Council on Competitiveness

WORKING DRAFT

Working Group Charter

National Innovation Initiative

OBJECTIVE: Each Working Group of the National Innovation Initiative will produce 3-5 priority recommendations in its field of inquiry, of which at least two must be actionable public policy reforms or initiatives. The public policy recommendations must be specific enough for government leaders to act on them. The recommendations also may call on business, academic, or labor organizations to take action.

Working Groups may issue additional findings and recommendations or dissenting views. The Principals Committee, acting through the Council on Competitiveness, will assemble the 3-5 priority Working Group recommendations into a National Innovation Agenda.

PROCESS/TIMELINE: Each Working Group will conduct three in-person meetings in 2004 – in February, May, and September. At the discretion of the Chair or Co-Chairs, a Working Group may meet any additional number of times by phone.

The first meeting in February will be a two-day event attended by all of the Working Groups. On the first day, each group will review its charter, refine its field of inquiry if necessary, and establish a strategy to produce the interim report and final recommendations. The second day will be a plenary session to discuss work strategies, share any proposed charter refinements, avoid duplicative efforts, and address outstanding questions.

Upon completion of the February session, the charters will be shared with the Principals Committee for review and referral to the Advisory Committee. The Principals Committee will return any feedback to the Working Group Chairs.

Working Group Chairs shall set a May 1 deadline for working group members to submit comments for the interim report. By May 15, the Chairs will circulate to their working group members a draft version of their section for the interim report.

The second meeting will be to review and amend the interim report submission. Working Groups may schedule these meetings at their convenience between May 15-30. The Program Committee will help the Chairs secure a location for these meetings if necessary.

By June 15, each Working Group shall submit their section of the interim report to the Council on Competitiveness to aggregate and transmit to the Principals Committee. The Interim Report submissions should summarize briefly the group's deliberations, suggest the priorities identified in each field of inquiry, and as appropriate, issue preliminary recommendations. The Principals Committee will review the draft, solicit input from the Advisory Committee, and return comments by July 14.

By July 20, the Working Group will offer a final interim report submission to the Principals Committee for release in late July or early August.

The third meeting will take place at a time of the Working Group's choosing between Sept. 1-15. This meeting will be to review ongoing work, discuss revisions to the interim report, and to hone each group's 3-5 recommendations for inclusion in the National Innovation Agenda and Final Report.

Working Group Chairs shall set a September 30 deadline for comments from working group members on the final report. By October 7, a draft shall be sent to the Principals Committee for review and referral. Feedback to Working Group Chairs is due by October 26. By November 9, the Working Group Chairs shall submit their final report to the Council on Competitiveness for aggregation, printing, and release by the Principals Committee at the December National Innovation Summit.

Innovation Frontiers Working Group

THE CHARGE: The Innovation Frontiers Working Group will identify policy recommendations and actions aimed at ensuring the United States pursues international leadership in every major frontier of innovation, research, science and technology. The Group will address these—and other—questions: What are the critical emerging technologies that will drive future innovation and growth in the United States? How can we optimize U.S. investment in frontier research? How can new knowledge be effectively and rapidly integrated into the nation's innovation enterprise? How can we identify and maximize growth at innovation intersections? How can we measure success?

BACKGROUND: While the U.S. position in innovation, frontier research and cutting-edge technologies remains strong, the nation's margin of leadership is beginning to erode. And the nation's commitment to R&D—a decades-long commitment that laid the foundation of innovation and prosperity in the 1990s—has weakened. For example: the US ranked fifth among OECD countries in terms of R&D/GDP ratios in the 1996-1999 period, and critical shortfalls are emerging in funding for the physical sciences and engineering. These are just a few of the important sets of challenges facing the nation's innovation enterprise in the early 21st century.

Why Does R&D Funding Matter for the Innovation Frontier?

