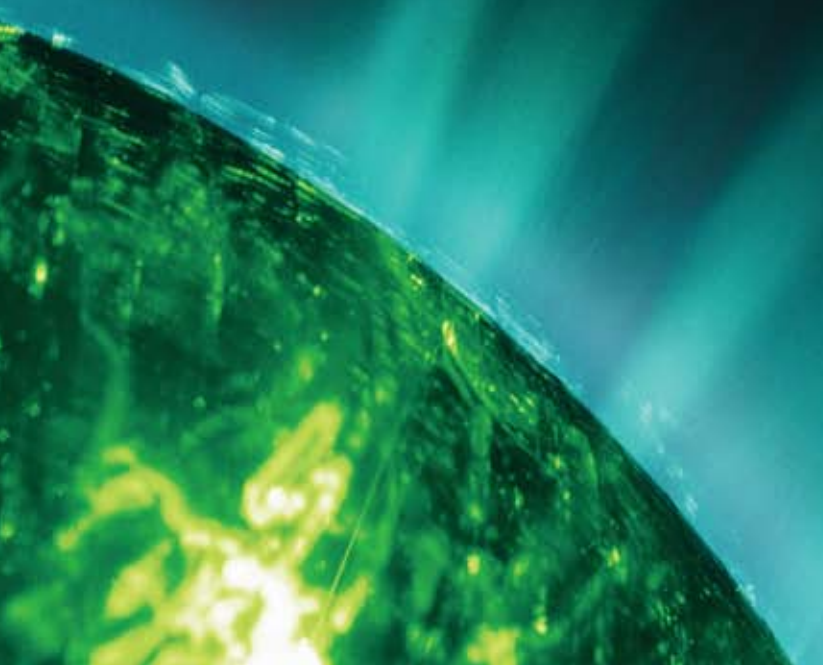
Council on Competitiveness

Five for the Future

Compete.
Council on Competitiveness

2007 Annual Meeting
Friday, October 26, 2007
Grand Hyatt
Washington, D.C.



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Five For the Future is built on the work of many of the Council's programs and program leaders. From the groundbreaking benchmarking in the *Competitiveness Index* to the cutting edge research on the economic impact of high performance computing to new approaches to regional innovation, resilience and sustainability, Council initiatives paved the way for the Five for the Future. Special thanks are due to **Chad Evans**, the Vice President for Strategic Initiatives; **Randall Kempner**, Vice President of the Regional Innovation Initiatives; **Susan Rochford**, Vice President for Energy and Sustainability Initiatives; and **Suzy Tichenor**, Vice President and Director of the High Performance Computing Initiative. Special recognition to **Carol Ann Meares** for creative content and to **Melanie Lum**.

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Table of Contents

Welcome Letter

Three years ago, the Council on Competitiveness' *Innovate America* report announced to the world that innovation was the key to economic growth and success in global markets. That call echoed from one end of Pennsylvania Avenue to the other, from the corporate boardroom to the university classroom and from state capitals to capitals around the world.

Today, the Council's corporate CEOs, university presidents and labor leaders remain committed to ensuring the future prosperity of all Americans through enhanced competitiveness in the global economy and the creation of high-value economic activity in the United States. That commitment requires a constant reassessment of national and global economic factors, as well as where the opportunity exists to put into play the Council's thought leadership and its members' time and resources.

Five for the Future is the culmination of this process and it lays out what we believe must be the critical components of America's competitiveness agenda in an increasingly globalized economy.

CHARLES O. HOLLIDAY, JR.

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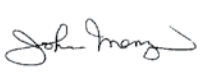
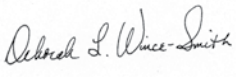


JOHN B. MENZER

Vice-Chair
Council on Competitiveness
Vice Chairman and Chief Administrative Officer
Wal-Mart Stores, Inc



DEBORAH L. WINCE-SMITH

President
Council on Competitiveness

Compete:
Five for the Future

The Challenge

The Council's *2007 Competitiveness Index: Where America Stands* noted that:

"By most measures, America's economy is the strongest in the world. The economy has grown faster than any other major developed nation over the past decade, and our standard of living is higher. The United States is the largest recipient of foreign direct investment and holds 40 percent of global financial assets. With only 5 percent of the world's population, America employs nearly one-third of the world's science and engineering researchers, accounts for 40 percent of global research and development spending and publishes 30 percent of all scientific articles. The United States remains the most popular destination for the world's best and brightest, and its financial markets and entrepreneurial culture are the envy of the world. It remains the benchmark against which all other economies measure themselves."[1]

Any perception that the country is standing at the edge of an economic cliff with one foot dangling in thin air is just not borne out by the economic data. What is undeniable is that the global economy is reshaping the competitiveness landscape in ways that few would have predicted even a decade ago. The global economy is transforming rapidly, driven by new competitors, revolutionary technologies, new industries, and growing numbers of sophisticated consumers.

