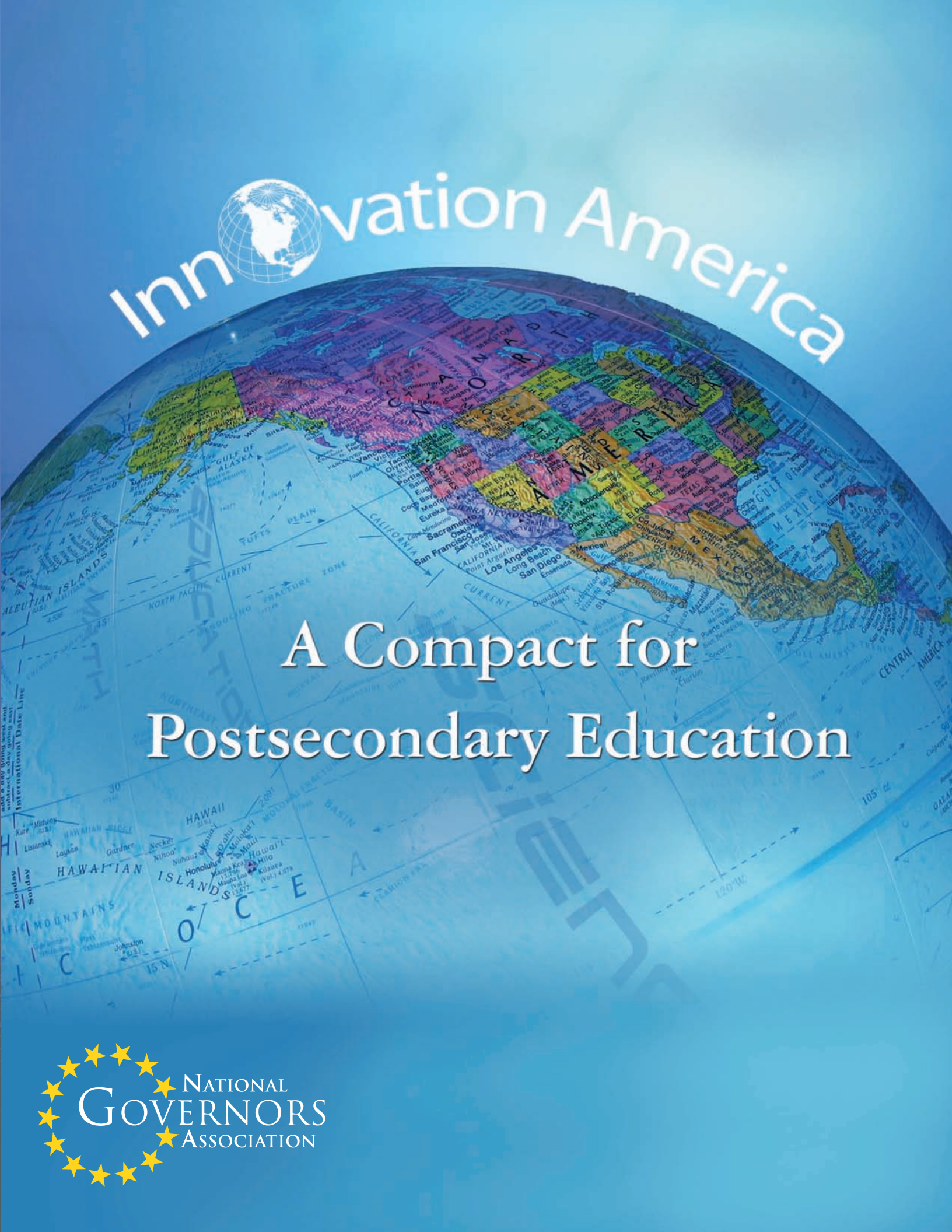
Innovation America
A Compact for
Postsecondary Education
National
Governors
Association

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Foreword

The National Governors Association's *Innovation America* initiative focused on strengthening our nation's competitive position in the global economy by improving our capacity to innovate. The goal was to give governors the tools they need to improve math and science education, better align postsecondary education systems with state economies, and develop regional innovation strategies.

To guide the *Innovation America* initiative, we assembled a bipartisan task force of governors, corporate CEOs, and university presidents. Working with the NGA Center for Best Practices, this task force provided valuable advice on innovation strategies in general and assisted in the development of the initiative's reports and forums. Through a variety of events and publications, we collected and shared best practice information to ensure that every state—and the nation—is equipped to excel in the global economy.

All of the documents produced during this initiative can be found online at *www.nga.org/center/innovation*.

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Co-Chair, Innovation America Task Force

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Executive Summary

American postsecondary education is a diverse collection of public and private institutions, ranging from community and technical colleges to comprehensive and research universities. These institutions are an invaluable resource to states and to the nation—they educate many of the talented people who work in our industries, businesses, and civic sectors, and they are the places where much of the research and development that benefits this country is conducted.

And while postsecondary education in the United States has already achieved key successes in the innovation economy, the public postsecondary education system overall risks falling behind its counterparts in many other nations around the world—places where there have been massive efforts to link postsecondary education to the specific innovation needs of industries and regions.

This paper focuses on how states can better align postsecondary education with their economic needs, which will position them to compete in the global economy by producing a highly-skilled workforce and by unleashing postsecondary education institutions' power to innovate.

A truly innovative postsecondary system must do the following:

1. Foster among its graduates the critical skills and capabilities needed to enhance state economic competitiveness.
2. Produce a well-qualified K–12 teacher corps that is highly skilled in the science, technology, engineering, and math (STEM) disciplines.
3. Create new knowledge by investing in research and development (R&D) and by establishing policies that facilitate the translation of new ideas into innovative products, processes, and services.

We also introduce a new vehicle for aligning postsecondary education to state economies—the postsecondary education compact. Through the compact, state governments, the postsecondary education system, the Boards of Regents, and the private sector collaboratively embrace a public agenda to ensure that postsecondary education policies, programs, curricula, and resources address current, emerging, and future economic realities.

Among other efforts to reform postsecondary education, governors can use the compact framework to encourage the postsecondary education system and other relevant stakeholders to agree on the mission and key outputs of a system that emphasizes innovation in exchange for state commitments to budget stability and enhanced autonomy in postsecondary education.

The compact is based on a clear understanding of the economic needs of the state and the related outputs of the postsecondary education system. The compact involves establishing:

- **Goals.** The compact sets long-term goals to address a state's major economic challenges—typically based on the results of a comprehensive assessment. Its aim is to hold institutions accountable for meeting these goals in exchange for a state's commitment to stabilizing the postsecondary education budget, rewarding performance, and providing autonomy through deregulation.
- **State Responsibilities.** The state and postsecondary education roles within the compact are then negotiated. The state provides clear direction as to its expectations and priorities for the postsecondary education system. Furthermore, states establish budget stability tied to incentives (or sanctions) based on how well the system meets the goals of the compact. States in turn give more autonomy to postsecondary education—such as reducing regulations and reporting requirements—so these institutions have maximum flexibility to meet the compact's ambitious goals.
- **Mutual Accountability.** Once all the stakeholders agree on the roles and objectives, an accountability system is set up to ensure that there are tools to enforce the compact on both sides. Tools include transparency, rewards, and penalties or sanctions for failing to meet expectations. The compact is underpinned by a robust longitudinal data system so that stakeholders can track the long-term performance of students and assess their gains according to agreed-upon postsecondary education metrics.

