulten, and Daniel E. Sichel, “Measuring Capital and Technology: An Expanded Framework,” in *Measuring Capital in the New Economy*, ed. C. Corrado, J. Haltiwanger, and D. Sichel, *Studies in Income and Wealth*, Vol. 65 (The University of Chicago Press, Chicago, 2005).

³ Mary Adams and Michael Oleksak, *Intangible Capital: Putting Knowledge to Work in the 21st Century Organization* (Praeger, Santa Barbara, California, 2010).

⁴ Kenan Patrick Jarboe and Roland Furrow, *Intangible Asset Monetization: The Promise and the Reality*, Athena Alliance Working Paper #03, April 2008; and Ian Ellis, *Maximizing Intellectual Property and Intangible Assets: Case Studies in Intangible Asset Finance*, Athena Alliance Working Paper #07, November 2009.

APPENDIX A

Conference Agenda

Monday, May 16

Introduction and welcome

What the conference is all about: Kenan Jarboe, President, Athena Alliance

Opening remarks and introduction: Richard Boucher, Deputy Secretary General, OECD

Keynote address

Ben Bernanke, Chairman, Board of Governors of the Federal Reserve System

Plenary roundtable discussion

Moderator: Jon Spector, CEO, The Conference Board

Otaviano Canuto, Vice President, Poverty Reduction and Economic Management Network, World Bank

Allen Howell, CEO, Corporate Flight Management

Edward Jung, Chief Technology Officer and Co-Founder of Intellectual Ventures

Lisa Lynch, Dean, Heller School for Social Policy and Management, Brandeis University

Carl Shapiro, White House Council of Economic Advisors

David Stafford, COO, Michelin Americas Research Company

Manuel Trajtenberg, Professor and former Head of Israel's National Economic Council

Working group sessions and report back

Reception and dinner

Speakers: Paul Kedrosky, Kauffman Foundation

Senator Chris Coons (DE)

Tuesday, May 17

Working group sessions and report back

Plenary summary session

Moderator: Lesa Mitchell, Kauffman Foundation

Tony Clayton, Intellectual Property Office, United Kingdom

Rebecca Blank, Under Secretary of Commerce for Economic Affairs

Raine Hermans, TEKES, Finnish Funding Agency for Technology and Innovation

John Mayo, Georgetown University

Ken Warwick, OECD Committee on Industry, Innovation, and Entrepreneurship

Closing remarks

Andrew Wyckoff, Director, Directorate for Science, Technology and Industry (STI), OECD

Richard Cohon, Chairman, Athena Alliance

APPENDIX B
Conference Steering Committee

Kenan Jarboe – President, Athena Alliance (Committee Chairman)

Richard Cohon – Chairman, Athena Alliance

Jonathan Low – Board Member, Athena Alliance, and Partner and Co-Founder, Predictiv, LLC

Peter Harter – Board Member, Athena Alliance, and Vice President, Intellectual Ventures LLC

Mary Adams – Principal, I-Capital Advisors

Andrew Wyckoff – Director, Directorate for Science, Technology and Industry, Organization for Economic Co-operation and Development (OECD)

Dirk Pilat – Head of the Science and Technology Policy Division, Directorate for Science, Technology and Industry, Organization for Economic Co-operation and Development (OECD)

Alistair Nolan – Senior Policy Analyst, Directorate for Science Technology and Industry, Organization for Economic Co-operation and Development (OECD)

Richard Johnson – Business and Industry Advisory Committee, Organization for Economic Co-operation and Development (OECD)