The game has changed. The policies and approaches that ensured U.S. economic preeminence for the past 20 years will not sustain our competitive edge in the decades ahead. We must adapt and face these new challenges to ensure America's future growth and prosperity, or risk leaving future generations a legacy of lost opportunity.

1 Council on Competitiveness: *Competitiveness Index: Where America Stands* (Washington:2007)

1. Global IT Expansion Is Changing the Competitive Landscape

Source: Federal Reserve Bank of Dallas

Information Infrastructure and Use	Now	Per 1000 People	Then (1990)	Per 1000 People
Personal Computer	898 billion	140	131 million	19
Cell Phones	2.7 billion	416	11.2 million	2
Countries Connected to the Internet	209		20	
Secure Internet Servers	401,050		0	
Internet Web Sites	110 million		9,300	
Host Computers Connected to the Internet	395 million		313,000	
Internet Storage (in Terabites)	532,897		0	

The Game Changers

Digitization

High-speed telecommunications are compressing time and distance, diffusing knowledge, and enabling connectedness in the global commercial enterprise at a mind-boggling level and pace. Digital commerce is transforming old industries, stimulating new business formation, shattering traditional business and management models, and delivering modern business tools and unprecedented economic opportunity to emerging economies.

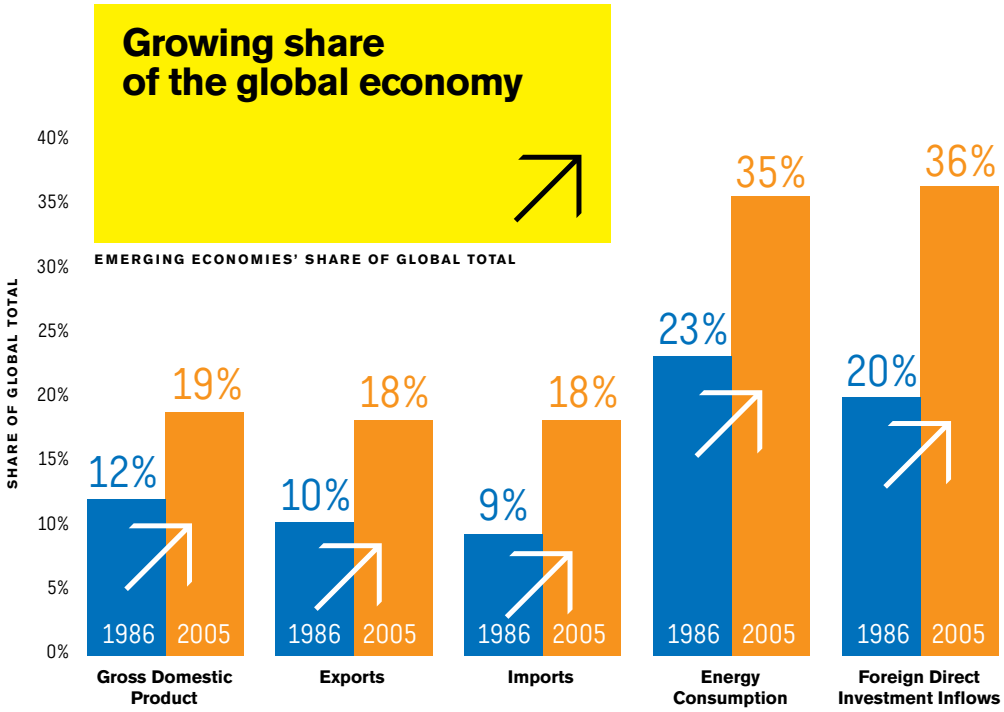
Information, capital, know-how and talent flow across national borders like never before. Digitally empowered production networks span the globe, moving at breakneck speed to exploit market opportunities. Using a Blackberry® on the road, a project manager can assemble a global work team that spans a dozen countries. From the convenience store parking lot to the seashore to ball field sidelines, every place is a potential workplace.

