Research & Occasional Paper Series: CSHE.9.16
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KNOWLEDGE BASED ECONOMIC AREAS AND FLAGSHIP UNIVERSITIES
A Look at the New Growth Ecosystems in the US and California

October 2016*

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ABSTRACT
The acceptance of new growth theory relates, in part, to a number of highly touted regional success stories – or what I term "Knowledge Based Economic Areas" (KBEAs) in this and past essays. The United States, and California in particular, is viewed as perhaps the most robust creators of KBEAs, providing an influential model that is visited and revisited by business and government leaders, and other Flagship (or leading national) universities, that wish to replicate their strengths within their own cultural and political terms. While California has a number of unique characteristics, including a robust University of California system with a strong internal academic culture and devotion to public service, the story of its historical and contemporary success as an agent of economic development is closely linked to a number of key contextual factors. These relate to the internal culture, governance and management capacity of major universities in the United States, national investment patterns in R&D, the business environment, including the concentration of Knowledge Based Businesses, the acceptance of risk, and the availability of venture capital, legal variables related to Intellectual Property (IP) and tax policies, the quality of regional workforces, and quality of life factors that are important components for attracting and retaining talent. In most of these KBEAs variables, California has enjoyed an advantage that helps to partially explain the success of the University of California (UC) and other major research universities as agents of economic development. This study focuses on seven contextual variables common to all KBEAs in the United States and much of the world, and with particular attention to the UC system – a network of ten research-intensive campuses.

Keywords: New Growth Ecosystems, Universities and Economic Development, Flagship Universities.

New Growth Theory is now a broadly accepted concept among business and university leaders, ministries and lawmakers of almost all political persuasions. The shared axiom essentially states that postmodern economies, and increasingly developing economies, are growing in their dependence on supporting "knowledge accumulation," and encouraging the process of applying new knowledge in the marketplace. Innovation and new technologies depend increasingly on the number of people able and motivated to seek new innovations and technologies. Most importantly, modern adherents of New Growth Theory underscore the importance of investing in new knowledge creation to sustain growth.

Along with government and the private sector, research universities play a pivotal role in building the productive regional and national ecosystems necessary for globally competitive economies. Universities in particular are significant actors both in creating new knowledge and for attracting and educating talented people. The ability of business to innovate is also increasingly tied to acquiring knowledge from outside sources, including universities. Businesses generally prefer engagement with local or

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regional universities that have knowledge of the socioeconomic, cultural, and legal environment in which they operate, and that can produce talent suited to their business climate.[1] Universities that are productive and economically engage thereby act as an anchor institution within regional economies.

In part, the growing acceptance of New (sometimes called Endogenous) Growth Theory[2] relates to a number of highly touted regional success stories – or what I term Knowledge Based Economic Areas (KBEAs) in this and past essays. The United States and California in particular are viewed as perhaps the most robust creators of KBEAs, providing an influential model that is visited and revisited by business and government leaders, and other universities, that wish to replicate their strengths within their own cultural and political terms.

The following outlines some of the important contextual variables that help explain the attributes of KBEA ecosystems in the US, and in California, and the important role of major universities – private and public institutions, but with a focus on the interplay of California's public "Flagship University," the University of California's ten-campus system.

There are many important higher education institutions in the US, but public Flagship Universities (research-intensive national leading institutions) have a special role and the largest impact. Compared to private research universities, they offer a more diverse portfolio of academic programs, research, and forms of public and economic engagement.[3] Part of the reason for the distinct role of leading public universities is scale; they are much larger in enrollment and in the number of academic programs, and the volume of research output, including patents and licenses. Another distinction is their geographic distribution throughout major population areas, while elite private research-intensive universities are found in only a few states. And Flagship Universities have historical roots and a growing commitment to public service, including often very large "extension" programs that provide relevant research and training programs for farmers and business people throughout a state.

California and other key states are major innovators and economic powerhouses because of a number of market positions. These include long-term investments in research universities, robust forms of federal R&D funding, the availability of venture capital, tax policies that promote private investment in university basic research, and a political culture that has supported entrepreneurs and risk-taking. In essence, the US was the first to understand and pursue the nexus of science and economic policy.

> **Figure 1 - New Growth Theory**
> New Growth Theory emphasizes that economic growth results from the increasing returns associated with new knowledge. Knowledge has different properties than other economic goods (being non-rival, and partly excludable). The ability to grow the economy by increasing knowledge rather than labor or capital creates opportunities for nearly boundless growth. Markets fail to produce enough knowledge because innovators cannot capture all of the gains associated with creating new knowledge. And because knowledge can be infinitely reused at zero marginal cost, firms who use knowledge in production can earn quasi-monopoly profits. All forms of knowledge, from big science to better ways to sew a shirt exhibit these properties and contribute to growth. Economies with widespread increasing returns are unlikely to develop along a unique equilibrium path. Development may be a process of creative destruction, with a succession of monopolistically competitive technologies and firms. Markets alone may not converge on a single most efficient solution, and technological and regional development will tend to exhibit path dependence.
>
> *Source: Cortright (2001) "New Growth Theory, Technology and Learning"*

> **Figure 2 – New Flagship Universities**
> Public Flagship Universities play a significant role in regional and national economic development. With the demise of many private research laboratories, our nation's universities have become the primary sources of U.S. research, discovery, and innovation.[6] The biotech industry originated almost entirely from research universities. Countless start-ups and patent grants in a number of industries have sprung from the research clusters that have formed, in conjunction with private counterparts, around the University of California, Berkeley; University of California, San Diego; University of Michigan; University of Texas at Austin; and University of Illinois at Urbana-Champaign.[7] Further, public research universities regularly engage with community and state governments, providing academic expertise, technical assistance, and critical education and workforce development. They are also major employers: in 2012–2013, public research universities employed over 1.1 million faculty and staff nationwide, and were among the top-five largest employers in twenty-four states.
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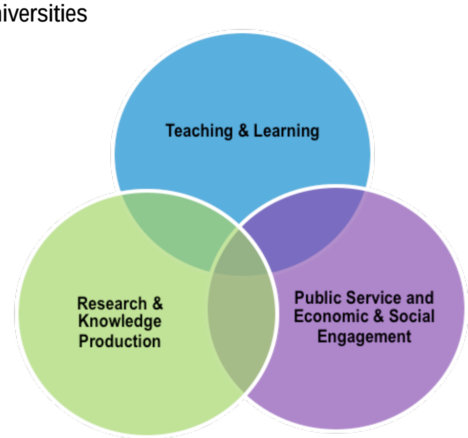
> Source: Adopted from Academy of Science Lincoln Project: *Public Research Universities: Why They Matter* (2016)