While offering real accountability, the compact is flexible enough to allow for adjustments and to provide for coordination among stakeholders on how the responsibility for achieving the compact's goals and outputs will be shared by all the participating institutions. Finally, the compact presents goals and challenges from a statewide point of view, and identifies challenges and opportunities as the compact matures and, if necessary, is renegotiated.

Chapter 1 — Introduction

Postsecondary education is a critical element of American society, contributing to the educational, aesthetic, cultural, and economic development of the nation. Public and private colleges and universities are bastions of learning. They provoke critical thinking, inspire thoughtful research, and provide insight into the most mundane and most complex questions of our past, our present, and our future. On a practical level, they contribute to local communities through arts, sports, and service projects, and provide employment and health care. Most importantly, the postsecondary education system helps create the nation's stock of highly mobile, gifted, and productive professionals in the arts and sciences, humanities, business, and engineering.

The American postsecondary education system is robust, consisting of more than 4,000 public and private colleges and universities in communities small and large. The system provides prospective students with a wide range of educational choices—from two-year technical and community colleges to four-year colleges to flagship research universities. Within these systems, the diverse offerings include an array of academic majors and specializations and multiple levels of degree types, including associate's, bachelor's, master's, and doctorates. An overall healthy competition between institutions also helps the entire system maintain its vibrancy. All of these characteristics and more have made the U.S. postsecondary system the envy of the world, attracting students and elite researchers from all corners of the globe.

The Challenge

Even though America's postsecondary education system is still highly prized, many countries around the world have sought to not only build and expand their own postsecondary systems but also to develop new models linking their institutions to the specific innovation needs of industries and regions. In Singapore, for example, state universities receive strong support from the government's Economic Development Board to strengthen academic capacity in engineering and technological fields deemed essential to the country's economic growth. Recent efforts in South Korea, such as BK 21 (Brain Korea21) and the New University for Regional Innovation project, exemplify data-driven reforms designed to meet the talent and research needs of Korean industry and regions.

Finland and Ireland also coordinate postsecondary education and economic growth priorities. Finland has relied heavily on its university system to transition from an economy based on natural resources to one that is knowledge-based through the establishment of new research institutes shadowing academic departments and devoted to the needs of particular industrial sectors. Ireland has spent billions of euros on research and education partnerships that link higher education to national strategies in workforce development, especially in critical sectors such as wireless technology.

In addition to the emerging international competition, there are signs that American postsecondary education is not evolving rapidly enough to meet the needs of the innovation economy:

- According to 2003 Organisation for Economic Co-operation and Development (OECD) data, the United States is second only to Canada in the proportion of adults ages 35 to 64 who hold a college degree. However, for ages 25 to 34, the United States has slipped to eighth behind Canada, Japan, Korea, Finland, Norway, Sweden, and Belgium. Furthermore, countries such as Spain, France, Ireland, Australia, and Denmark could easily overtake the United States in the next several years.
- Many public colleges and universities are not providing all of their graduates with the critical thinking, problem-solving, and adaptive skills, including science, technology, engineering, and math (STEM) competencies, required to meet the needs of employers.
- Public institutions have not kept up with the need to produce highly qualified nurses, engineers, scientists, K-12 level teachers in science, technology, engineering, and math (STEM), as well as other professions critical to the innovation economy.
- Far too few new ideas ever make it out of university classrooms and laboratories and into new products and process that can be sold in the international marketplace.
- A total of 19 OECD countries have higher graduation rates than the 54 percent experienced by the United States. Japan with 91 percent, and Ireland and Korea with 83 percent, are the true leaders.

While colleges and universities typically shoulder the brunt of criticism for this new profile, it is true that there are a host of other societal factors that also have an impact on these statistics. Furthermore, many postsecondary leaders feel they face unreasonable expectations, excessive state and federal regulations, and often little clear direction or vision from the state:

- The complexities and challenges of postsecondary education are not well-understood by many state policymakers and business leaders.

- Financial support of postsecondary education continues to decline among states; federal funding of civilian R&D remains mostly flat.
- State postsecondary systems often lack clear, well-articulated expectations for individual institutions, including how they are expected to relate to one another and to industry, communities, and K-12 education.
- Postsecondary education is increasingly tasked with providing remedial math and English courses for first-time freshman, highlighting the lack of college readiness among many high school graduates.
- State policies and governance structures are often not geared toward flexibility and coordination among institutions, exacerbating existing challenges and making reform more difficult—there is no institutional way to look at the broader state picture.

While neither the public postsecondary systems nor states may be completely to blame for the challenges above, both are responsible for their remediation. Urgent action is needed. The future of U.S. public postsecondary education is at stake, and the risk of obsolescence relative to other emerging international institutions will increase. What is less often discussed is that the economic future of states is becoming increasingly dependent on how well their postsecondary systems can adapt. States and their colleges and universities must *together* align the mission of postsecondary education systems with the economic needs of the regions and states where they are located.

The Scope

This paper is intended to help governors, working closely with their boards of regents, the private sector, and college and university leadership, to think about and undertake the alignment of postsecondary education with the overall economic needs of their state. The intent is to provide a broad conceptual framework. However, it is not a "how-to" paper because governors will have to tailor the concepts to their own states, and the concepts need further refinement. It does, nevertheless, provide many state examples that should be helpful. By laying out these concepts and specific examples, it is our hope that governors will make a long-term commitment to postsecondary reform.

It is clearly acknowledged that the postsecondary education systems have both national and regional economic benefits that extend far beyond those of the states. There are also a significant number of societal and individual benefits that go beyond the scope of this paper.

This paper is relatively narrow in scope, focusing on the three outputs of the postsecondary system critical to innovation. First, is the development of problem solving, creativity, and other competencies important to developing innovative goods, services, and processes that can be sold in the national and international marketplace. Other skills and competencies that support the local economy and are provided by both community and other colleges are also included. Second, within the workforce there is a specific focus on developing a well-qualified teacher corps, especially within the STEM disciplines. And third, the creation of new knowledge through R&D and the diffusion and acceleration of these new ideas into processes, products, and services for the national and international marketplace.

Among other actions, the paper introduces the concept of a new (or in some cases renewed) postsecondary education compact that forges an agreement between the regents, business community, college and university leadership, and state political leadership—both the governor and legislators—to ensure the postsecondary system is aligned with the needs of the states' economy. Governors can initiate and lead this process of negotiating a new state compact with postsecondary education. The compact would be a negotiated agreement on the mission and key outputs of the postsecondary system as well as on the state's responsibilities, such as budget alignment and deregulation and an overall accountability system.

The Context

While this paper is conceptual and tightly focused on postsecondary education, it is only part of a much broader innovation strategy that must be implemented by states. These strategies, which are examined in detail in the initiative's other reports, include improving K-12 STEM education standards and teaching, fostering cluster-based economic development, investing effectively in R&D and its commercialization, and facilitating innovative entrepreneurship.