Implications

The digitization of work is turning services and even high-tech goods into commodities faster than ever before. If a product, service or process is routine or rule-based, if it can be digitized or reliably codified, it becomes a commodity, and its production is easier every day to ship around the globe in bits and bytes.

2. Emerging Markets Are Rapidly Growing Their Economies, Exports and Share of Global Investment Flows

Source: World Bank, UNCTAD, U.S. Department of Energy, EIA



New Competitors

Emerging economies are advancing rapidly, so much so that they now account for six of the top ten high technology exporting nations. This stunning rise to high tech market leadership in a little more than a single generation is due to three key factors:

- Changing Global Market Demographics

  Sophisticated consumer markets are burgeoning in the developing world. By 2020, 80 percent of middle-income consumers will live outside the industrialized world. Companies from many nations are rushing to take advantage of these lucrative markets and international business opportunities. In addition, the globally available workforce has expanded dramatically. Newly developing market economies in India, China and Eastern Europe have added an unprecedented two billion workers to the global labor pool.[2] Increasing numbers of workers are both technically skilled and willing to work for significantly lower wages than their counterparts in the United States.

2 The World Factbook 2006, U.S. Central Intelligence Agency.

- Fewer Barriers to Global Trade and Investment

  To participate in global trade, many nations have created a more business friendly climate—reforming laws that limited domestic market access or foreign investment, reducing tariffs and subsidies, privatizing state-owned enterprises, and removing other barriers that have frustrated trade and investment. These market-opening efforts have fueled global economic integration.

- Investment in Innovation Infrastructure

  Emerging economies learned a key lesson: investment in innovation capacity is the key to higher productivity, higher wages and higher economic growth. Emerging economies are investing in research and virtual, physical and educational infrastructure. Global companies are establishing additional innovation capabilities in the emerging world as they increasingly colocate R&D with new market opportunities. While the United States is the world's strongest innovator nation today, a wide range of surveys shows that many companies plan to establish high value and knowledge-intensive operations offshore, including R&D, and that emerging economies are now among the most attractive destinations for that investment.

Implications

Running in place is not an option when the competition is running relatively faster. The developed market's near monopoly on advanced technology is ending. Billions of new consumers in the developing world will drive new consumer markets and offer often lower-cost skilled labor pools, creating incentives to increase foreign investment and shift operations of U.S. companies.

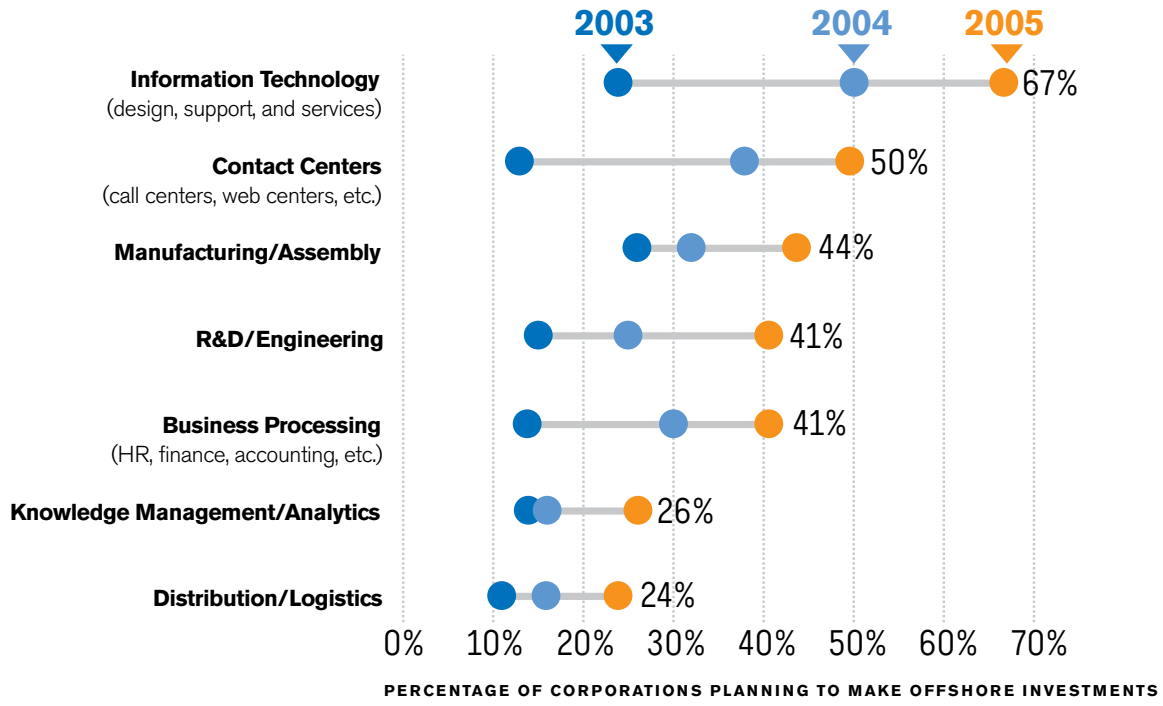
"In order to advance America's scientific and technological edge, it is critical that the private sector have sufficient market incentive to continue to invest in innovation and in human capital. To fully realize our potential, we need the doors of commerce to be more open, and we need strong legal protections for our innovations."