There is a vast scholarly literature on how universities have and should interact with society at large to promote economic development and social goods. It is also a significant policy area for government and intergovernmental agencies like the Organisation for Economic Cooperation and Development (OECD)[4], and pan-regional associations like the Association of Southeastern Asian Nations (ASEAN). My objective in this essay is to reflect on this work by economists, sociologists and others, and provide a way to discuss the contextual aspects that help illustrate and highlight essential dynamics experienced in one of the most successful economies. While globalization is reshaping our understanding of economic competitiveness, regional economic productivity, and the interplay of government, business and organizations like universities, and national and regional cultures, remain primary sources of technological innovation and increased productivity. As noted by Barbara Ischinger and Jaana Puuka, while reflecting on numerous OECD studies on the role of universities in regional economic development, "despite the 'death of distance,' innovation continues to cluster around specific regions and urban centers that have skilled people, vibrant communities, and the infrastructure for innovation. The competitive advantage of regions that create the best conditions for growth and development is increasing, and the gaps between regions are growing."[5]

A. ROBUST KBEAs – SEVEN CONTEXTUAL VARIABLES

Beginning in earnest in the mid-1800s, public universities in the United States were established and developed as agents of both economic and social progress, with charters that emphasized a three-part mission: Teaching, Research and Public Service. In much of the world, the concept of economic engagement, and more generally public service, is a relatively new concept and identified as a "third" mission – as if it was an additional and new part of the purpose of major universities. There is a tradition of engagement with the private sector within the disciplines of engineering and the agricultural sciences, but at least historically they have been the exception.

Figure 3 - The Tripartite Mission of Research Universities



Most of the famous state "Flagship" universities – Michigan, Wisconsin, Minnesota, Cornell, California, Washington and others – either were established or gained initial funding under the federal "Land Grant Act" of 1862. This watershed act provided allocations of federal controlled land largely in the American West to each state to sell for the funding of regionally focused universities. The objective was to increase access to universities, and to have them serve local economic needs of a young nation. Universities that gained land, and hence a source of funds, were required to include programs in agriculture and mechanical arts (essentially civil and other forms of engineering training and research), but not at the expense of the liberal arts and classical subjects.

Figure 4 - Key Contextual Variables for Knowledge Based Economic Areas (KBEA)

To reinforce the notion of the American university as an agent of socioeconomic change, the governing boards of these public institutions had a majority of "lay members" (i.e., not associated directly with the academic community) that represented the broader society that the university was intended to serve, including business and farming interests.

California was transformed by this important federal legislation. The subsequent establishment in 1868 of California's then sole state university at Berkeley was a direct result of the Land Grant Act. Its curriculum and subsequent research and outreach efforts were significantly focused on interacting and supporting the state's economic needs. Agriculture and mining were the largest economic sectors in the later part of the 19th century. From these beginnings emerged universities that gauged a significant portion of their purpose and success on interaction and support of both economic development and socioeconomic mobility.

California has a number of unique characteristics and contextual factors that, as noted previously, shaped its historical and contemporary success as an agent of economic development. Figure 4 provides an outline of the variables for the most productive KBEAs. The following description provides a brief overview of each of these variables and how they influence or play a role in California.

1. Universities – Autonomy/Governance; Internal Quality Assurance and Self-Improvement; Academic; Culture Supportive of Economic Engagement

The levels of autonomy, the governance structure, and internal academic culture of research-intensive universities, play a major role in influencing their engagement with economic development and socioeconomic mobility. This includes a sufficient level of institutional autonomy to make decisions and form collaborations with private sector firms and with local government entities and NGOs. It also includes the need for an internal academic culture in which faculty and researchers value and are rewarded for pursuing research and collaborations that range from working with established firms, to supporting and participating in start-ups, and developing curricula that directly benefit regional labor needs.

Universities in the United States, public and private non-profit, have common governance features that relate to their very earliest development as corporate entities, chartered by state governments that have authority over higher education institutions. In the U.S., there is no national equivalent to ministries responsible for higher education. The federal government primarily sets policy related to student financial aid (direct grants for low income students and loan programs for all qualified lower and middle class students), R&D funding through agencies such as the National Science Foundation, and regulatory controls related to these allocations and to national antidiscrimination policies. State governments charter all institutions and generally have provided management authority to universities via their governing boards, with expanding accountability schemes sometimes linked to university funding.

As a result, public and private universities have governance structures that lend themselves to significant management capacity when compared to universities in many other parts of the world. This includes some form of a Governing Board, an Executive Leader (e.g., “president”) and a formal body of the faculty who share management responsibilities under a model of “shared governance,” with different traditions and levels of cooperation within different universities.

Governing boards include members from the larger society that the university serves. They are sufficiently autonomous from national ministries, and government in general, to set broad institutional policies and hire and fire their top university administrator. Depending on its legal authority and the process for selecting members, the board provides a crucial combination of public accountability and, at the same time, a buffer with respect to the occasional political vacillations of ministries and other forms of political pressure that may not benefit the university’s mission and public purposes.

In the U.S., states differ with regard to the amount of independence and authority that public-university boards have. California is one of three states where its Flagship public university has a large degree of constitutional autonomy – meaning independence from legislative control. The other two are Michigan and Minnesota.

If properly constituted in their membership and responsibilities, governing boards act as a conduit and forum for major policy decisions that balance the academic values necessary for the internal life of universities while responding to the external needs and multiple demands of stakeholders. (See Appendix 1 for an example of the general principles for a university governing board’s operation, developed by the Association of Governing Boards based in the United States.)

Most major universities also have an affiliated “Foundation” or “Development” corporation with a board to solicit donations, gifts and funds that are managed outside of the legal framework and restrictions of the university itself. This provides a means to generate additional income for targeted projects, like buildings and scholarships, and sometimes to provide operating funds. But a foundation is very different from the larger policy and financial accountability role of an effective governing board that optimally would charter and regulate a university’s foundation.

Governing boards retain ultimate responsibility and full authority to determine the mission of the institution within the constraints of state policies and government funding mandates. But they must do so with regard for the higher education needs of their states or regions, in a deliberative manner that includes the advice of the president (or equivalent title, like rector), who in turn should consult with the faculty and other constituents.

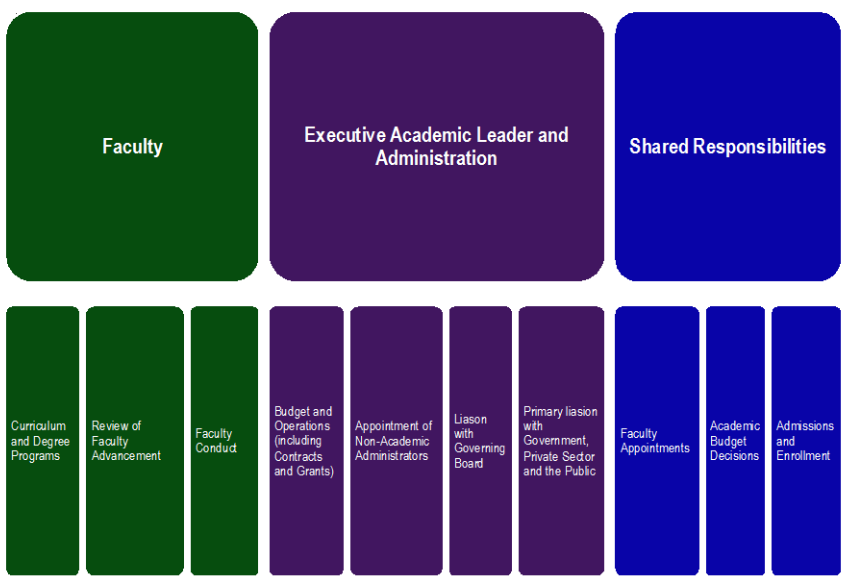
To help navigate the proper balance in authority, universities should define the roles of administrative leaders and faculty in university management under a model of "shared governance" summarized in the following and in Figure 5:

- Academic administrators should, generally, have the primary decision making authority in all issues related to the institution's budget, and effective management of university operations that support academic activities. They should act as the primary liaison with governing boards, government authorities, and other stakeholders. Executive leaders can also provide a strategic vision for universities and ideas for new initiatives, yet always in a consultative manner with university faculty and other members of the academic community.