Chapter 2 — A Vision of Postsecondary Education

As alluded to in the previous chapter, the traditional mission of the U.S. postsecondary education system includes teaching, research, and vocational training that is conducted in more than 4,000 educational institutions, including:

- Comprehensive colleges and universities that provide undergraduate- and graduate-level education
- Research universities that provide undergraduate- and graduate-level education and support the granting of Ph.D.s through their research mission
- Community and junior colleges that offer associates degrees, baccalaureate-track courses, and vocational education and training

These different colleges and universities evolved separately. The purpose of early colleges was to educate "Christian gentlemen" in theory and the classics. Early research universities provided instruction and research in the "useful arts": military tactics, engineering, and agriculture. Community and junior colleges were established as gateway schools to meet the exploding demand for postsecondary education after WWII and provide vocational training to working adults.

Community colleges have since established themselves as nimble, high-quality institutions and, in many ways, provide a model from which postsecondary systems can draw. Community colleges are well-tied to the needs of the state and regions where they are located, offering a wide range of education choices, vocational training and certification programs that have practical relevance to workforce needs. Perhaps most importantly, they provide an important access point to higher education for millions of high school graduates, working adults, women, and minorities.

Postsecondary governance is as diverse among states as individual postsecondary institutions. Private colleges and universities continue to be governed by institutional boards with a strong chief executive officer—the university president. These individual boards usually have little direct connection to the state beyond their charter and accreditation. Many, if not most, public universities have institutional boards, but because they receive state funds, universities often report to a state postsecondary agency and legislative committees. In other states with a multicampus or branch-campus system, institutional boards have less autonomy and report to a state coordinating board. Community colleges typically fall under a separate structure from four-year institutions and can be independent, governed by a state coordinating board, or centrally governed by a state agency.

State efforts to restructure postsecondary governance systems were popular over the course of the 20th century but yielded mixed results. Studies show little correlation between one particular governance structure and the long-term performance of postsecondary systems; there is not one ideal model of governance. According to scholars who study postsecondary systems, the most significant determinants of a vibrant, successful system are not particular governance structures, but rather a clear, well-defined vision for postsecondary education, intimately linked to the relationship between a state's public agenda and how the university system is perceived by the citizens of the state.[1]

Given the diversity of backgrounds, missions, and governance structures of postsecondary institutions, it is useful to articulate a common vision for postsecondary education.

The Vision

While the current postsecondary system is widely admired, the system that has flourished historically may not be the one for the 21st century. As the world economy becomes more global, more technology-driven, and more knowledge-based—with a premium on "the fastest to market"—more is being asked of our postsecondary education system. This is to say nothing about the virtual explosion of new and emerging universities in Eastern and Western Europe, Asia, and other parts of the world. The U.S. postsecondary education system must change dramatically over the next several decades to meet these new global challenges.

The major characteristics of a postsecondary system for the 21st century include:

- **Globally focused.** Given that we now compete in a global marketplace, the postsecondary system must be internationally focused. This means ensuring that skills needed to compete in a global marketplace are taught and that the mastery of such skills by students is internationally benchmarked. It may also mean a new emphasis on learning languages and understanding other cultures and the business practices of other countries.
- **Linked to the needs of the state.** Colleges and universities should have a clear understanding of a state's economy and needs of its people. Furthermore, they can use this understanding to arm policymakers with information regarding the

[1] McGuinness, Aims, "The States and Higher Education," in Altbach, et al. *American Higher Education in the Twenty-First Century: Social, Political, and Economic Challenges.* Baltimore: Johns Hopkins University Press, 2005.

composition of regional industry clusters, workforce needs, and research trends. Postsecondary initiatives in Kentucky and North Dakota began with an intimate understanding of state and regional economic needs.

- **Innovation-driven.** University R&D is the seed corn for innovation and entrepreneurship. Colleges and universities are understandably interested in patenting. Publications, disclosures, and "deal flow" can also be important factors for the economy. New York has built its postsecondary reform efforts on its efforts to build-up research capacity tied to the needs of regional industries.
- **Quality-oriented.** The system should continue to enhance the quality of its courses, research, and training to equal the best in the world.
- **Collaborative, transparent, and open.** There should also be an emphasis to make the process collaborative and open in order to ensure that the system adapts quickly and maximizes the rate of innovation. Ensuring that new information is quickly shared with other researchers and the public is key to building the appropriate knowledge base to accelerate innovation.
- **Adaptable, flexible, and market-driven.** As technology, competitors and products change, the system needs to quickly respond to new demands by creating new curricula, practices, and organizational structures. In a knowledge-based economy, postsecondary education should seek to align its offerings—curricula, research, and partnerships—to the needs of the marketplace.
- **Innovative and entrepreneurial.** The system itself also needs to become more innovative and entrepreneurial and to develop partnerships with both private and nonprofit organizations. There should be a premium on being entrepreneurial in the hiring and promotion of both professors and administrators and the structure of the colleges and universities should emphasize collaboration and innovation.
- **Accessible.** To guarantee the nation's future prosperity, we must ensure that students who want to attend college are not prevented from doing so because of cost. This would be particularly true for women and minorities. Colleges and universities should experiment with new approaches to course technologies, type of collaboration, and institutional structures to enhance their ability to teach. Accessibility not only applies to first entering the postsecondary pipeline, but also to continuing education and transfers among postsecondary institutions.
- **Accountable.** We must develop agreements, arrangements, and oversight that ensure the 21st-century postsecondary system meets the economic needs of the state as well as of professors and students. Transparency of the accountability system should be the first step, but sanctions and removal should also be considered.
- **Clear articulation and coordination of missions among individual colleges and universities.** Rather than competing against each other, public colleges and universities should be competing to meet the goals of the state within the context of their clearly articulated educational and research roles.

The vision provides a foundation for a state postsecondary reform agenda. What is now needed is a vehicle for stakeholders—state government, the postsecondary education system, the Boards of Regents and the private sector—to collaboratively embrace a public agenda for the realignment of the postsecondary education system to meet the particular economic needs of the state.

Chapter 3 — The Postsecondary Education Compact

Now that the fundamentals of better aligning the postsecondary educational system are understood and the governor has committed to marshalling all of his or her resources toward this goal, what is the next step?

The answer: the postsecondary education compact.

Through the compact, state governments, the postsecondary education system, the Boards of Regents, and the private sector collaboratively embrace a public agenda to align postsecondary education policies, programs, curricula, and resources with current, emerging, and future economic realities.

The compact is most effective when it is initiated by a governor who can lead the negotiations with necessary stakeholders, including private institutions. The compact defines long-term goals to address a state's major challenges and aligns postsecondary education to the achievement of these goals. The agreement holds institutions accountable for meeting a set of performance standards in exchange for a state's commitment to budget stability and a reduction in regulatory and bureaucratic burdens on the system. The agreement also includes articulation agreements with individual institutions.