Publicly financed research is the bedrock of American innovation. Many of the country's most innovative industries were built on decades of research—often in fields that had no discernible application at the time. No one imagined in the 1940s that the arcane field of quantum mechanics would launch the semiconductor revolution. The engineers developing time-sharing and packet switching techniques probably did not envision the worldwide web or e-commerce. Investment infrastructure and instrumentation led to new research tools, such as lasers, high-performance computers and atomic resolution microscopy. These, in turn, opened up whole new fields of application—laser chemistry, computational biology and nanotechnologies—whose developments will lead us to the industries of tomorrow.

What Is the Challenge?

U.S. federal R&D investment, as a share of national wealth, is lower today than it was in 1985. Increases in R&D were slower in the last economic boom period than in any previous boom of the past 25 years. The federal government—the mainstay of long-term, frontier research—provided a decreasing share of the nation's total R&D investment. In real terms, the total federal contribution to the nation's R&D portfolio dropped from 46 percent in 1985 to around 25 percent today. Although industry investments more than offset these declines in federal funding, the bulk of industry's investment was properly targeted on the development of new products and processes, not on basic discovery.

Industry relies heavily on public science for its own innovation. Over 73 percent of U.S. industry patents cite publicly funded science as the basis for the invention. There is a risk that declines in federal funding for frontier research could result in a slowdown in industry's capacity for innovation.

Investment in physics, chemistry, math and many engineering fields has declined in real terms. The national goal of leadership or being among the leaders in every major field is threatened by uneven support for research among the major disciplines. Also, new technologies and products in many sectors, including the health sector, depend on concurrent advances across many fields.

BOTTOM LINE: Investments in new directions must be identified and promoted to reflect the today's highly competitive, global economy. These are required to push out the innovation frontier, create new knowledge, and ensure its application and integration in the economy as a whole.

21st Century Innovation Working Group

THE CHARGE: The 21st Century Innovation Working Group will define innovation and innovation success in a contemporary economy. The group will measure what innovation means for comparative advantage to an advanced economy in the first century of the new millennium. An explicit charge of this Group is to identify and develop new metrics for innovation in the 21st century. In addition, the Group will attempt to address these, among other, questions: What are the new dynamics of innovation in a more open, competitive, and networked global environment? Are there ways to drive innovation at the intersection of services and manufacturing, across disciplines and sectors? How do we stimulate innovation across the services sector?

BACKGROUND: Innovation in the 21st century includes both invention plus application of that invention which builds economic value. Invention alone is not sufficient for the 21st century; it must lead to exploitation, to diffusion into the marketplace and create impact. Exploitation, the use of invention, and global networks of knowledge, skills and resources are new dimensions of innovation.

Innovation is critical because it creates comparative/competitive advantage. It is central to economic growth for that reason alone. As a result, since World War II, the US has mobilized the nation's scientific and technological talent by providing public funds for fundamental research. Through this federal investment, we have created both universities, which are second to none, and ideas to meet the mission needs of government and for the wonder of pure discovery. The resulting inventions have sparked the innovations we now enjoy in American life and around the world.

This traditional investment and growth model is no longer sufficient for today or the future. In today's open, inclusive, connected world, invention must be matched with application. For a nation to lead, it must create a new understanding of the framework, or ecosystem, of innovation. It must focus on the linkages or intersections between customer value, insight, input factors to create innovation and marketplace pull for innovation, the underlying infrastructure, and public policy. There must be a clear perspective on how these elements contribute to national outcomes, such as jobs, economic growth, productivity, comparative advantage and higher living standards. We must focus in these areas if we want to lead in innovation. The traditional linear model of innovation no longer applies. Innovation for today demands the quick search for application and business value.

Innovation—traditionally defined as the transformation of knowledge into new products, processes and services—involves more than just science and technology. Innovation opportunities are present today in virtually any industry—and in an ever-increasing number of countries. However, certain nations do appear to be more innovative than others. Why is this? This is not the same as asking why some countries publish more scientific papers than others, nor is it the same as asking why some countries are able to achieve higher scores on standardized tests in math, science or engineering. Instead, the answer requires identifying and measuring those factors that influence the ability of a nation's firms to identify economically valuable new products, services and processes and develop them commercially.