Bart van Ark – Vice President and Chief Economist, Conference Board

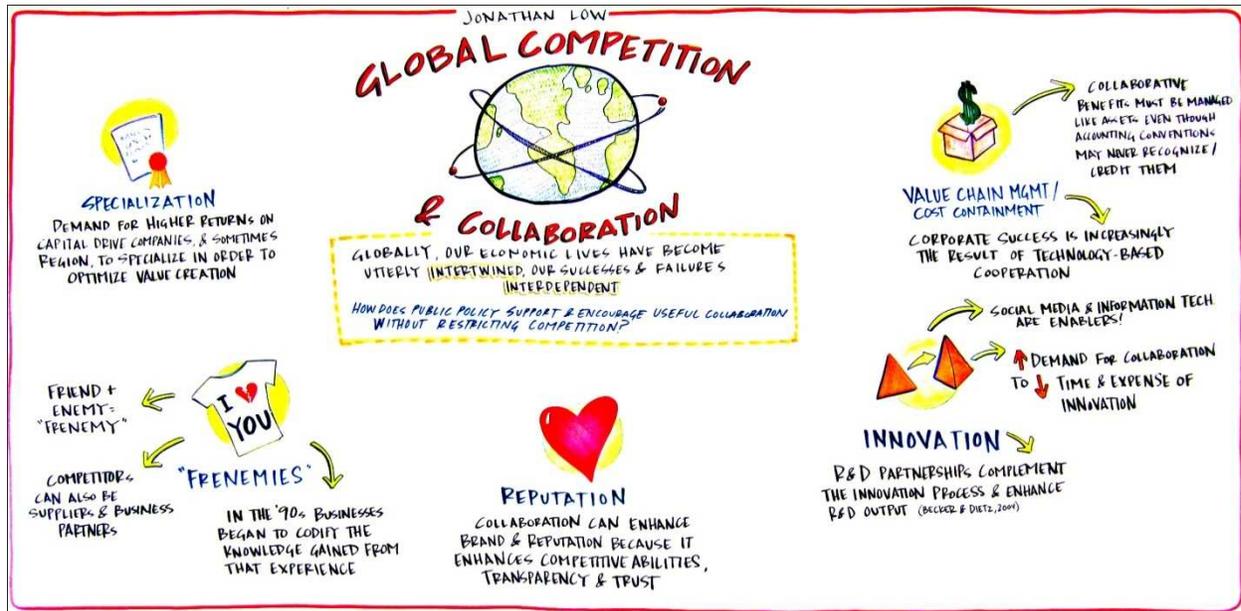
Carol Corrado – Senior Advisor and Research Director, Conference Board

Stephen Merrill – Executive Director, Board on Science, Technology, and Economic Policy (STEP), National Academies

Lesla Mitchell – Vice President for Innovation, Kauffman Foundation

APPENDIX C Background Briefing

Global Competition and Collaboration



Jonathan Low summarized the *Global Competition and Collaboration* background paper. The premise for the paper is the lesson from the financial crisis on how intertwined and interdependent the global economy has become. The impact of competition and collaboration is significant for policymakers and business leaders.

There are a number of elements to the interaction between competition and collaboration. One such element is the rise of “frenemies,” whereby competitors and collaborators interact in often complex ways. Companies and governments may be suppliers, financiers, customers, and competitors, all at the same time. Examples range from entertainment to the biomedical and pharmaceutical industries. Managing complex relationships among actors that may be both competitors and collaborators can be crucial for success. In addition, global supply chains can demand close coordination on issues relevant to intangibles, such as personnel, intellectual property/capital, quality, technology adaptation, communication, workplace organization, innovation, and others.

Specialization has increased as the demand for higher returns on capital drives companies, and sometimes regions, to try to optimize value creation. Achieving first-mover advantage to be more competitive can often best be achieved by collaborating or partnering with other entities. Thus, intangibles, such as the investment in collaborative activity, must be managed like assets, even though accounting conventions may never recognize or credit them. This is especially true now that corporate success is increasingly derived from technologically based

cooperation. Models of innovation are changing as well. The expense and time necessary for innovation in many fields has created more demand for collaboration to reduce cost and time to market. Finally, collaboration can enhance brand and reputation and contribute to transparency and increased trust.

In summary, competition and collaboration shape the information economy. Policy must take into consideration factors such as the enhanced role of intellectual capital, economies of scale in information technology, complements and interfaces in products and services, and the importance of networks.