No matter the particular structure and governance of the postsecondary system in the states, the governor should bring all appropriate stakeholders together to agree on a compact that identifies the state's economic needs and outlines policies to address them. Likewise, an agreement should clearly convey an understanding of the entire postsecondary system—the strengths, challenges, and opportunities for reform and improvement. All stakeholders should be identified early and show a willingness to engage on an ongoing basis to identify and modify priorities and outputs of the compact over time.

Developing the Compact

The following steps are critical in developing a compact:

1. **Determine the economic needs of the state.** The state compact must be based on a comprehensive understanding of its economic conditions and regional industries and markets. This includes knowing the growth industries and the critical competencies and related skill requirements, and what R&D spending would spark innovation. Specific business "cluster" and market analyses can help all stakeholders understand the composition of local industries and the global market factors that might impact them. Leaders must also understand the idiosyncrasies of industry development in varied market conditions. In addition, states also might survey industry leaders to learn how the postsecondary education system is contributing to the workforce and innovation needs of the state. Overall, the needs assessment should emphasize high-level problem-solving and work to bring about creative and adaptable skills and competencies to develop the goods, services, and processes that enhance competition.

In Minnesota, Governor Tim Pawlenty and the legislature directed the Office of Higher Education (OHE) to create a baseline of data, called *Minnesota Measures*, to understand the educational and economic conditions of the state and its people and to create the foundation for an accountability system. OHE supplemented these efforts by holding dozens of roundtable meetings across the state that involved leaders from industry, state and local government, education, and the public. When the process was complete, not only did the state have an in-depth understanding of its needs, it had vetted and reached consensus on a number of core goals for postsecondary education.

2. **Understand the state postsecondary education system.** Before negotiating a compact with postsecondary education, states need to have a clear profile of their postsecondary system. They must understand the individual institutions, systems of governance, levels of state support, levels of federal and industry support, areas of faculty and research expertise, and their relative standing among similar states. States should also conduct regular policy audits to understand the state rules and regulations that impact postsecondary performance. Many such rules and regulations were put into place when states were primarily "owner-operators" of postsecondary systems and when most system support came from state appropriations; some policies go back decades and are in desperate need of reevaluation. Postsecondary compact efforts in Minnesota, Virginia, Kentucky, and other states were jumpstarted with an all-encompassing policy audit and a frank discussion of the current state of postsecondary education.

3. **Establish high-quality data systems.**[2] A data system is the essential component for the needs-assessment and for the subsequent accountability mechanisms that will ensure that the compact is meeting its goals. Longitudinal data systems provide the infrastructure to track and understand the long-term performance of students and for gauging the performance of the postsecondary system. Timely and relevant data—whose integrity and privacy are protected—are the foundation of a robust accountability compact. Data should also be portable and interoperable. Finally, the data system should enable stakeholders to connect institution and system performance to deregulation, budget alignment, rewards, and sanctions.

4. **Work with stakeholder groups.** The success of a compact agreement requires that all stakeholders take ownership of the final agreement and share in its adoption. Four major stakeholder groups need to be part of the compact negotiation process:

    - *Public Sector:* The governor should appoint representatives of state government, such as the cabinet officials in economic development, postsecondary, and K–12 education. The team also could include the appointed or elected chief state school officer and legislative leaders in postsecondary education and economic development.
    - *Governing Boards:* This governor-appointed group is responsible for coordinating and overseeing the postsecondary education system. Some states do not have one overall board, but distinct boards for specific universities. When there are multiple boards, the governor should appoint a team to represent all of these members.
    - *Postsecondary Education:* This group should be composed of the presidents of various institutions as well as the deans of some departments that may be involved in degree programs in science, math, and engineering. Involving research university deans is very important when it comes time to negotiating specific innovation outputs.
    - *Private Sector:* The private sector is a critical component of this negotiation to help people understand the skill needs of industry. The private sector is also important as an underwriter of much of the research and development in the state. It is also often involved in new business start-ups and with other fast-growing small firms.

All stakeholders should have a clear understanding of what the others bring to the compact, including their assets, challenges, and relationship to postsecondary education. Interdependencies should be fully understood, as strong relationships are critical to a compact's success.

It is also important to involve citizens of the state in the compact process, allowing them to attend and comment on stakeholder deliberations. During the process of establishing goals for the postsecondary systems in Virginia and Minnesota, for example, state officials hosted a series of town hall meetings across their states to both understand citizens' perceptions of the postsecondary system and to gather feedback on different proposals for the compact.

In 1999, the North Dakota Legislative Assembly mandated a study of the role of postsecondary education in "meeting the state's needs in the 21st century … and [creating] an accountability system and reporting methodology for the University System." The study eventually led to the creation of the Higher Education Roundtable, a standing committee of state leaders from industry, postsecondary education, and government, including several legislators and members of the governor's office. Eight years after its establishment, the roundtable continues to evolve and has played a critical role in helping North Dakota align postsecondary education to its economic needs.

Elements of the Compact

Once the process of assessing economic needs, profiling the postsecondary system, establishing data systems, and gathering stakeholder participation is complete, the state is ready to negotiate the major elements of the compact. Broadly speaking, the compact should delineate the mission and outputs of the system, the specific funding and deregulation responsibilities for the state, an overall system of accountability, and a final articulation agreement among the institutions.

Key stakeholders must agree on a mission statement for the overall postsecondary education system, identify priorities, and set outputs. The mission statement might include statements like the following:

> The postsecondary education system will serve the economic needs of the state by graduating the appropriate number of high-quality science and math teachers and by producing the necessary number of software engineers and technicians with the foundational skills to advance in their careers and to

[2] *Creating a Longitudinal Data System: Using Data to Improve Student Achievement*. Data Quality Campaign, 2005.

support rapid changes in the telecommunications industry. The postsecondary education system will serve as a catalyst for innovation in the growing biotechnology industry.

The compact should serve as a vehicle for the discussion, agreement, and support for a few clear and focused long-term goals that address the state's major economic challenges, gauged by data-driven performance metrics. The various elements and action steps of the compact are shown in **Table 1,** along with state best practices.

Table 1. Elements of a Postsecondary Education Compact

Element	Action	State Best Practices
Involve stakeholders	Choose relevant stakeholders for the compact process to ensure maximum buy-in and effectiveness, including representatives from— • Postsecondary education—(institutions' presidents and some deans) • Public interest—(state government leaders) • Governing boards—(state and institutional board members) • Private sector—(key business leaders)	**ND —** The Higher Education Roundtable, a standing committee of state leaders from industry, postsecondary education, and government, aligns postsecondary education to state economic needs.
Conduct audit of state needs	Determine economic needs through advisory groups and cluster and market analyses Understand postsecondary education in the state by assessing its relative standing among similar states	**MN —** Directed by the governor and legislature, the Office of Higher Education created a baseline of data, called *Minnesota Measures*, to understand the educational and economic conditions of the state and its people.
Articulate the goals and priority mission of postsecondary education	Agree on the mission, priorities, and key outputs of the overall postsecondary system, including production of STEM teachers and critical competencies and acceleration of innovation	**KY —** Governor-initiated postsecondary education compact designed to improve the health and well-being of the people by asking five questions, each benchmarked to a metric.
Specify the responsibilities of the state	Share the responsibility for the success of postsecondary education in the compact by outlining state government commitment to provide clear direction to postsecondary education; align and adequately fund compact outputs over the long-term; and reduce the bureaucratic and regulatory burden to allow postsecondary education to be more flexible	**VA —** Legislation passed in 2005 provides universities with more autonomy (in areas like purchasing and capital spending) and less regulation if they make progress meeting 12 statewide goals, including stimulating economic development in university communities; increasing the level of externally funded research conducted at institutions; and facilitating the transfer of technology from university research centers to private sector companies.