What Is the Challenge?

Several efforts over the past half-decade have attempted to create a quantitative benchmark of national innovative capacity that highlight the resource commitments and policy choices that most affect long term innovation output. This Working Group will advance this still emerging area by defining clearly what innovation means for the complex economy of a nation like the United States.

The Working Group will suggest ways in which the public and private sectors can measure innovation beyond typical output metrics like patenting rates and scientific citations. Also, the Working Group will define a direction for the U.S. innovation engine to maximize overall productivity and economic growth.

BOTTOM LINE: The foundations of U.S. innovative capacity are broad and affect many aspects of a nation, its institutions, and its policies. The Working Group will make advances in defining what we mean by innovation, how we measure innovation, and how we compare our performance across time and across countries.

Innovation Skills Working Group

THE CHARGE: The Innovation Skills Working Group will identify policy recommendations and actions to ensure the United States has the workforce necessary to conduct research, deploy technologies, manufacture at the state-of-the-art, and provide unparalleled services necessary for the 21st century innovation. The Group will attempt to address many questions, including: What skill sets will be needed to sustain U.S. innovation in the 21st century? What kinds of incentives are needed to increase the flow of students into fields of future demand? What should academia be doing to nurture interdisciplinary approaches? What are the teaching and educational strategies needed to drive individual creativity, problem-solving and teaming skills? Are our research universities maximizing their roles in solving large-scale science and technology problems that require an integrated research approach?

BACKGROUND: Though other Working Groups will focus on the importance of investments in fundamental research and infrastructure in driving 21st century innovation, these investments—particularly at universities—are equally critical in creating the pool of scientists and engineers that powers America's innovation enterprise. Declines in research and infrastructure funding generally result in fewer S&E graduates; and in turn, shortages of technically trained talent cause companies to seek research operations overseas.

What Is the Challenge?

The United States needs more of its citizens armed with the skills necessary to participate in an innovation-based economy. This requires a growing cadre of scientists and engineers, but the U.S. pipeline for S&E talent is narrowing rather than expanding:

- Fewer and fewer top U.S. students choose to pursue studies in science and engineering. While a larger fraction of the American population receives an undergraduate degree compared to almost any other developed nation, far fewer U.S. undergraduates receive degrees in physical science and engineering; and the number of undergraduate and graduate S&E degrees over the past 15 years has been flat or declining in every field outside of the life sciences.
- Women and minorities, the fastest growing segments of the labor force, are underrepresented in the S&E workforce.
- U.S. universities face a financial disincentive for training more undergraduate scientists and engineers. Unlike other advanced economies in which government payments to universities vary with the cost of the educational track that students follow, the U.S. system for financing higher education does not give colleges or universities additional resources if they encourage students to shift from a low-cost degree programs to a higher-cost course of study in science or engineering. Evidence indicates that when governments offer additional resources for expanded enrollments in innovation driving disciplines, colleges and universities respond.

Colleges and universities must help students engage in an increasingly interdisciplinary research environment to reflect an increasingly interdisciplinary private sector. Along with this challenge comes the difficulty in preparing students to remain individually creative while participating more and more in teamed environments.

Finally, as US employment shifts to higher value added jobs in the services sector, universities need to develop pedagogy to prepare American students for the jobs of the future. They need new understandings to drive the growth areas identified by the Innovation Frontiers working group. We must link the frontiers of innovation with the necessary ideas and skills.

BOTTOM LINE: The vitality of the U.S. innovation enterprise is only as strong as the nation's science and engineering talent pool. The decline in the supply of scientists and engineers is at odds with the growth in demand for technically trained talent and entirely new skill sets. Jobs requiring technical degrees are projected to grow by 51 percent versus a 12 percent growth rate in jobs for the economy at large between 1998 and 2008. The dearth of women and minorities entering and remaining in S&E programs artificially constricts the prospects for increasing the S&E talent pool.