Ian Read, President-Worldwide Pharmaceutical Operations, Pfizer Inc

3. Global Firms Are Offshoring a Range of Corporate Functions

Source: A.T.Kearny, Foreign Direct Investment Confidence Index (2005)

Steady increase in offshore investments →



The Rise of Global Enterprises

As described by IBM Chairman, President and Chief Executive Officer Samuel J. Palmisano, the new global enterprise is a fundamentally different organization, "as different from 20th century multinationals as the nascent industrial companies of the 19th century were from the international traders of the 1700s."[3]

Enabled by digital commerce, and the slicing of product and service processes into separable pieces of work, U.S. corporations are adopting global sourcing and delivery strategies. With a global delivery strategy, companies employ capabilities and resources in multiple countries using standard processes and methodologies supported by a global infrastructure.

They increasingly operate their far-flung global enterprises as virtual, integrated organizational entities comprised of in-house operations, and outside contractors and partners. *Consider that the top 20 of these global enterprises are bigger in market value than the economies of 144 countries.*

Many U.S. companies operate and serve customers in dozens of countries, where a significant portion of their customers and employees reside, and their revenues are generated outside of the United States. For example, more than one-third of U.S. corporate profits are generated by foreign operations. Foreign sales by U.S. companies increased 264 percent (in nominal terms) from 1986 to 2003, and represented

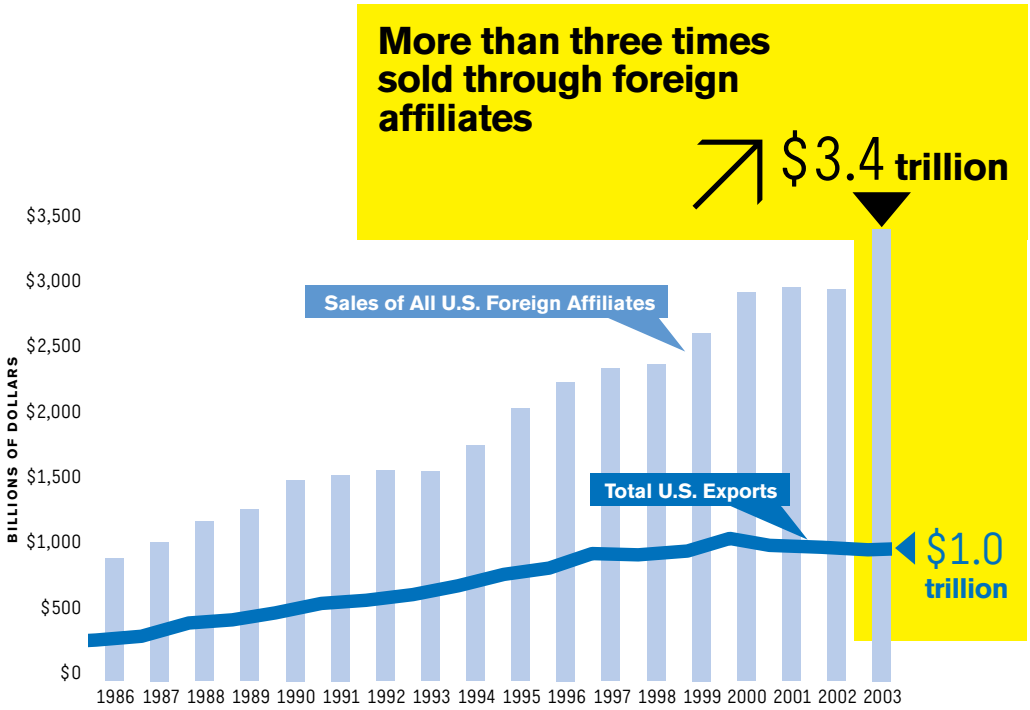
3 Samuel J. Palmisano, " The Globally Integrated Enterprise," Foreign Affairs, May/June 2006