Table 1. (continued)

Element	Action	State Best Practices
Create a system of mutual accountability	Establish mutual accountability systems to enforce the compact that include these tools: transparency, rewards, and sanctions for noncompliance Underpin accountability system with robust longitudinal data systems with performance tied to the above enforcement tools	**KS —** The Board of Regents reviews and approves institutional improvement plans based on core indicators of quality performance developed in cooperation with each institution. The receipt of any new state funding is tied to how well these indicators are met at the end of a yearly evaluation cycle. **CA —** The state's Higher Education Compact, established in 2004, stabilized university-system funding in return for measurable outputs. By 2010, the California State University is committed to doubling the number of credentialed math and science teachers—from 750 to 1,500—while the University of California is raising its math and science teacher output from 250 to 1,000 annually, in part through the "California Teach" program.
Articulate and agree on roles of individual institutions	Establish agreements that coordinate and specify responsibilities to avoid duplication	**CA —** Created in the 1960s under the leadership of Chancellor Clark Kerr, the California "Master Plan" divided labor among state colleges and universities this way: The University of California system held the exclusive right to confer doctoral degrees and draw undergraduate admissions from the top 10 percent of high school graduates; the California State University system earned the right to confer master's degrees and draw graduates from the top third of high school graduates. The community college system was to have a statewide presence and provide an open pathway for all students, with specific articulation agreements facilitating transfer from one institution to another.

Chapter 4 — Advancing the Compact

Once the framework for realigning state postsecondary systems to support state economies is established, states are ready to adopt policies that will help bring about comprehensive reform, including establishing the metrics to assess the success of the compact over time and other courses of action to rework the postsecondary education systems to spark innovation. As noted, the three major state needs critical to innovation are:

1. The fostering among postsecondary education graduates of the critical skills and capabilities needed to enhance state economic competitiveness, which encompasses the high-level skills and competencies that are required by key industries to develop goods, services, and processes that can be sold in the international marketplace. It also includes the more traditional job skills necessary to support local, state, and regional economies.
2. The need for the postsecondary education systems to produce a well-qualified K–12 teacher corps, particularly in STEM disciplines.
3. The creation of new knowledge by investing in research and development (R&D) and by establishing partnerships and policies that disseminate and accelerate new ideas into products, processes, and industries.

Below we explore ways to advance in each of these areas, with best practice examples provided by the states.

Developing Skills and Capabilities for the Innovation Economy

When assessing what skills are needed, states should look at both the macro- and microeconomic picture. The knowledge-based economy requires that postsecondary education graduates are equipped with strong foundational skills and competencies as well as interdisciplinary problem-solving abilities vital to the nation's overall competitiveness. States must also determine the specific competencies that graduates need to support traditional local and regional industries. For instance, are there shortages of workers in certain professions, like allied health, engineering, and technology?

States should develop transparent systems to understand the skill needs of each industry and how well the postsecondary education system is meeting them. Metrics for meeting state workforce needs may include:

To bolster the skills of future postsecondary graduates, the state of Washington assembled 41 industry skill panels—partnerships of business, labor, and education that capture the expertise of member stakeholders to address industry skill gaps and to monitor the quality and consistency of postsecondary curricula. Washington funds panels in fields that have been identified through accountability metrics as under-producing and in high demand. In 2006, North Dakota's Education Roundtable established a plan for postsecondary education to improve workforce quality in its *Accountability Success Measures Report*. The state assessed skill gaps by calculating the number of North Dakota businesses that use and are satisfied with the state workforce training system.

- Increased production of skilled engineers or scientists
- Higher number of graduates for critical competencies
- Higher retention and graduation levels in disciplines that prepare students for critical occupations

Research indicates that the quality of workers' skills is a critical factor in the competitiveness of industries. Graduates must be well-educated and STEM-literate; be able to think critically; be adept at working in teams; and be able to demonstrate entrepreneurial qualities. The workers who can best contribute to the economy of their state also should be equipped to continuously update their skills, which will help them grow and adapt in their careers.

Metrics for holding postsecondary institutions responsible for producing students armed with these important skills may include:

- Higher program graduate scores on exit and/or licensure exams
- Improved retention of program graduates in their field or discipline

Minnesota constructed a quantitative performance analysis of the state's postsecondary system in its gubernatorial-commissioned evaluation of higher education—*Minnesota Measures*. By comparing postsecondary reports of degree production with forecasted industry need, Minnesota is now beginning to use those metrics to assess degree production—in STEM and critical health fields—by defining specific numbers of industry workers that postsecondary institutions must produce for the state to remain competitive.

In Kentucky, Governor Paul Patten created a postsecondary education compact designed to encourage the postsecondary education system to improve the citizenry's social, health, and economic well-being. The initiative had five primary goals captured in the following questions:

1. Are more Kentuckians ready for postsecondary education?
2. Is Kentucky postsecondary education affordable to its citizens?
3. Do more Kentuckians have certificates and degrees?
4. Are college graduates prepared for life and work in Kentucky?
5. Are Kentucky's people, communities, and economy benefiting?

Each question was benchmarked to a metric. For example, the question, "Do more Kentuckians have certificates and degrees?" was measured by the number of ninth-graders that have a chance for college, the college-attendance rates of GED graduates, and the overall number of degrees awarded according to various demographic groupings. These goals and corresponding metrics drive reforms and better articulate the roles of stakeholders.

- Increased alumni satisfaction concerning their preparation and readiness for work
- Enhanced satisfaction among employers that workers have the necessary job skills

Professional Science Masters (PSM) programs are useful tools for helping states meet the increasing need for well-trained problem solvers in technology-based industries. PSM is an innovative new graduate degree developed to provide advanced training in science or mathematics while simultaneously developing workplace skills highly valued by employers. Many postsecondary institutions and, increasingly, states are adopting PSM as a tool to meet workforce needs.

In 2006, the California State University (CSU) became the first statewide higher education system in the nation to make PSM degrees available on multiple campuses. CSU's PSM-degree programs have been developed in concert with the growth industries in biotechnology, medical, and computational sciences.

Producing a Well-Qualified K–12 Teacher Corps in STEM Disciplines

STEM teachers for the primary and secondary grades are critical to preparing children to succeed in the innovation economy. States should target the production and development of sufficient numbers of highly effective teachers in STEM areas to meet the state's current and projected needs and should engage the postsecondary system as a partner in that effort. States can establish accountability measures for all providers of STEM teacher preparation and training that are tied to the quantity and quality of program graduates. The quality of those graduates—and ultimately the quality of preparation programs themselves—should be measured according to the impact those teachers have on student achievement.