Boosting Competitiveness, Jobs, and Growth

BOOSTING
COMPETITIVENESS,
JOBS
& GROWTH

CAROL CORRADO

EXHIBIT 10.10: U.S. NON-FARM BUSINESS INVESTMENT IN INTANGIBLE ASSETS
SOURCE: BUREAU OF ECONOMIC ANALYSIS, U.S. DEPARTMENT OF COMMERCE

INTANGIBLE ASSETS DRIVE INNOVATION & CONTRIBUTE to
A FIRM'S AND A COUNTRY'S COMPETITIVE EDGE IN the
KNOWLEDGE ECONOMY

INVESTMENT
ASSET CREATION
ASSETS PUT TO WORK/USED
PROFIT

ECONOMIC GROWTH

JOBS

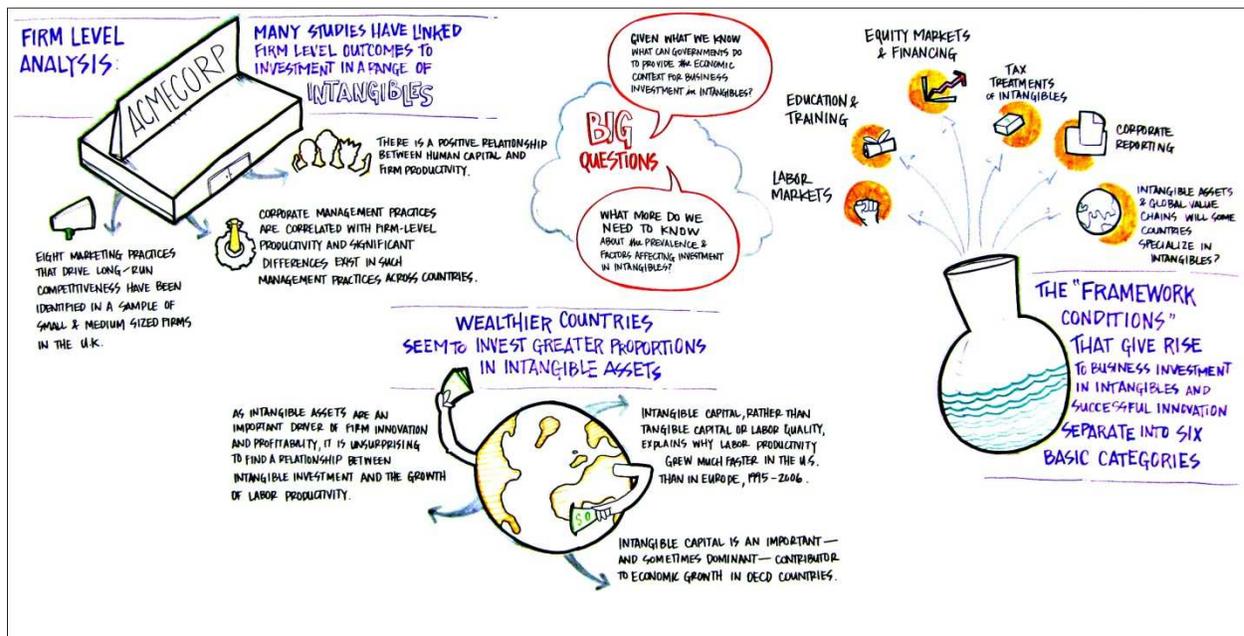
INCREASED WELL BEING

SOME EVIDENCE ON the SIZE, GROWTH AND INCIDENCE OF
INTANGIBLE INVESTMENT ACROSS TIME, FIRMS & COUNTRIES

- 💡 WITH RISING EDUCATIONAL ATTAINMENT, OECD ECONOMIES HAVE ACCUMULATED A GROWING STOCK OF HUMAN CAPITAL, WHICH ENABLES INVESTMENT IN INTANGIBLE ASSETS.
- 💡 PRODUCTS ARE BECOMING MORE KNOWLEDGE-INTENSIVE, E.G. IN AUTOMOTIVE MANUFACTURING, LEADERSHIP IN CONTROL SOFTWARE IS STRATEGICALLY VITAL.
- 💡 GLOBALLY, SUSTAINED COMPETITIVE ADVANTAGE IS INCREASINGLY BASED ON INNOVATION, WHICH IS DRIVEN — IN LARGE MEASURE — BY INVESTMENTS IN INTANGIBLES: R&D, EMPLOYEE SKILLS, SOFTWARE/DATABASES, DESIGN, MARKETING AND CUSTOMER ACQUISITION.
- 💡 THE GROWTH OF THE SERVICES SECTOR HAS AMPLIFIED THE IMPORTANCE OF INTANGIBLE ASSETS.