"We are living in a globalized world. It means that old certainties about the way we look at human problems have to be seen in a new light, and it means that we have to have the courage and the energy to change the way we do business"

R. Nicholas Burns, Under Secretary for Political Affairs, U.S. Department of State

4. U.S. Multinationals Sell Three Times More Through Foreign Affiliates Than Through Exports

Source: U.S. Bureau of Economic Analysis



28 percent of total sales in 2003 (up from 20 percent in 1986).[4]

Just a decade ago, a key metric for measuring national competitiveness was cross-border trade. But today, imports and exports may no longer indicate where something was produced or where most of the value was added. Significant flows of global business do not involve traditional exports or imports, but rather intra-firm transactions, partnerships, and foreign direct investment. *In 2003, foreign subsidiaries of U.S. firms generated $3.4 trillion in sales, three times the total value of U.S. exports and 50 percent higher than the trade deficit.*[5]

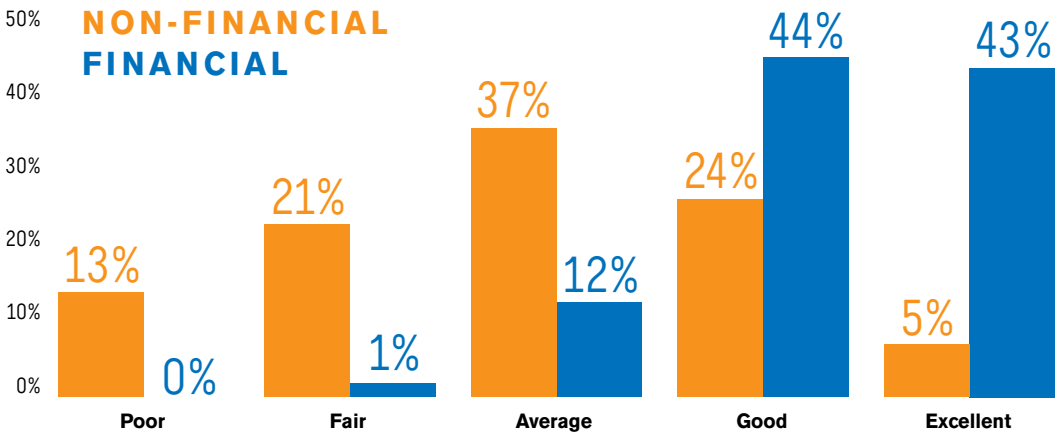
Implications

The globalization of assets and operations may signal that trade is no longer a principal measure of national economic success and that American worker incomes will be tied less directly to U.S. corporate outcomes in the future.

5. Boards Are Less Confident in Non-financial Risk Management

Source: Deloitte. "In the Dark II." Deloitte, 2007.

How would you rate your organization's record of measuring and monitoring financial and non-financial aspects of performance



Rising Global Risks

In lock step with the rise of global trade and global enterprises has come a growth in risk. Beyond the well-documented threat of global terrorism, natural disasters and weather phenomena, the reliability of the operational life-lines—IT, supply chain and energy, for example—has become far more critical to economic stability and enterprise competitiveness. These systems have become highly interdependent, creating a potential for disruptions that can cascade across networks and borders.

Many of the emerging, game-changing trends amplify operational risks for companies, but also offer new ways to reduce and manage risk. On the one hand, the diffusion of interconnected operations increases a company's exposure to infrastructure disruptions. On the other hand, companies can leverage geography to disperse risk. Indeed, rather than creating static backup sites (that often gather dust until a disruption occurs), some leading companies plan to create shadow seats, or parallel competencies that enable them to automatically shift operations among global hubs should one site go down.