- A representative body of the faculty (such as a "faculty senate") should have direct or shared authority regarding all academic activities of a university, including oversight of academic programs and curriculum, a strong advisory capacity to the university's rector or president over faculty appointments, determination of admissions standards and practices where there is institutional discretion, and consultative rights for major budget decisions related to academic programs.

The University of California, a multi-campus system with ten campuses, provides an example of policies on shared governance that arguably are one reason for its status as one of the great university systems in the world. In addition, UC's particular legal status as semi-autonomous from state and federal government control has allowed the institution to develop strategies and processes for engaging with the private sector, and for allowing faculty and university research staff to create and enterprises, subject to appropriate controls set by the university itself.

Figure 5 – A General Model of Shared Governance



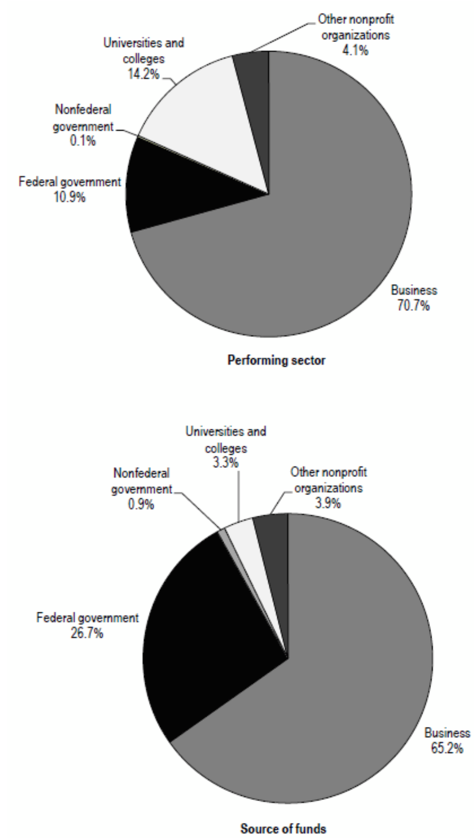
At the same time, it is important to note that the model (Figure 5) is not typical of many of top private research universities in the United States – governance organization and behaviors vary greatly. Often, an organizational challenge for a university is to more clearly outline the roles of academic administrators and faculty, and students and governing boards or ministries. In many parts of the world, these roles are sometimes dictated by national laws or by ministerial policies that, arguably, limit the management capacity of universities.

2. R&D Investment Patterns – Public and Private Funding

In the area of R&D investment, the US has had three major market advantages relative to other economies. First, the high proportion of R&D investment by the private sector; second, the relatively high investment rate in basic research beginning in the early 1960s; and third, the fact that funding is dispersed among universities and its researchers largely on a competitive, peer-reviewed process. Absolute levels of R&D expenditures are important indicators of a nation's innovative capacity and are harbingers of future growth and productivity. But equally important is the source, how the R&D is invested, and the geographic concentration of R&D activity.

Since 1953, US R&D expenditures as a percentage of national GDP have ranged from a minimum of 1.4percent to a high of 2.9percent in 1964. In 2013, the ratio was 2.72 percent. In the 1960s, the majority of R&D investment was by the federal government. Since then, however, the private sector as become the majority R&D funder, mostly in the development side, yet now increasing its investment in basic research in areas such as biotechnology. Non-federally financed R&D, the majority of which is company-financed, increased from 40percent of all R&D in 1968 during the peak of U.S. investment in R&D relative to GDP, to nearly 70percent in 2013.[6]

Figure 6 - Shares of U.S. total R&D expenditures, by performing sector and source of funds: 2013



Source: U.S. R&D Increased in 2013, Well Ahead of the Pace of Gross Domestic Product, InfoBriefs, NSF 15-330, September 8, 2015

Research and development performed in the United States totaled $456.1 billion in 2013, with spending concentrated geographically in about ten states. As noted, the business sector continues to be the largest performer of U.S. R&D. Domestically business R&D accounted for $322.5 billion, or 71percent, of the $456.1 billion national total (see Figure 6).[7]

Most of the private sector R&D investment occurs in only five states, reflecting their concentration on high tech industries and robust research intensive universities: California, Washington, Texas, Massachusetts, and Michigan, accounting for almost half the nation’s company-paid R&D. The top 10 states—adding New Jersey, Illinois, New York, Pennsylvania, and Connecticut—produced 70percent of the R&D that U.S. companies financed. Pharmaceuticals and medicines, the largest R&D industry, accounted for 17percent of the national total.

The higher education sector is the second-largest performer of U.S. R&D. Universities and colleges performed $64.7 billion, or 14percent, of U.S. R&D in 2013 (see Figure 6). Over the 20-year period 1993–2013, academia's share in U.S. R&D has ranged between 11percent and 15percent annually.

Universities and colleges remain the primary providers of the nation’s basic research, accounting for approximately 41.2 billion out of a total of $80 billion. Most of that funding is via a competitive review process that provides wide latitude for researchers to determine areas of science that are most promising. Relatively little funding has been directed toward specific industry needs, for example. At the same time it is important to note the high concentration of federal and private funding for university R&D in about 50 top institutions – and the importance of having highly competitive and quality universities in general for promoting regional innovation systems.

As noted, the business sector is also increasingly investing in and carrying out basic research, particularly in biotechnology. About 17percent of all basic research is performed by the private sector in the United States. The federal government, through its national laboratories and engineering centers, performed 15percent; other nonprofit organizations performed 13percent. Unlike other economic competitors, a substantial amount of university and other funding for basic research, the building block for long-term technological innovation, comes from the private sector.

3. **Business Environment** - Concentration of Knowledge Based Businesses; Openness to Risk Taking; Access to Venture Capital

Venture capital is a primary source of funding for high-tech (HT) businesses. The US remains the single largest source of venture capital, representing a major market advantage unmatched by any other major developed nation. The lack of an equity investment culture, complexities related to intellectual property and legal processes for investing in new businesses, and market volatility are factors that hinder the development of early-stage financing in many OECD countries.