Public Sector Innovation Working Group

THE CHARGE: As a major component of society, the public sector plays a significant role in the nation's innovation enterprise that extends far beyond funding and performing basic research. For example, the Federal Government alone comprises slightly less than 20 percent of the U.S. GDP. That number increases significantly when state and local governments are included. The Public Sector Innovation Working Group will address many questions aimed at identifying specific policies and actions to ensure that the U.S. public sector, alongside the private sector, plays a key role in the nation's innovation enterprise. For example: What can governments do to nurture strategic partnerships among the private and public sectors, universities, and labor? Are our public sector processes and infrastructure contemporary, adaptive to new innovation, and supportive of innovation outside of the public sector? How can government drive innovation as an early adopter? What are the implications—and opportunities—of a new age of innovation for the ways we are governed? Since innovation often occurs at intersections between organizations, how can government break out of its stovepipes?

BACKGROUND: According to Jacques S. Gansler, Dean of the University of Maryland School of Public Affairs, one of the major changes taking place today in government management (federal, state, and local) is the shift from the government as the historic "provider" of public services to the government as the "manager of the providers" of services to the public—essentially a shift from a monopoly supplier to a competitive environment.

While preliminary evidence suggests that benefits can arise from such a shift, they are not widely understood or accepted. And, at the same time, this shift has potential implications beyond cost-savings and resource maximization—impacting, for example, how (and where) critically important innovation-related activities may take place. In the past, the government has played a key role as an early adopter and buyer of innovative technologies and services. Can the public sector still play this type of role in an environment in which it may make more sense to "outsource" this capability?

Government also plays a critical role as convener, as a neutral meeting ground where non-profits, businesses and governments increasingly work together. The complexity of the problems being addressed requires a tremendous capacity for learning, innovation and collaboration across diverse groups. Conventional government models may not be optimized for this new governmental role of convener, organizer, coordinator, due to the needs for flexibility, adaptation and blending of expertise and credibility.

Further, government needs to breed and train leaders for public service. Government needs to focus on innovative ways to attract people with desire and skills to focus on the core purpose of public service, and develop systematic growth programs where leadership itself, and the unique requirements of public service, are taught and valued.

The public sector is also facing technological challenges—and opportunities—as it defines its future in the U.S. innovation enterprise. Information technologies are transforming the public sector by lowering the cost of coordinated, collaborative activities. In the 21st century innovation enterprise, the public sector must be pro-active in delivering increased value to constituents through continual innovation, which might include: improved services, increased operational efficiencies, enhanced citizen participation, improved policy formulation, and enhanced economic development. The goal is identifying those key recommendations to help ensure the public sector continuously innovates itself, remaining alert to the needs of the innovation imperatives outside the public sector.

BOTTOM LINE: Just as the private sector is not immune to the transformational opportunities made available by new technology, neither is the public sector. As the private sector continually transforms itself and innovates to remain at the cutting-edge, so too must the public sector. An "always on," "intelligent," "trusted" and responsive public sector is an essential partner to the private sector in the nation's 21st century innovation enterprise.

Innovation Finance Working Group

THE CHARGE: The Innovation Finance Working Group will identify policy recommendations and actions aimed at ensuring the United States has the necessary capital environment to finance innovative products, processes, and services. The Group will address these—and other—questions: How can we strengthen incentives for private sector investments in innovation? What public policies or strategies are needed to expand the pool of risk capital for entrepreneurial investment, facilitate a longer-term horizon for innovation investments, and incent investment in research by the private sector?

BACKGROUND: In his 1956 and 1957 papers, the economist Robert Solow reported the "shocking" empirical finding that "most of the growth of the economy over the past century had been due to technological progress." According to Solow, an increase in the use of capital accounted for only 12.5 percent of the doubling of gross output per man-hour from 1909 to 1949. The remaining 87.5 percent was due to "technical change." These results highlight the critical and linked role of entrepreneurship and innovation in economic growth. As the economist William Baumol puts it, any innovation "will require entrepreneurial initiative in its introduction."