Over time, states should move beyond the first stages of accountability, such as transparency of results, program ratings, outcome goals, etc., to funding consequences for meeting or failing to meet STEM teacher outcomes. Some states are already moving on the rewards side, but it remains to be seen if rewards are sufficient to achieve desired outcomes.

In Texas, the governor recently won legislative approval for $100 million in incentive funding to postsecondary institutions to produce additional numbers of math and science teachers and degrees in other critical fields, and bonuses for graduates scoring higher on required exit or licensure exams.

The fact remains that states and school districts are experiencing severe shortages of qualified teachers in STEM fields. According to the National Center for Education Statistics, 40 percent of middle school physical science teachers, 30 percent of middle school biology teachers, and 20 percent of middle school math teachers teach outside of their respective fields. Postsecondary education—with support from the state—can clearly produce larger numbers of STEM instructors. Metrics for boosting the quantity of STEM teachers may include:

- Increased production of certified teachers in STEM areas
- Increased production of teacher program graduates in STEM areas entering the classroom
- Retention of teacher-preparation program graduates in STEM teaching positions

In California, the governor and the leaders of the state's two higher education systems, the University of California (UC) and the California State University (CSU), reached a Higher Education Compact in 2004 that established stability in state funding in return for achieving measurable outputs. CSU pledged to double the number of credentialed math and science teachers it produces annually from 750 to 1,500 by 2010. UC pledged to quadruple its math and science teacher output from 250 to 1,000 annually by 2010, in part through the "California Teach" program. UC and CSU agreed to devote a certain level of their institutional funds to the initiative, while the governor leveraged significant private funding and committed targeted state funding for loan forgiveness and program development. The Higher Education Compact gives the UC and CSU systems more latitude in the initial years in terms of accountability to offset several consecutive years of significant budget cuts. The compact doesn't indicate what occurs if the systems do not meet their goals or the state falls short on its commitments.

Louisiana is developing an accountability system that holds the overall postsecondary institution—not just the teacher-preparation programs—publicly responsible for producing sufficient numbers of high-quality teachers in STEM and other areas. The state currently rates its teacher-preparation programs based in part on the quantity of teachers produced in critical shortage areas. The ratings also measure the quality of those programs—according to scores on content licensure tests; the satisfaction levels of principals and mentors; the rates of retention in the third year of teaching; and the impact on student achievement—and assess whether the program has a meaningful partnership with a local district. The state provides a small amount of funding and technical assistance to help low-rated programs improve or risk being shut down. Louisiana applies the same accountability standards to its alternative certification programs, which also are helping the state meet the demand for STEM teachers. Louisiana has not yet established clear financial consequences for institutions that fall short of these outcomes. While the ratings are public and transparent, the state has not directly tied them to state funding nor has it closed any low-rated programs. The state will not report for another year or two the institution-level results on the impact of these efforts on student performance. Louisiana is currently revising the accountability system to determine how to include this student achievement data.

Teacher quality also is a critical factor in improving student achievement in STEM skills. While there are "islands of excellence" among teacher-preparation programs, there are still too many mediocre programs. Many graduates say their programs did not adequately prepare them for the challenges of the job.[3] Metrics for holding postsecondary institutions responsible for producing quality STEM teachers include:

- Greater impact of teacher preparation program graduates on public school student achievement
- Higher teacher program graduate scores on exit and/or licensure exams
- Higher teacher satisfaction with their preparation programs
- Higher principal satisfaction with recent hires from preparation programs

Creating New Knowledge and Accelerating Innovation

Aside from its critical role in the production of talented teachers and skilled graduates, postsecondary education also plays a part in state-level R&D. Most R&D, however, is conducted by a small percentage of these institutions. In smaller states, this may occur in only one university; in other states, several research institutions may be involved in R&D.

The innovation outputs and metrics of the compact are complex and require an intricate understanding of R&D funding, knowledge creation, and knowledge diffusion—and how all of this relates to current postsecondary practices and policies. Therefore, negotiating these outputs requires the engagement of a new set of stakeholders—deans of the major research schools, entrepreneurs, research executives, technology-transfer managers, and vice presidents for research, to name a few—who are not necessarily engaged in the main work of the compact.

Several key events characterized a dramatic shift in both the support and conduct of R&D during the latter half of the 20th century. First, private firms rapidly increased their support for R&D, focusing on close-to-market product development. In 1979, private R&D investment surpassed government support in dollars and now accounts for a much larger percentage of the nation's R&D portfolio. Second, companies reduced support for basic research and, in some cases, dismantled or spun-off large, corporate research laboratories such as Bell Labs or Xerox Palo Alto Research Center (PARC), in effect, making university basic research relatively more important. And finally, Congress in 1980

[3] See Arthur Levine. "Educating School Teachers." The Education Schools Project, 2006.

passed the Bayh-Dole Act, which gave universities legal claim to intellectual property—inventions and innovations—developed by their faculty (and students), even if they were using federal funding.

The confluence of these events led to a major shift in expectations for research-intensive universities; they have become both a potential source of innovation and, for companies, a potential substitute for their declining levels of in-house basic research. As a result of Bayh-Dole, most universities created a technology-transfer office (or TTO) as a centralized clearinghouse to manage disclosures and intellectual property for the institution and its faculty.[4]

Today, while more than half of the nation's basic research is funded in universities, its distribution is highly skewed: Over 90 percent of federal R&D is conducted by the top 100 university recipients.[5] Commercialization successes are relatively rare, yet well-publicized licensing successes—think Gatorade, Google, and Cisco—have the unfortunate effect of creating a "home run" mentality among postsecondary institutions, even though they may have little in the way of innovation resources.

Despite the skewed distribution of research funding and the infrequency of start-ups and big-hit licensing deals, most research universities continue to focus on a simple "pipeline" model of innovation, whereby knowledge is created in university laboratories, licensed by companies through the technology-transfer office, and then developed into successful products. Not only is this a simplistic way in which to conduct technology transfer, other means exist for diffusing knowledge into the economy, including employment of graduate students by businesses, faculty consulting and technical assistance, publications, and university start-ups.[6]

The innovation component of the compact should therefore focus on the university role in a broad spectrum of innovation activities, including the generation, dissemination, and commercialization of new knowledge, no matter how "small" the idea or technology. In some states, the compact may be developmental in nature, seeking to build research capacity to attract federal and industry R&D. In states with thriving, knowledge-intensive industries, the compact may be more focused on the diffusion of knowledge created through high levels of federal research support and enhanced partnerships with industry.

In 1990, the Georgia governor, legislature, and others established the Georgia Research Alliance (GRA), which recruits scientists from around the world to lead R&D programs in advanced communications, computing, and the biosciences. GRA is a private, nonprofit corporation governed by a board of 12 industry representatives and six university presidents and involves institutions from throughout the state—including the University of Georgia, Clark Atlanta University, Emory University, the Georgia Institute of Technology, Georgia State University, and the Medical College of Georgia. The centerpiece of GRA is the Eminent Scholars program, a university-state partnership to share the cost of funding permanent scholarly endowments. GRA is credited with attracting 54 new scholars to lead research in advanced communications, bioscience and nanoscience, and advanced materials and with generating $1 billion in new research grants.