Total U.S. venture capital investment hit $48.3 billion in 2014, its highest level since 2000 and an increase of 61 percent over the previous year in terms of dollars. The number of individual venture capital investments, or deals, were up as well, but by a more modest 4 percent to 4,356 deals in 2014, indicating the growth of deal size and the presence of a number of "megadeals" – many in California.[8]

In the United States, a continuum of capital providers, including angel investors and public and private venture funds, helps diversify risk and ensures a steady flow of quality deals. These networks — together with the use of staged financing instruments linked to performance, provision of technical and managerial support, and easy exits on secondary stock markets — have contributed to the survival and growth of portfolio firms.

Figure 7 - Top 5 U.S. States Receiving Venture Capital Investment

	Business Deals	Amount Invested
California	1,804	$27,151,513,000
Massachusetts	396	$4,678,599,700
New York	203	$1,920,793,100
Pennsylvania	189	$774,665,400
Texas	187	$1,506,448,000
Sub-Total Top 5	2,779	36,032,019,200
US Total	4,356	$48,348,586,400
Top 5 percent of US Total	64percent	75percent

Source: National Venture Capital Association/PricewaterhouseCoopers

The number of venture capitalists with financial and technical expertise is limited in many countries and has not generally matched the rapid growth in risk capital supply across the OECD. Some countries, including Canada and Sweden as well as Israel, fill this experience gap by attracting venture investors from abroad.[9]

In many countries, structural, regulatory, and fiscal barriers act to constrain the development of a dynamic venture capital market and business environment. A 2007 study on venture capital notes that, around the world, almost 20 percent of all venture deals take place across national boundaries, an increase of 250 percent over the preceding five-year period. The authors observe that this trend has been accelerated by the practice of "venture licensing," the replication of proven business models in new markets.[10] Although the US, Europe, and Israel remain key in the industry, practices like these are expected to lead to an increasing focus on emerging markets in the coming years.

While the US remains a major source of high tech innovation and job growth, among the various states there are differences in the geographic dispersion of mature KBEAs, particularly in the generation of new high tech businesses and centers of venture capital. Similar to the overall rates of R&D investment, California has the largest concentration of venture capital and venture deals; in 2014, some 56 percent of all US venture capital investment was in California, mostly occurring in the San Francisco/Bay Area, Los Angeles, and San Diego. The top five states in venture capital investments represent 75 percent of all investments (See Figure 7).

One study indicates that larger firms with over 1,000 employees are the most likely to collaborate with universities and other public research institutes (non-profits). Further, most if not all of these firms are already engaged in R&D activity, sometimes via contracting research activity, and have therefore successfully built a capacity to absorb and use public-generated research.[11] Another study indicates that university-based start-ups are largely concentrated in states with the largest economies and with the largest levels of venture capital.[12] These patterns of R&D activity all point to the importance of a vibrant metropolitan environment for providing the ecosystem for the most productive KBEAs.

4. **Legal Environment -** Intellectual Property Laws; Tax Laws that Promote R&D; Tax Laws for Gifts/Funding of Universities; Foreign Investment Laws

While there is a long history of UC faculty involvement in the development of agriculture (wine, citrus, major vegetable crops) and high-technology based sectors (computing, communications, biotech), a factor that has enhanced this activity is the 1980 Bayh-Dole Act. This federal legislation changed the landscape of intellectual property law. Universities gained ownership rights for inventions and resulting patents funded through federally funded research – as noted, the primary source of basic research funding which is performed largely in research universities.

In part because it has been one of the most prolific generators of intellectual property, the US has created a relatively elaborate and generally protective set of laws that, in turn, have influenced economic development. Two major developments help to decipher the proliferation of intellectual property and its influence on the American market.

First, as noted, the Bayh-Dole Act of 1980 opened the doors for universities and, in turn their faculty and researchers, to own patents on inventions developed through federally funded research and to issue licenses on them. Prior to 1980, patents and licenses generated by federally financed research remained, with few exceptions, under the ownership of the government in Washington – the result of a Cold War approach to intellectual property that focused much of the federal R&D investment on defense related technologies.

The Bayh-Dole Act is credited with providing an important market force for encouraging universities, and their faculty and graduate students, to be more entrepreneurial – an intellectual property model later replicated by other national governments, beginning with the UK during the Thatcher administration. Bayh-Dole generated a revised worldview for both the university and business sectors by encouraging tech-transfer, and arguably an exaggerated sense of potential profits for researchers through return of portions of royalties to inventors. This national initiative, along with the funding of new federally funded university-business centers in engineering, had another effect: State governments, and to a lesser extent municipal governments, looked for new ways to harness their universities to support and grow their tech-based businesses and to compete for growing federal funding.

Another major shift in intellectual property laws was shaped by the legal system, and specifically the emergence via the courts of a more liberal determination of what could be a patentable discovery or idea. Remarkable discoveries in the life sciences, fed in part by long-term investments in basic research, created unique requests for patents and licenses. In 1980, the same year the Bayh-Dole Act was passed, the US Supreme Court upheld a lower court decision providing an extremely broad definition of "patentable material," including the patenting of organisms, molecules, and research techniques related to new biotechnology fields.[13]

Patenting by academic institutions in the U.S. has increased markedly over the last two decades—from 1,800 in 1992 to 8,700 in 2012—resulting in their share of all patents doubling from 1.8percent to 3.4percent. The top 200 R&D-performing institutions dominate among universities and university systems receiving patents, with 98percent of the total patents granted to universities between 1997 and 2012. Among these institutions, 19 accounted for more than 50percent of all patents granted to the top 200 (some of these were multi-campus systems, like the University of California and the University of Texas). The University of California system received 11.3percent of all U.S. patents granted to universities over the period, followed by the Massachusetts Institute of Technology, with 4.2percent. Biotechnology patents accounted for the largest share (25percent) of university patents in 2012. [14]

Research on innovation systems state indicate that the number of patents and licenses may be of less importance than the increased circulation of faculty and researchers, including graduate students, between the academy and the private sector. Universities now allow faculty to engage with the private sector, sometimes taking leaves of absence and then returning to their teaching duties. The networking and free flow of labor and, to some degree, ideas is one of the major characteristics of robust KBEA's – feeding and sustaining these ecosystems.[15]

Other countries implemented policies similar to the Bayh-Dole Act by the early 2000s, giving their academic institutions (rather than inventors or the government) ownership of patents resulting from government-funded research. To facilitate the conversion of new knowledge produced in their laboratories to patent-protected public knowledge that potentially can be licensed by others or form the basis for a startup firm, many U.S. research institutions established technology transfer offices, research parks, and incubators – a topic for later in this report.

Shifting the ownership rules for government funded intellectual property has clearly encouraged greater investment by capital markets and resulted in research collaborations in the US to a degree not yet fully replicated in similar developed economies. Furthermore, actual ownership of technology is necessary if corporations are to make large investments, such as for clinical trials and Food and Drug Administration approval, in order to bring the inventions to market.