What Is the Challenge?

Fundamental to the ability of entrepreneurs and entrepreneurial firms—large and small—to develop, use and commercially exploit innovations is the access to affordable and patient capital. How to finance both R&D and the timely introduction of end-use applications is the single most important challenge to firms of all sizes and at all stages of the product development cycle.

While there are many barriers to the start-up and growth of innovative and entrepreneurial companies (including human capital, technology and infrastructure), financial capital imperatives are crucial to address (maintaining tax preferences for capital gains; a growth-oriented monetary policy; fiscal stability and balance; maintaining current accounting treatment for purchase acquisitions; and funding for effective equity and loan programs targeted to emerging, but under-performing entrepreneurial economies).

Large firms also face a challenge because of investor emphasis on short-term returns to capital, and the lack of fiscal incentives to create more patient capital and investment in R&D. Small and start-up firms face a significant challenge in the lack of early stage financing. Two more challenges are also worthy of focus. First, as the average venture capital investment round increases, there has emerged a "seed and early stage capital gap." Entrepreneurs can assemble capital from savings, second mortgages, credit cards, and friends and family up to about $300,000—but between $300,000 and $3 million, securing venture capital is not a given.

Second, a robust national innovation enterprise demands an expansion of entrepreneurship beyond the five states in the nation that now receive 70 percent of all the venture capital, and one key to that effort is our research universities. But too few of our best universities effectively transfer technology in the form of new, start-up entrepreneurial growth companies. In 1999, for example, Stanford and MIT each spawned nineteen and seventeen new companies, respectively, whereas the average for all reporting research universities was three. Forty-two percent of all research universities reported no start-up companies at all. Interestingly, American universities produce one start-up company for every $85.7 million research dollars, but Canadian institutions produce one company for every $22.45 million.

BOTTOM LINE: Innovation—and the entrepreneurial spirit behind it—needs financing. Policymakers and other actors in the public and private sectors can play key roles in ensuring a robust capital market for new ideas and innovations. Efforts to fill the gap in early stage venture financing, to create more patient capital and investment in R&D, and to provide incentives at the federal level and direction at the state level to universities to change their technology transfer functions to favor spin-out entrepreneurial companies are just a few critical steps necessary for financing U.S. innovation in the 21st century.

Innovation Environment & Infrastructure Working Group

THE CHARGE: With technology, talent and capital available globally, a nation's climate for business innovation—particularly its regulatory, legal and policy frameworks—is an important differentiator in attracting high-value investment. The Innovation Environment & Infrastructure Working Group will address these—and other—questions: What are the critical elements of national policy that encourage (or discourage) innovative activity? How would we re-prioritize the strategic importance of legal or regulatory solutions in light of the evolving nature of innovation? What should national and state policy makers do to encourage an innovation-friendly investment environment? How can we assure that knowledge creators and innovators have access to state-of-the-art facilities, instrumentation and digital tools to facilitate cutting-edge research, products and services? How can standards-setting processes be improved to drive innovation and competitiveness?

BACKGROUND: Federal, state and local governments can exert tremendous influence over innovation, as well as the development and deployment of technology through a system of structural incentives, and in some cases, structural disincentives for investment. This primary staging platform for innovation is established through several infrastructures, including but not limited to: Regulatory Infrastructure; Legal Infrastructure; and Physical and Information Infrastructure.

What Are the Challenges?

A rational and transparent regulatory system can foster or impede the private sector's innovative capacity and success. For example, a problem facing the U.S. innovation enterprise is not high standards, but inefficient, litigious and time-consuming regulatory processes that do not always strike a balance between cost and benefit. The World Economic Forum's Competitiveness Report has consistently ranked regulatory costs higher in the United States than 30 of its competitors. In gross terms, total federal spending on regulatory activity is estimated to have grown from nearly $2 billion in 1960 to around $20 billion at the turn of the century. And a new study for the National Association of Manufacturers and the Manufacturers Alliance/ notes that "structural factors outside of manufacturers' direct control" (including regulatory compliance) are eroding the global innovation leadership of U.S. manufacturers.