Whatever the case, it is useful to frame the compact as a progression from building research capacity by attracting talented, entrepreneurial faculty and building infrastructure, to the dissemination of new knowledge through partnerships and pathways, to state-university partnerships to accelerate innovation and entrepreneurship. In turn, states should provide support to identify, disseminate, and commercialize new knowledge generated in these institutions and provide services and support for university start-ups.

The "science" of measuring innovation is in its infancy, but states can focus on innovation proxies. There are several indicators of research inputs, research and commercialization activity, and relevance and applicability to industry. Some of these (imperfect) metrics include:

- *Innovation Input Indicators:* To compete in the global, knowledge-based economy, states must possess the capacity to invest in and conduct R&D. Input indicators that measure R&D capacity and support include federal, state, and industry R&D expenditures as well as the number of scientists and engineers conducting research. While innovation inputs have economic (and social) value to states and their regions and are prerequisites for innovative activity, they do not themselves generate innovation. Furthermore, there is little agreement among researchers about the minimum level of input activity that is necessary for innovation.

[4] The concept of the TTO is not new. Harry Steenbock, a scientist at the University of Wisconsin, helped establish the Wisconsin Alumni Research Foundation (WARF) in 1924 as a university-affiliated entity that could accept patents, license them out, and disperse the revenues back to the inventor and university without exposing the university to potential financial and political liability. See *www.warf.org*. Accessed April 7, 2007.

[5] Federal Science and Engineering Support to Universities, Colleges, and NPOs: Fiscal Year 2003, NSF 06-309, June 2006.

[6] Litan, Robert E., Mitchell, Lesa, and Reedy, E.J. *Commercializing University Innovations: Alternative Approaches*, Ewing Marion Kauffman Foundation, May 16, 2007.

- *Research Quality Indicators:* Research must be of high quality, but this is notoriously difficult to quantify. Most proxies of research quality are either based on the number of peer-reviewed publications produced by scholars or on peer surveys of university and industry R&D managers who seek to ascertain the relative quality of university research and the openness of an institution to working with industry.
- *Patents and Licenses as Output Measures:* Patents and, to a lesser degree, licenses have been used as primary output measures of innovation. Patents protect intellectual property and are highly correlated to innovative activity and are relatively easy to measure. Patents may vary substantially by quality, type, industry, and location. For example, patents have been very important and used widely in the pharmaceutical and chemical industries. However, innovations in other industries, such as trades and services, are far less likely to be patented and are kept as trade secrets. Most university research is geared toward early-stage discoveries and has little near-term economic value. Patents, therefore, fail to capture the multitude of new knowledge and ideas generated by universities that are not only useful to society but may also have long-term commercial value.
- *University Start-Ups as Indicators:* University start-ups provide an important link between early-stage university knowledge and existing products and services in the economy. Start-ups frequently license early-stage technologies and pursue new commercialization and business model paths often ignored by larger, established firms. And despite the fact that these start-ups constitute a very small percentage of fast-growing firms, they have a higher survival rate than most, are higher performing, and are more likely to result in an initial public offering.

The Maryland Technology Development Corporation's (TEDCO) University Technology Development Fund is a new university faculty program designed to bridge the gap between basic university research and commercially viable concepts in the marketplace. The program provides university researchers with up to $50,000 to further develop the technology—often in cooperation with other researchers or private companies. Researchers apply for funding in cooperation with their respective university technology license office, and may use up to $5,000 to defray patent expenses. Programs such as MIT's Deshpande Center for Technological Innovation and the William J. von Liebig Center at the University of California San Diego are other models that states and universities may want to examine.

The University of California (UC) Discovery Grant program is an effective partnership between a state, industry, and research institutions. Created in 2002, the UC Discovery program aims to bolster existing academic and industrial strengths by promoting collaborative, early-stage research projects. The program provides state funds, matched by industry contributions, to focus research on a number of areas that reflect the research strengths of different UC campuses and the different industry clusters in California, including biotechnology, communications and networking, digital media, electronics manufacturing, new materials, life science information technology, and microelectronics.

However, university start-ups are highly dependent on factors that extend beyond the responsibilities of the university. For instance, the condition of the state or regional entrepreneurial ecosystem, including tax laws and credits, available entrepreneurial services, and available early-stage finance are critical. So while the number, survival rate, and profit levels of university start-ups are important indicators, responsibility for spurring university entrepreneurship is complex and shared by many players.

- *Number and Strength of Partnerships with Industry:* The number of partnerships and level of industry investment in university partnerships can be a valuable metric to understand levels of innovative activity. These partnerships can be R&D-specific or they can focus primarily on the development of ideas and technologies from the institution. Some state programs fund contract research while others engage interested faculty members and provide support work with local companies to solve specific problems. While partnerships can be measured by their length and scope, partnership outcomes are more difficult and highly dependent on subjective surveys of industry. Faculty consulting levels can also be a useful indicator of less formal partnerships with industry.

As this by-no-means-exhaustive list demonstrates, "measuring" the acceleration of innovation is a complex endeavor, requiring the participation of individuals with expertise in research, technology transfer, and entrepreneurship. The compact should also allow for improvement and revision of the aforementioned innovation metrics to reinforce broad goals for the dissemination and commercialization of knowledge—no matter how "small" the idea. Many experts have termed this innovation "deal flow" and, in the future, metrics might include the contributions of university science to specific products, to new curricula for schools, or to a new DNA sequence.

State Responsibilities in Establishing the Postsecondary Education Compact

To be successful working with the postsecondary system to implement the vision of the compact, states should also be mindful of their evolving responsibilities in these three areas:

1. **Providing a clear direction in terms of the mission, priorities, outputs, and accountability.** States must be explicit when communicating their expectations of the postsecondary system or of individual institutions and constantly focus on the critical outputs—whether in the number of STEM teachers, in skilled workers for critical occupations, and R&D that supports innovation.
2. **Creating budget alignment and stability.** States must align the postsecondary budget with the needs of the economy. This means adequately funding agreed-upon outputs detailed in the postsecondary education compact. Direct operating subsides should be differentiated from capital budget and research. States also should adopt long-term budget horizons—10 years, for instance—that can be updated yearly yet offer a general level of funding stability.
3. **Reducing bureaucratic and regulatory burden.** If states are going to hold the postsecondary system accountable for the major outputs in the compact, they need to be willing to reduce rules and regulations over the system so that it has the flexibility to meet the goals. These regulations are numerous and may include the following:
   - *Tuition-Setting Authority:* Many states set tuition rates for the entire system. Some states have given individual institutions the authority to set, retain, and expend tuition revenues on the condition that the process is transparent, gives preference to in-state students, and provides need-based aid.
   - *Personnel Polices:* In some states, postsecondary education must follow state civil service procedures when hiring personnel; many must follow state salary schedules and rates. This often makes it difficult to bring on new faculty and staff.
   - *Purchasing Policies:* Many postsecondary institutions are subject to state purchasing policies that regulate, for example, purchases less than $1,000 or require that purchases be made through state agencies.
   - *Travel and Automobile Approvals:* Travel often must be approved by a state agency, be made through a state-approved agency, or be booked through state-approved providers, while travel reimbursement is frequently provided by a state agency. Automobiles also must often be hired through the state-operated motor pool or be leased and/or purchased through the state.
   - *Contracting Authority:* Currently, many postsecondary systems are subject to regulations with regard to state contract law; state agencies must often approve contracts with the postsecondary system.
   - *Capital and Investment Authority:* These regulations ensure that all capital projects—new buildings as well as renovation of existing facilities—are under the control of a state building agency or are approved through a capital projects process.