CHART: U.S. BUT TREND IS ALSO
SHOWN IN JAPAN & GERMANY

- 💡 FRAGMENTED AND GEOGRAPHICALLY DISPERSED VALUE CHAINS — AND AN INCREASED SOPHISTICATION OF PRODUCTION PROCESSES — HAVE ACCENTUATED THE IMPORTANCE OF INTANGIBLE ASSETS.
- 💡 MAJOR INVESTMENTS IN NEW INFORMATION & COMMUNICATION TECHNOLOGIES HAVE REQUIRED COMPLEMENTARY INTANGIBLE INVESTMENTS IN NEW BUSINESS PROCESSES.
- 💡 NEW INFORMATION AND COMMUNICATION TECHNOLOGIES MAKE SOME INTANGIBLES MORE VALUABLE TO FIRMS, E.G. WHEN CONSUMERS CAN BUY ON-LINE, A REPUTATION FOR RELIABLE SERVICE GAINS IN IMPORTANCE.



Carol Corrado outlined the broad themes of the background paper *Boosting Competitiveness, Jobs, and Growth*. Intangible assets drive innovation and contribute to a firm's and a country's competitive edge in the knowledge economy. Macroeconomic analysis provides evidence of the size, growth, and incidence of intangible investment across time, firms, and countries. Business investment is increasingly intangible-intensive. This trend is clear not just in United States but also in the United Kingdom (UK), Europe, and Japan. The rise in intangible investment encompasses more than the well-measured, well-researched category of R&D. Aggregate R&D trends are more or less stable in most OECD countries. Design, software, and organizational investments are expanding categories. Firm-level analyses have also linked firm-level outcomes to investment in a range of intangibles. Cross-country analysis shows that businesses in wealthier countries seem to invest greater proportions in intangible assets.

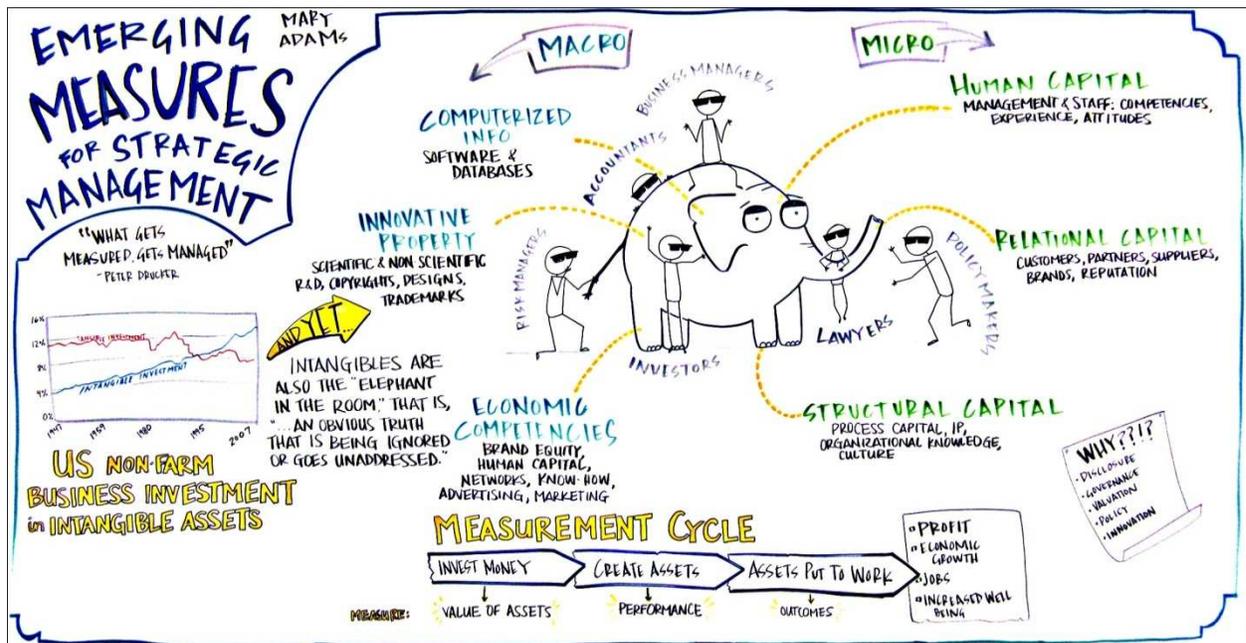
As intangible assets become an important driver of firm innovation and profitability, it is unsurprising to find a relationship between intangible investment and the growth of labor productivity. Intangible capital, rather than tangible capital or labor quality, explains why labor productivity grew much faster in the United States than in Europe from 1995 to 2006. Thus, intangible capital is an important—and sometimes a dominant—contributor to economic growth in OECD countries.