4 and 5 Council on Competitiveness: *Competitiveness Index: Where America Stands* (Washington:2007)

The ability to manage risk in the extended enterprise will increasingly become a competitive differentiator. But there is evidence that many companies do not incorporate operational risk into their overall risk management systems. Consider that:

- Only 25 percent of directors of non-financial companies report that their board considers all major risks to the company versus 55 percent of financial industry directors[6]
- Most companies give themselves high marks for financial risk management. But only 29 percent describe their non-financial risk management performance as excellent or good, and more than a third describe it as fair or poor[7]
- During a 12 month period, one in five companies surveyed suffered significant damage from a failure to manage risk, and more than half experienced at least one near miss[8]

6 Conference Board, *CEO Challenge* 2006.

7 Deloitte Research, *In the Dark II*, 2007

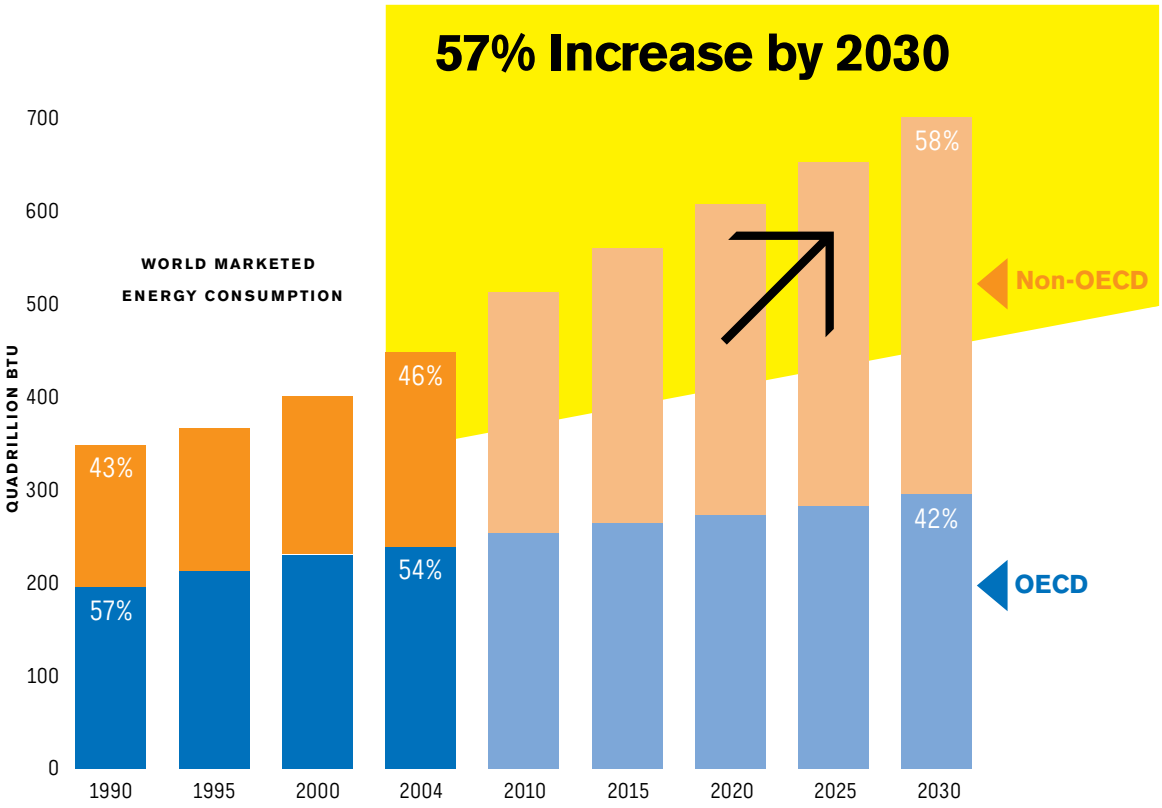
8 Lloyd's, In association with the Economist Intelligence Unit, *Taking Risk on Board*, 2006

Implications

In a simpler time, companies were able to achieve operating efficiency by establishing stable business models with repeatable, uniform processes. Today, stability and predictability are elusive. Competitive companies will have to learn new skills—agility, adaptability and resilience—to deliver consistently high performance and shareholder value.