Accountability Systems

Once stakeholders agree upon goals, outputs, and metrics to measure success and failure, tools are needed to enforce the compact. Such a system of mutual accountability—where both states and postsecondary systems have a symbiotic role in developing and achieving the desired outputs—will be challenging to implement. It will take time to ensure that the data and metrics are reliable but it is important to create a framework of accountability early in the compact process. For the first few years, it would be productive to make clear to all stakeholders and the public at large when the system meets, exceeds, or falls short of the goals. When there is failure it would be critical for all stakeholders to fully understand why the goals were not met so there can be adjustments to ensure success in the future.

The Virginia "Restructuring Act," passed in 2005, creates a framework for all institutions to realign their goals with those of the state in exchange for greater autonomy and incentives to achieve these goals. The law builds on more than a decade of work by several governors, the Virginia General Assembly, and the State Council for Higher Education for Virginia (SCHEV). It includes goals for improving access, affordability, articulation, economic development, partnerships with K–12 education, research funding and technology transfer, and financial standards, among others. SCHEV has created metrics to measure progress on each goal, which, in turn, is tied to additional incentives. These incentives, which currently amount to $30 million across the system, include interest on tuition and fees, automatic reappropriation of unexpended balances back to the institution, and rebates on purchases made with the state's credit card.

States might then advance to a system of rewards for meeting various goals of the compact. Though uncommon, several states (see the Virginia example) have begun to use incentives like deregulation and funding to reward their postsecondary institutions for meeting specific goals in a compact. Such a system of performance funding will likely require substantial modifications to the state budgeting process as postsecondary operations funding is traditionally tied to student enrollment.

A compact may also include funding sanctions for falling short of desired performance metrics. While penalties have their limitations, they can also be a powerful tool of last resort for states, especially when combined with other incentives and reforms (see the Kansas example).

Kansas is one of the few state systems that uses withholding penalties to maintain institutional accountability. Postsecondary institutions submit goals, performance measures, and targets for the coming year, which are subject to the approval of the Kansas Higher Education Board. New state funding is dependent on how well these targets are met. In fact, during the last evaluation cycle, one Kansas institution received two-thirds of its scheduled funding increase while two institutions received no increase.

Coordination and Articulation Agreements

The final step in this process of developing a compact is agreeing how the specific degree and other outputs are allocated among individual institutions or groups of institutions. For example, if one of the goals is to produce 1,300 new high-quality science and math teachers, the agreement should specify how many teachers that individual colleges and universities are expected to produce. Similar agreements would be negotiated for graduates entering critical occupations or innovative disciplines, such as biotechnology. This process should be part of a broader agreement that would limit the overlap and potentially counterproductive competition between universities to create, for example, a new engineering or medical school. While multiple institutions can offer basic courses in STEM-related subjects, specializations should probably be limited to one or two colleges or universities.

Chapter 5 — Conclusion: The Role of Governors

American postsecondary education is clearly a crucial component in the ongoing effort to create innovative state economies that can compete in the global marketplace. But leaders from the government, governing boards, industry, and colleges and universities must work together to transform this postsecondary system that has served the country so well.

Governors play an essential role in establishing a vision for postsecondary education. Here are some guidelines that governors should consider when undertaking postsecondary transformation:

- **In the new knowledge-based economy, governors need to be aware that their postsecondary education system is one of the state's most valuable economic assets.** Colleges and universities play a critical role in regional and state economies through the production of workers in critical occupations, with a special focus on STEM teachers; the conduct of research; and the dissemination and commercialization of new knowledge.
- **Postsecondary education should be fully integrated into the governor's long-term economic development and growth strategy.** All economic development efforts should answer this question: What is the role of postsecondary education in this endeavor? This is especially true when governors are considering training in critical occupations, R&D, commercialization, and entrepreneurship.
- **State economic development officials and policy advisors should understand the relationship between postsecondary education and R&D, industry, commercialization, and entrepreneurship.** The governor's advisors need this background so they can fully implement an integrated innovation development policy in cooperation with postsecondary education and key industry sectors.
- **The governor should appoint committed, reform-minded members of governing boards.** Governors can have a longer-term impact on postsecondary education by appointing experienced governing board members who share the governor's vision. In several states, reform has taken root with successive governors appointing reformers whose board terms often extend beyond a single gubernatorial administration.
- **The governor should build relationships with key college and university presidents, governing board members, legislators, and leading private sector CEOs around the state's long-term economic strategy.** These relationships should focus on strengthening the state's long-term capacity for innovation and the role of postsecondary education.
- **The budget should be viewed as a tool for change.** The governor can affect the direction of postsecondary education through the budget and by signing or vetoing bills impacting postsecondary structures and funding. In the past, states have funded postsecondary education on a per-student basis; governors can work with their legislatures to instead emphasize performance by tying funding to the production of STEM teachers and graduates in other critical occupations. Governors can also encourage the enactment of legislative policies that allow them to use public R&D dollars to disseminate and commercialize new knowledge.
- **Governors should use the bully pulpit to lead reform efforts.** State leadership is central to the task of aligning postsecondary education with the needs of the state—the governor's attitude, the frequency of communication between the governor, legislative leaders, the heads of the state higher education agencies, and university presidents, and whether or not the governor includes postsecondary education in his or her vision for the state all are critical determinations in a communications strategy. Governors also should use optimistic, specific, and action-oriented language to convey their goals to the public.
- **The governor should create a compact with postsecondary education, including an innovation compact with major R&D universities.** The compact would define long-term goals to address state needs, establish a system of accountability, and tie funding and autonomy to performance in meeting compact goals. Special attention should be paid to research universities and their role in commercialization and entrepreneurship.

The compact can be a key vehicle for governors to work with their postsecondary educational institutions to foster critical skills and capabilities needed to enhance state economic competitiveness, reduce well-qualified STEM teachers and other skilled graduates in critical occupations, and create new knowledge by investing in research and development. The framework allows states to set goals, outline responsibilities, and establish mutual accountability systems on the road to reform.

But reform can only work when states determine their needs, fully audit their postsecondary outputs, and establish data systems to track accomplishments along key guideposts. The reform process also must be collaborative, open, and flexible. And as the compact develops, states, higher education authorities, the private sector, and other stakeholders will have to agree on how best to measure innovation progress and how to share the responsibilities for postsecondary reform.

But there is no longer a debate on whether postsecondary systems need to change to respond to the realities of today and of tomorrow. Now is the time to build innovation into the postsecondary system so that states can meet their current economic needs and so that future generations have the skills to share in the promise of innovation.

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