One historical US advantage in shaping investment patterns and promoting risk-taking relates to tax policy at the federal, state, and, increasingly, local level as well. The US has long engaged in using taxation not simply to generate revenue, but to shape economic behavior – a characteristic relatively new to many other economies. For example, bankruptcy laws in the US have been the most liberal of any major developed economy, reflecting a political culture that essentially promotes entrepreneurship, recognizes the high rate of failure among all types of businesses, and spreads the risk so that a business failure does not mean permanent ruin.

The U.S. tax system includes "tax credits," encouraging businesses to invest in technology and increasingly in R&D (see Figure 8). This in part accounts for the high rates of private investment in R&D (about 70 percent of all US R&D expenditures).

An important shift to further encourage private investment occurred around the time of the 1980 Bayh-Dole Act, with the establishment of the Research and Experimentation (R&E) tax credit as part of the Economic Recovery Tax Act of 1981. It has since been extended and modified several times and was last renewed through 31 December 2013 by the American Taxpayer Relief Act of 2012. From 1990 to 1996, companies claimed between $1.5 billion and $2.5 billion in R&E credits annually; since then, annual R&E credits have exceeded $9 billion.[16]

Figure 8 - US R&D Tax Credits
Source: American Association of Universities

The federal Research and Development Tax Credit ("R&D tax credit") is a business tax credit for qualified research expenses that can be deducted from overall corporate income taxes. This includes:

- Qualified research expenses include: certain labor and wage costs for performing research activities "in-house;" certain supplies used in conducting research; and a percentage of costs associated with "contract research expenses." The credit only applies to research performed in the United States.
- The traditional R&D tax credit provides a 20 percent credit for qualified research expenses that exceed the taxpayer's base amount (determined by reference to the taxpayer's research expenses during the mid 1980s and the taxpayer's recent gross receipts). In lieu of the traditional credit, taxpayers may elect to claim the Alternative Simplified Credit (ASC). The ASC provides a 14 percent credit for qualified research in excess of 50 percent of a company's prior three-year average qualified research expenses.
- Under certain circumstances, businesses can also claim a credit if they fund qualified research at another organization such as a university or other research organizations. In such instances, a business can claim only 65 percent or 75 percent (as compared to 100 percent for in-house R&D expenditures) of qualifying expenditures toward the tax credit. The 75 percent rate applies only to qualified research organizations (such as universities or research consortiums), which are tax-exempt entities organized primarily to conduct scientific research and which are not private foundations.

Historically, state and local taxation systems varied significantly in the US, including a sales tax in some states, or an income tax model like the federal system, or both.[17] Few provided significant tax credits or other incentives for R&D investment. But over the past three decades, states and local government have become much more engaged in shaping tax policy to attract desirable businesses, including high technology enterprises, and to generate investment in both university and business-based research.

5. **Workforce** - High-Quality/Professional; Mobility; Access to Global Labor Pool; Pathways to Citizenship

The US has reaped tremendous advantages by its early commitment to mass higher education. Over most of the last century, more Americans went to college and graduated, with many entering graduate programs, than was the case for citizens of any other nation in the world. Adding to the nation's supply of talent has been a relatively open-market approach to attracting academics and researchers. In the 1930s, the US provided a haven for preeminent scientists escaping Nazi Germany and World War II. The emergence of a large network of high-quality, sometimes prestigious universities that would hire foreign nationals as professors and researchers contrasted sharply with many if not most nations where university faculty held or hold civil service positions, and in which national governments limited the hiring of non-native talent.

Particularly after World War II, and beginning in earnest during the 1960s, the presence of foreign students in US universities also grew dramatically, supported sometimes by the national governments, and increasingly by offers of student financial aid by American universities in graduate programs such as engineering where, today, foreign nationals are often more than 50 percent of the total students in any given program.

In previous decades, students who came to the US for both undergraduate and graduate programs largely stayed in the US and entered the job market. Their presence has dramatically influenced HT innovation and the growth of that sector in the US economy. For example, one study indicates that nearly one-third of all the successful start-ups in Silicon Valley were started by foreign nationals, most of who gained their training in American universities.

Foreign nationals from Asia became the largest single source of talent coming to the US for education, largely in graduate programs in science and engineering. Bolstered by Chinese national government initiatives, students from China became the largest single source of foreign students in the US beginning in the early 1990s. The overall growth in all foreign nationals entering US graduate degree programs in that period also reflected a shortfall in the training of “native” US students in STEM fields, and the push by HT economic sectors to get the talent they needed via US universities, and by successfully advocating more liberal visa policies for highly educated immigrants.

This pattern of attracting and then retaining talent is beginning to erode for two general reasons. First, the US and other developed economies with mature higher education systems are finding that a growing number of foreign nationals educated in science and engineering fields, and professionals that have long contributed to science and technology innovation and businesses, are returning to their native economies as they mature, buttressed by national policies to attract top scientific talent. Second, the overall market for higher education, one of the primary means of attracting talent, is both growing and shifting with further development of university systems in the EU and elsewhere.

The United States continues to enjoy a distinct but decreasing advantage in the supply of human capital for research and other work involving science and engineering. In absolute numbers, the United States still has the largest population of science and engineering researchers, but China (which almost tripled its number since the mid-1990s) and other parts of the world, in particular Northern Europe, are catching up and will soon surpass the US.

The number of international students in national higher education systems (defined as those students with citizenship or residency in another country) has grown from around 1.8 million in 2000 to over 4 million in 2014. Over that period, most EU nations have either retained or expanded their market share of international students, as shown in Figure 9; countries such as Australia and New Zealand have also grown in their market share. Meanwhile, even in the midst of a significant expansion in the number of students seeking higher education outside of their home countries, the share of international students attending US universities and colleges has declined marginally.

The US does retain a strong international draw at the graduate level, and particularly in engineering, the sciences, and business management. A high percentage of Chinese students wishing to study abroad still come to the US. Nearly 30 percent of all international Chinese students enroll in a US university or college. And some 24 percent of all international doctoral-level students in the US are foreign nationals. But as an indicator of shifts in the global talent pool, there is now an even a higher percentage in the EU and in Australia which, combined, draws 28percent of the global pool of doctoral students.

There is then the question of the relative quality of the international student pool, and the quality and reputation of the graduate programs they enroll in – all rather difficult factors to evaluate. The US remains a world leader in the prestige and, arguably, the quality of its advanced graduate programs. Yet there is growing evidence that students throughout the world no longer see the US as the primary place to study; that in some form this correlates with perceived quality and prestige in the EU and elsewhere;

and, further, that the trajectory of growth in international students may mean a continued decline in the US market share of international students.

Attracting talent from abroad is an important component of the US's high technology advantage. Educating a more robust native population should be an equally, if not more, important goal. A factor that will influence the US's market position, and the general socioeconomic health of the nation, is the relative decline in higher education attainment rates of Americans when compared to other developed economies. This phenomenon relates to a decline in the quality of pre-college education in the US, especially in the public sector.