In addition, elements of the legal infrastructure merit attention in a nation whose innovation assets are increasingly knowledge-based. Effective intellectual property protection and global harmonization of IP regimes are keys to fostering investment and market success in innovation activity in advanced nations where more than $1 billion per day is being spent on R&D to generate intellectual property assets.

Recent studies also suggest that the current U.S. product liability system is haphazard as a deterrence mechanism and is both costly and haphazard as a compensation mechanism. States have adopted standards that for the most part are unpredictable, inconsistent and not uniform. Brookings Institute economists have found that product liability concerns disproportionately burden innovative industries like aerospace, instruments, electronics, chemicals and pharmaceuticals. They noted that up to a certain threshold, product liability rules do create incentives for safety that stimulate product-related research. However, once these costs become sufficiently large, the effect of product liability can dampen innovation incentives, decreasing R&D expenditures, and withdrawing/failing to introduce new products.

And, the physical and information infrastructure is one of the major building blocks of the national innovation enterprise. The costs of the deteriorating infrastructure are very real. For example: 1) The American Society of Civil Engineers gives the U.S. physical infrastructure an overall "D" grade, estimating that $1.3 trillion would be required to bring the infrastructure up to acceptable conditions and functional performance levels; 2) Power consumption across the country, projected in 1990 at 1.8 percent per year has actually grown by 3 percent, with the result that there is a shortage of generating capacity; and, 3) In 1985, the Internet connected 2,000 computers. Today, the Internet connects over 37 million computers and an estimated 153 million users. The Internet of the future will connect billions of information devices. Computers are being combined with sensors, wireless modems, GPS locators and devices that can interact with the real world. But U.S. infrastructure was not designed to support this explosion in the number of users and devices – and much more investment in research will be needed to transform the technology.

Aside from the ubiquitous Internet, other critical research infrastructures and research laboratories need an upgrade. In the 10-year period from 1988 to 1998, the amount of laboratory space at universities needing repair or renovation increased in every S&E field and doubled in some fields. Universities deferred about $11 billion in laboratory construction or repair programs because of insufficient funds. At the same time, the federal contribution to maintaining laboratory facilities declined.

BOTTOM LINE: The nation needs to prioritize and streamline the various legal and regulatory processes that aid or impinge upon innovation—ensuring that they are flexible and pro-innovation.

Innovation Markets Working Group

THE CHARGE: The Innovation Markets Working Group will identify policy recommendations and actions aimed at ensuring the United States benefits both domestically and globally from its innovation activities. The Group will address these—and other—questions: How can we assure access by U.S. innovators to global markets, protect intellectual property, support fair competition regimes, and enforce legitimacy and transparency in the global marketing, investment, and trading system?

BACKGROUND: Innovation is an increasingly global phenomenon. While the margin of U.S. innovation leadership appears large, it is also true that many more nations have joined the innovators club during the last part of the 20th century and the first few years of the 21st. And the pace of their innovation continues to accelerate while other nations work to join in on the innovation game.

Much of this globalization of innovation has taken place due to successful negotiations to eliminate trade barriers through the WTO and other mechanisms. Indeed, U.S. innovators large and small have benefited from this opening.

However, at the same time that tangible barriers to trade have fallen, intangible barriers—often tied to innovative activities and investments—have gone up in many parts of the globe. Despite the WTO, many nations engage in foreign direct investment policies that are aimed at innovation investments without reciprocity—for example, demanding certain innovation-rich investments for market access.

BOTTOM LINE: Going forward, innovation stakeholders in the public and private sectors need to confront this reality—and think more strategically about a productive and proactive response. Both domestic and global competition remains vital to stimulating innovation in both emerging and mature industries and market sectors. We need a new national consensus on the impact on innovation of issues related to global markets.