Corrado said that we know something—but not enough—about the “framework conditions” (policies and institutions) that give rise to business investment in intangibles. Labor market mobility is likely to be important in many sectors. Education and training are critical, although questions arise about possible skills shortages and whether there is too much or too little emphasis on science and engineering. Well-functioning equity markets are important, as

is the tax treatments of intangibles. Corporate reporting is also important but underdeveloped, possibly leading to the difficulty in understanding investments in intangibles on a risk-adjusted basis. One area where there is need for further investigation is the role of intangible assets in global value chains. Can governments mobilize intangibles to help businesses move into higher value niches of global value chains?

Given what is known, what, if anything, can governments do to provide the economic context for business investment in intangibles? And, in a related question, what more needs to be known about the factors affecting investment in intangible investment?

Emerging Measures for Strategic Management



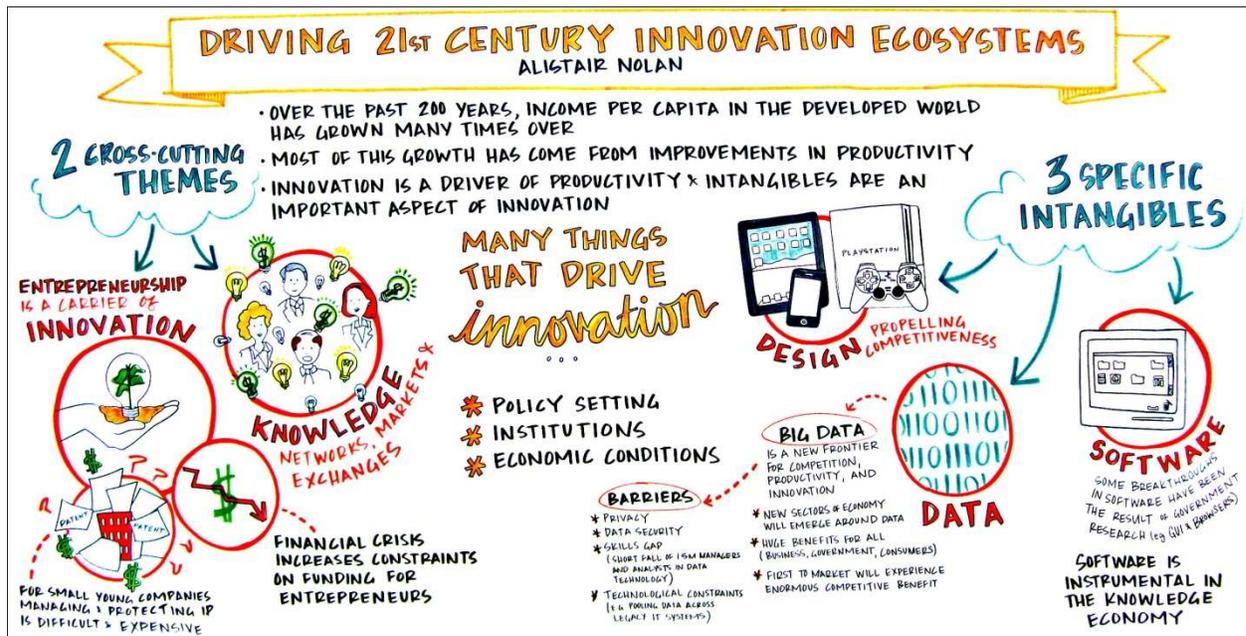
Mary Adams began the summary of the *Emerging Measures for Strategic Management* background paper with the elephant-in-the-room metaphor. The “elephant” represents the enormous shift in economies as the world moves from the industrial age to the knowledge era, which gives rise to intangibles. This cannot be ignored. Nor can the elephant be treated as the proverbial blind men treated it, with each believing that the small part of the elephant that they could feel constituted the whole: one said it is a rope (the tail); another, a wall (the body); another, a water spout (the trunk); and yet another, a tree trunk (the legs). Like the blind men and the elephant, people experience intangibles from different points of view depending on their role and expertise. These include the roles of business managers, accountants, lawyers, risk managers, investors, and public policymakers.