6. Quality of Life – Metropolitan Advantage; Housing and Transportation; Education; Pollution; Crime

A growing body of research suggests that quality of life (QOL) is becoming an increasingly important consideration in modern business location decisions, particularly for high-tech firms that are less tied to traditional location factors such as transportation costs, proximity to raw materials, and cheap labor. A recent study on new business formations notes that, "Quality-of-life factors appear to be able to explain roughly a third of new-business formations" in the US in metropolitan areas where the bulk of business activities occurs.

QOL is also an important variable for productive research-intensive universities and for supporting KBEAs. Attracting and retaining talented people is highly dependent on an environment that promotes creativity, excellence and entrepreneurship, including affordable housing, cultural amenities, convenient transportation, health care, good quality schools, job opportunities for spouses/partners, low pollution, and safe neighborhoods and city streets. Add to this other variables related to open societies: freedom of speech and racial tolerance, gender equality and non-discriminatory practices related to sexual preferences.

A faculty recruitment study at Harvard, of more than 2,000 doctoral students and almost 700 first- and-second-year faculty members at a sample of top American universities asked respondents to rank the importance of such factors as salary, location, chances of tenure, department quality, and institutional prestige when weighing different offers. Both groups ranked geographic location and quality of life as their first priority, followed by the "work balance" between teaching and research. Salary and institutional prestige where ranked toward the bottom of the list. The tenure factor was ranked somewhere in the middle.

Collaborative efforts of regional or city governments, universities and the private sector have led to a variety of strategies that link many of the KBEAs variables noted. These include:

- Defining a region based on common needs. It should be durable enough to have a home location.
- Finding a region's unique competitive niche.
- Programs for developing and assisting high-growth entrepreneurs.
- Creating clusters in the region around core business niches. Newly identified synergies can benefit adoption of new technologies, worker training and business models.
- Improving and leveraging local amenities – parks, recreational facilities, social services etc.
- Investing in people, community leaders and local workforce alike, including life-long learning.
- Enriching the region's supply of equity capital. The public and private sectors can play very different and important roles.
- Tapping technologies suited to the region. In many regions, they might include: production agriculture that includes renewable energy and new bio-based materials from crop plants; advanced manufacturing, and high-skill services based on information technologies that are not location dependent.
- Investing in 21st century infrastructure. This includes quality-of-life infrastructure such as community centers, education and distance education options, and well- designed public and recreation areas as well as telecommunications infrastructure, for example.
- Reinventing regional governance to make decisions as a region instead of as independent jurisdictions.

Universities have a special responsibility to extend their expertise to helping improve the QOL in the regional area in which they operate – on their own, or in collaboration with other higher education institutions, local government and business.

7. **Political Environment** - Political Leadership; University Funding (Operational and Capital); Leveraging Federal/EU Funding

Among the general public, and most importantly among major political leaders in the US, the tenets of new growth theory, as noted previously, are growing in influence. With declines in older manufacturing and consumer goods industries, high technology and service industries are widely viewed as the sources of near- and long-term economic competitiveness. This worldview is, of course, shared by many other developed economies, such as the EU. The difference is that the US has had a longer history of essentially believing that HT innovation and economic activity will, in some form, be the crux of its future economy, and this belief influences R&D investment rates.

There is abundant empirical evidence of the central importance of high tech innovation, including highly productive regional economic areas such as Silicon Valley and the San Francisco Bay Area for IT and biotechnology, San Diego in communication technologies (like Qualcomm), and Boston for biotechnology. But there has also emerged a rhetoric influenced by these success stories, including the desire to replicate in some form a seemingly universal formulas for success, and fueled by an optimistic enthusiasm and sense of competition that often drives policymaking.

Still, the bright light of a technology and knowledge based economy remains the focus of much public investment. The major change in the US, with similar trends in other parts of the world, is the movement of policymaking and public investment intended to promote high tech innovation and encourage university-business collaboration from national policymaking to the regional (or state) and local levels. State governments have increasingly becoming active promoters of generating and supporting KBEAs. Yet the source of public R&D funding has traditionally been the purview of federal (national) governments. Hence, many state and local initiatives intended to build university-business collaborations two decades ago, for example, were in large part pursued to capture federal funds. This motivation remains, but increasingly states are simply investing their own money in basic research efforts in areas such as stem cells and nanotechnologies.

Political interest, enthusiasm, and the sense of political competition--to copy the practices of competitor states or local regions, or to beat them to new policy initiatives--are in some form prerequisites to building KBEAs. Arguably, although with many nuances, the US has a high political interest in and desire to promote KBEAs and HT innovation.

B. ASSESSING CALIFORNIA'S SUCCESS[18]

Flagship Universities (leading national research intensive universities) play an essential role in KBEAs. This includes a political and legal environment that supports innovation, quality of life factors key for attracting and retaining talent, a conducive business environment including sources of venture capital, access to and nurturing of a quality workforce, robust sources of R&D Funding for both academic and applied research, and finally, but not least, productive universities who value economic engagement and that actively seek interaction with the private sector. The ability of businesses to innovate is increasingly tied to acquiring knowledge from outside sources, including universities. Businesses generally prefer engagement with local or regional universities who have intimate, local knowledge of the socioeconomic, cultural, and legal environments in which they operate.[19]

All of these components of a robust regional innovation system exist in various forms within California. In a highly interactive and iterative process of shaping and being shaped by these KBEAs variables, the University of California has long held a pivotal place within California's growing and diverse economy. With ten campuses, five health centers, and other facilities located throughout the state, the University of California is a significant actor in California's economy and in its social and cultural life. With expenditures of about $26.7 billion, much of that in the form of salaries, wages and benefits, UC annually generates more than $46 billion in economic activity in California, and approximately $14 dollars in economic output for every dollar of taxpayer money invested by the state. The following summarizes some of the key ways UC influences and shapes the California economy.

- *Geographic Presence and Public Service* - One of the key features of California's pioneering public higher education system is a conscious effort to have campuses and services distributed throughout the state, and correlating with population centers and regional economic needs.

- *Employment* - UC is a major employer in California, with over 190,000 faculty, researchers, staff, and students employed at 10 campuses, five health centers, and other facilities throughout the state, making UC the third-largest employer in the state. UC employees are broadly distributed throughout the state with about 74 percent associated with the nine general campuses, 23 percent at the five health centers, and 3 percent at other UC facilities.

- *Graduates and Post-Graduate Employment* - UC has more than 150 academic disciplines and over 600 graduate degree programs. At the undergraduate level, the university awards nearly one-third of California's bachelor's degrees. Across disciplines, undergraduate degree recipients tend to double their earnings between two and ten years after graduation. At the graduate level, UC confers more doctoral degrees per tenured/tenure-track faculty than the average at public American Association of Universities (AAU) peers. More than 25,000 graduates of UC's academic Ph.D. and master's programs (in fields other than engineering/computer science) have entered the California workforce since 2000.