To date, two frameworks have emerged for describing the overall elephant: (1) a macro view of economists and policymakers and (2) a micro view from the perspective of companies and their stakeholders. The macro classifications are based on available data on corporate

spending on knowledge intangibles and include computerized information (software and databases); innovative property (scientific and non-scientific R&D, copyrights, designs, trademarks); and economic competencies (brand equity, human capital, networks, know-how, advertising, marketing). The micro classification is driven by a need to understand the resulting assets created by corporate investment and include human capital (management and staff competencies, experience, attitudes); relational capital (customers, partners, suppliers, brands, reputation); and structural capital (process capital, intellectual property [IP], organizational knowledge, culture).

These different perceptions matter because, as the management expert Peter Drucker has said, “what gets measured, gets managed,” and what gets measured depends on the purpose of the measurement. Those purposes can be disclosure, governance, valuation, policy, strategy, or the general management of innovation. Finally, the economic cycles associated with intangibles create a number of stages where intangibles can be measured (beyond the macro and micro described previously). The cycle is as follows: investments (macro) lead to the creation of assets (micro). These assets are put to work with multiple outcomes of increased profits, economic growth, and jobs. These outcomes, in turn, increase the ability to invest. Each of these stages in the cycle requires different measures.

Driving Next-Generation Innovation Ecosystems



Alistair Nolan opened his summary of the *Driving 21st Century Innovation Ecosystems* background paper by noting that innovation-driven productivity gains have been the engine of economic growth for the past 200 years. Many factors are involved in fostering innovation-led growth, only some of which were examined in this working session. The issues considered

include two cross-cutting themes: (1) knowledge networks and markets and (2) support for entrepreneurship. Three specific intangible assets were also addressed: design, software, and data. Knowledge networks and markets are mechanisms for the exchange and sharing of information and knowledge in the form of intellectual property rights, knowledge, and information or data. A key public policy question here is why such networks and markets are still relatively underdeveloped. At issue is the following question: What are the most important steps that governments can take to support the development of these knowledge-sharing mechanisms?

On entrepreneurship, the recent financial crisis has made banks less willing to lend to small and young firms and appears to have widened an existing gap for seed and early-stage financing. New and small firms also face particular problems when attempting to protect their IP. A lack of awareness about IP management and a lack of a coherent IP strategy are also common among many small and medium size enterprises (SMEs). Here the public policy questions revolve around encouraging greater investment in new, small, intangibles-intensive firms and helping such firms better manage their IP.

On the three specific intangibles of design, software, and data, each has been shown to be important with regard to innovation and firm performance. Iconic products of the information economy, such as Apple's iPhone, illustrate the importance of design. Building design know-how has become a focus of policy in a number of countries. And software is instrumental in the evolution of knowledge-based economies. What then is the role of government to foster investment in design and software?

Data is another basic driving force of the information age. Utilization of large data sets may be the next frontier for innovation, competition, and productivity. How should public policy help to assist new data-related markets and facilitate the creation of private and public economic value from personal data? The range of policy issues here includes questions of data security and privacy, the availability of analysts and managers with the requisite skills, and the terms of access to public-sector information and its use for commercial purposes.