- *Research Impact* - UC faculty and researchers have received nearly nine percent of all academic research and development grants coming from Washington and reported more than 1,700 new inventions in 2014 that led to over 70 startup companies in California and generated $118 million in royalty and fee income. UC has more than 12,500 active U.S. patents from its inventions — more than any other university in the country. UC startups are independently operating companies that formed to commercialize a UC technology. The vast majority (over 85percent) of these startups were founded in California. As of 2014, 430 UC startups are actively operating in California. These startups employ 5,178 people and bring in a combined $654 million in annual revenues.

In a globalizing world where businesses investment and activity are increasingly competitive, universities can also play an essential role as a KBEA anchor -- a physical space that generates new knowledge and talent not transportable to another region, another nation. The University of California plays this anchor role in California's innovation system, along with other major research universities, including Stanford, Caltech and the University of Southern California.

What are the main lessons from California's experience that might be relevant to other parts of the world, and specifically focused on UC's role in California's innovation economy? The following outlines six major observations.

- University Autonomy and Management Capacity

  As noted previously, early in its development as the Flagship University for the state of California, UC gained a high level of institutional autonomy, granted to its Board of Regents, including a prominent role for faculty in institutional management. This allowed the university to manage financial and capital (buildings and land) resources, and, most importantly, to shape its academic programs, admissions standards, faculty advancement policies, and the role of university administrators, all relatively free of government interference and influence.

  At the same time, with such autonomy came a responsibility to insure that the university was responsive to political, cultural, social, and economic needs of the people and the state that gives the institution life and purpose. Higher levels of institutional autonomy, along with role of the Board of Regents, provide a balanced governance structure that allowed the university to be accountable to the public, yet also relatively free from political vacillations and the constant, and growing and sometime contradictory demands of stakeholders.

  In turn, UC's autonomy has been a precondition for building a significant level of management capacity, essentially empowering a university to make strategic choices in a deliberate manner, a desire for institutional self-improvement, evidence based management.

  At the same time, it is important to note that UC is a coherent network of ten university campuses under a single governing board with substantial management capacity under its "One University" model. It is also part of a larger pioneering system of higher education with different missions for different types of institutions that serve the higher education needs of the state. In contrast, almost all national public universities are independent entities, in competition with each other for students, for research funding, and are not conceived as part of larger systems.

- Internal Academic Culture that Values Economic Engagement
  A sufficient level of autonomy, and an appropriate management capacity also provided the required environment for UC to build a performance-based academic culture that focuses on faculty productivity. This includes regular campus peer review of faculty performance and clear policies regarding criteria that reflects the larger mission and goals of an institution.

  The quality, expectations, and productivity of faculty in carrying out their duties, built around peer review and with an emphasis on innovation and creativity, is one of the most important features of leading universities. This includes placing sufficient value on economic engagement *and* public service as a vehicle through which a faculty member may demonstrate intellectual creativity and/or public service. As noted, this does not mean that all faculty should be economically engaged; Universities also need to include policies that provide time and resources to engage with businesses, local and regional governments and public agencies and non-profits.

  Universities also need to seek organizational changes and emphases in faculty hiring that keep them at the forefront of research, and that may eventually influence technological and other sectors of the economy. For example, both the San Francisco and San Diego campuses undertook structural-biology research on complex and human-scale organisms at the critical point in time when that field was rapidly blossoming due to new research capabilities and fundamental biological knowledge. The UC San Francisco approach of stressing teamwork among outstanding researchers from different disciplinary backgrounds was particularly effective.[20]

- Robust Sources of External and Competitively Funded R&D
  The University of California, and specifically its faculty and researchers, have long operated successfully in a competitive environment for securing extramural research grants. Most research funding has come from the federal government that understands its crucial role in promoting both basic and applied research, and its fundamental role in shaping innovation and economic growth.

  Another important aspect of California's innovation system, and that of the United States, is that most research funding is not directed to a specific outcome. Through the process of competitive peer review and funding for general areas of research, researchers themselves shape the research agenda. Universities play the key role in fundamental (or blue-sky) research in which the value and future use is not always clear. Further, a balanced research investment portfolio insures research in all the disciplines and encourages research that falls between disciplines and/or brings several needed disciplines together.

  It is also important to see research income, from public and private sources, as one part of a larger funding model for research universities. UC has benefited from overhead rates that recognize the larger costs of its research activities, including administrative staff support and capital costs. Universities need to cover the real costs of grant-generated research, integrate these activities where appropriate into its teaching and public service roles, and generate resources for future investment in promising research and economic engagement initiatives.

  UC has worked out a financial structure with the State of California whereby about half of the recovered overhead that is made available by the federal government is passed on to the university and has become an essential and flexible source for major unanticipated expenses such as financial-support packages for faculty recruitment and retention.

- Universities and Technology Transfer
  Universities need to develop policies and mechanisms to encourage interaction and collaborations with businesses and public agencies and to move inventions stemming from faculty research into commercial use. This includes carefully establishing the "rules of engagement" with businesses in which the university outlines conflict-of-interest and conflict-of-commitment policies and appropriate expectations between the academic community and the private sector.

Over time and with substantial experience, the University of California has developed its own "rules of engagement," administrative support offices and policies to link faculty expertise and knowledge generation with regional businesses and local governments, and has participated in formal and informal interactions with stakeholders–including business-university forums and industry specific university centers or institutes that encourage the exchange of ideas, knowledge, and people. As the technology transfer operations of the university increased and as experience was gained over the years, the university moved toward more active marketing of technology and decentralization that placed technology-transfer operations closer to the faculty inventors.

- A Supportive Political and Business Environment
  An essential component of California's innovation system, and that of any KBEAs, is the interest and support of lawmakers, business interests, and more generally the public on the multiple roles universities play in socioeconomic mobility and economic growth. The development of the San Diego/La Jolla area into science-based industry and independent research organizations surrounding the UC San Diego campus is a strong example of how important these factors are.[21]

  There is significant complexity to promoting a positive environment for universities to interact and support local and regional, and national economies. Political support is in part based on the performance, real and perceived, of universities in meeting a larger set of institutional responsibilities: from socioeconomic mobility, to generating talent for local labor markets, generating societal leaders, and research that both furthers knowledge and provides possible utility, including start-ups. The business environment is part of the political environment and, as we have discussed in this report, includes a broad range of variables: including a society supportive of risk-taking, perception regarding the interest and flexibility of a university to engage with the private sector, to tax and land-use policies that encourage private sector investment in university research, and the availability of venture capital.

- University Accountability
  Developing and sustaining a vibrant KBEAs, and a positive and strategic relationship with local communities and the private sector, takes time and effort. The University of California has a long history of significantly shaping California's economy. But there is always the question of what UC has done for the state, and the nation, lately. Universities need to actively report on their overall economic and social impact, on their collaborations and influence on specific business sectors, and seek avenues to disseminate and help explain their role in society.

  Much of the data on the University of California's economic impact is published in an annual UC generated "accountability reports"[22] along with occasional "economic impact reports" generated by third parties. These activities provide formal and transparent sources of information on a wide variety of UC activities and comparative performance.

  Internationally, most accountability standards have been developed by ministries and are sometimes used for resource allocation. But universities need to creatively seek their own internally generated processes for setting performance standards, including their economic impact and the strength of their relationship with the private sector, and evaluating their strengths and weaknesses in these activities.

C. THE NEXT FRONTIER for INNOVATION ECOSYSTEMS?

These are some of the elements that have proved to be important to California, with a particularly large role for the state's public Flagship University, the University of California. What about in other parts of the world? The particular dynamics of productive KBEA eco-systems, and the interplay of public and private research-intensive universities in the U.S. (about 115 according to the Carnegie Classification of Institutions of Higher Education) and in California (only about 12, with ten being UC campuses), are not necessarily directly replicable.[23]

In the UK, in Canada, in France, and in China, KBEAs exist or are emerging with a different alignment of the Seven Contextual Variables discussed previously, and within their own cultural and evolving norms. The history and contemporary relationship between universities and their regional private sectors very significantly, faculty culture might be less entrepreneurial, they face significant legal and transactional barriers may; there are also the demands of ministries, and different funding mechanisms for R&D.

When compared to other parts of the world, another big difference is the mix of higher education institutions, and the concentration (or lack thereof) of academic research activity and the intensity of engagement with local, regional, and the national economy. In the US, the 115 universities in the Carnegie Classification of doctoral granting, research-intensive institutions conduct the vast majority of academic R&D—over 80percent. In much of the world, demands for equitable distribution of research funds have spread funding among many institutions, all claiming to be research-intensive universities. But generally, this formula has not been as productive – hence a global movement by governments to seek greater mission differentiation among its growing number of higher education institutions and to focus research funding on fewer institutions. Good quality research-intensive universities are expensive.

In the US, and in California, it is important to note the role of the many other less research-intensive universities (some doctoral granting universities and 741 master's granting universities and colleges) in educating undergraduate and graduates, and in producing new knowledge. For example, while Berkeley and Stanford's engineering programs produce significant numbers of graduates who are then employed in Silicon Valley firms, San Jose State (a part of the California State University system without doctoral programs with a few rare exceptions) is actually the largest producer of subsequently employed engineering graduates. In much of the world, all universities strive for research-intensive status; within thee US there is a history of mission differentiation, where many universities attempt to excel in their area of responsibility in a larger higher education system. Hence, San Jose State, and other parts of the CSU system, focus more on teaching and educating for the professions than on producing researchers.

Deciphering the characteristics, dynamics, strengths, weaknesses, and longevity, of different KBEAs, and the particular role of universities that take on the New Flagship University role that I outline in a recent book,[24] can help in the process of both national and regional economic development. Again, while noting the different cultural, political, and economic conditions in various parts of the world, there is a clear trend toward policy convergence. In a globalizing world, we are all looking over our shoulders for new ideas, patterns of success, and paths for future economic growth.

Finally, this brief analysis has not attempted to outline the many conundrums and difficulties of the interplay between universities, the private sector, and governments – what some have called a triple helix interrelationship now deemed essential for the "Knowledge Society."[25] How is the close association with the private sector, which focuses on proprietary ownership of knowledge, influencing the behaviors of researchers and universities who have public missions? What are the costs and benefits of universities becoming more entrepreneurial, often in search of funding within the context of declining public investment? These are among a myriad of important questions that are being vigorously debated, often described as a process of privatizing an important and scarce public good.

With these thoughts in mind, activities of universities of today, as well as that of the private sector, government, and more generally the workings of society, continue to become more complex and intertwined. There remains a political consensus and faith in the ideals of New Growth Theory, even if arguably this model of regional and national economic development is romanticized, sometimes removed, for instance, from the realities of economic and educational inequality. This consensus on the need for innovation and the essential role of universities promises new policy initiatives, new relationships and funding, to not only create KBEAs, but to sustain them. As in the rise and decline of great industrial sectors, like steel in the American upper mid-west, will we see similar economic cycles related to KBEAs? The rise and fall of Nokia in Helsinki, and Blackberry in Waterloo, Canada, seem to indicate the importance of a diversified regional investment in knowledge production and talent, even in the midst of a high successful specific technology—easier said then done. The next frontier in research on innovation systems seems to be how to sustain investment and innovation, and the dynamics of productive KBEAs.

Appendix 1

General Principles for a University Governing Board Association of Governing Boards (AGB)

- The ultimate responsibility for governance of the institution rests in its governing board. Boards are accountable for the mission and heritage of their institutions and the transcendent values that guide and shape higher education; they are equally accountable to the public and to their institutions' legitimate constituents. The governing board should retain ultimate responsibility and full authority to determine the mission of the institution within the constraints of state policies and with regard for the state's higher education needs in the case of public institutions or multi-campus systems, in consultation with and on the advice of the president, who should consult with the faculty and other constituents.

- The board should establish effective ways to govern while respecting the culture of decision making in the academy. By virtue of their special mission and purpose in a pluralistic society, universities have a tradition of both academic freedom and constituent participation—commonly called "shared governance"—that is strikingly different from that of business and more akin to that of other peer-review professions, such as law and medicine. Faculty are accorded significant responsibility for and control of curriculum and pedagogy. This delegation of authority results in continuous innovation. Board members are responsible for being well informed about and for monitoring the quality of educational programs and pedagogy. Defining the respective roles of boards, administrators, and faculty in regard to academic programs and preserving and protecting academic freedom are essential board responsibilities.

- The board should approve a budget and establish guidelines for resource allocation using a process that reflects strategic priorities. Budgets are usually developed by the administration, with input from and communication with interested constituents. The board should not, however, delegate the final determination of the overall resources available for strategic investment directed to achieving mission, sustaining core operations, and assuring attainment of priorities. Once the board makes these overarching decisions, it should delegate resource-allocation decisions to the president who may, in turn, delegate them to others.

- The governing board should manifest a commitment to accountability and transparency and should exemplify the behavior it expects of other participants in the governance process. From time to time, boards should examine their membership, structure, policies, and performance. Boards and their individual members should engage in periodic evaluations of their effectiveness and commitment to the institution or public system that they serve. In the spirit of transparency and accountability, the board should be prepared to set forth the reasons for its decisions.

- Governing boards have the ultimate responsibility to appoint and assess the performance of the president. Indeed, the selection, assessment, and support of the president are the most important exercises of strategic responsibility by the board. The process for selecting a new president should provide for participation of constituents, particularly faculty; however, the board should make the decision on appointments. Boards should assess the president's performance on an annual basis for progress toward attainment of goals and objectives, and more comprehensively every several years in consultation with other constituent groups. In assessing the president's performance, boards should bear in mind that board and presidential effectiveness are interdependent.

- Boards of both public and independent colleges and universities should play an important role in relating their institutions to the communities they serve. The preceding principles primarily address the internal governance of institutions or multi-campus systems. Governance should also be informed by and relate to external stakeholders. Governing boards can facilitate appropriate and reciprocal influence between the institution and external parties in many ways.

Source: Statement on Board Responsibility for Institutional Governance, AGB, 2010

ENDNOTES

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