6. The United States Is Not Alone in its Growing Appetite for Energy. Demand Is Projected to Grow in Both Developing and Developed Countries Alike

Source: Energy Information Administration



Energy Security and Sustainability

The future prosperity of the United States is inextricably tied to our ability to create a secure and sustainable, environmentally prudent, and balanced energy system. Creating the conditions that foster investment in modern energy infrastructure and energy innovation, and that elevate energy management to a strategic level in the corporation, will help to improve dramatically our economy, environment, national security, and standard of living. It will also move the United States to the forefront of a remarkable new era of technological advances, market opportunity, industrial transformation, and innovation of all kinds at every scale.

"We used to think of agriculture in terms of four "F's": food, feed, fiber and flowers. To these four, we can now add a critical fifth—fuel, as in energy. And the opportunities to create abundant sources of fuel promise to create the biggest transformation in agriculture in 200 years. Through photosynthesis, plants represent one of the few effective energy storage systems, offering a significant avenue for deployment of clean and sustainable solar energy."

Gale Buchanan, Under Secretary for Research, Education and Economics, Department of Agriculture

Unlike the "supply shock" of the late 1970s, recent energy price increases have been driven by a sharp rise in demand from both industrialized nations and rapidly growing emerging economies. Price volatility in oil, natural gas and electric power has shaved almost a point off of U.S. GDP growth in recent years, increased costs to U.S. public and private sector enterprises, and reduced the discretionary income of ordinary Americans. The current trajectory of energy supply and demand, combined with the growing likelihood that some form of carbon emission restraints will be imposed in the United States, presents a new competitiveness challenge to the nation and its enterprises. Meeting our growing energy needs in new, environmentally friendly and sustainable ways has become a national imperative.

Energy issues are creating large opportunities as well as challenges. Tom Friedman points out: "With three billion new consumers from India, Russia, and China joining the world economy, it is inevitable that manufacturing clean, green power systems, appliances, homes and cars will be the next great global industry."[9]

Implications

Given the increasing volatility of energy supply and pricing, some industries are beginning to relocate to areas around the nation and the world that produce reliable, renewable and cost-competitive sources. U.S. competitors are making a significant effort to attract, develop and grow alternative energy capabilities and industries.

The Path Forward: Five for the Future

The unique Council on Competitiveness tripartite membership is committed to addressing the impact of globalization on U.S. competitiveness and individual prosperity. The confluence of global access to talent, capital and ideas enabled by high-speed communications has all but eliminated the importance and impact of physical boundaries to our economic security. Whether our citizens and businesses will thrive in the new global economy depends largely on our ability to understand and act upon the prevailing forces of change and attract high-value economic activity to regions across America.

9 Thomas L. Friedman, *Our Green Bubble*, New York Times, June 3 2007

America's future competitiveness demands that we:

- Challenge the frontiers in science and technology
- Renew access to secure and sustainable energy
- Achieve advantage with creative and cutting-edge talent
- Transform risk intelligence into resilience
- Engage in the global economy

In short, we must strategically create the platform for America's future competitiveness.

Roadmap for Competitiveness In the 21st Century

Challenge

the frontiers in science and technology.

Science and technology are being rewritten in atomic, digital and genetic codes, with game changing innovation rising from the digital, biotechnology and nanotechnology revolutions. Leadership at the frontier of science and technology conveys competitive advantage in the global economy, particularly to those poised to rapidly translate new knowledge and insight into new high-value products and services. Such leadership also will be critical in answering many of the global grand challenges: global warming, global hunger and global disease, to name only a few of the pressing problems that confront the world's citizens.

The Network as the Foundation for Innovation

Howard Charney
Senior Vice President, Cisco Systems, Inc.

Information technology (IT) and the Internet are transforming every sector of the global economy—and it is striking how swift the proliferation of these technologies has been. Before Sir Tim Berners-Lee launched the World Wide Web application in 1991, few people had even heard of the Internet. Since then, it has become almost as fundamental as electricity. More than one billion people have gone online, and everything from banking to manufacturing, transportation, medicine and the sciences now relies on Internet solutions and the global network.

The Venezuelan economist, Carlota Perez, has scrutinized the relationship between technology innovation and economic cycles, and she suggests that we are currently about halfway through a major technological revolution. According to the Perez model, every 50 to 60 years a signal innovation triggers a technology revolution that transforms every aspect of society. Professor Perez has identified five such cycles over the past 240 years, beginning with the Industrial Revolution in the 1770s. She argues that the current revolution was kicked off by the Intel 4004 in 1971. The telegraph, telephone and transistor all contributed, but it was the programmable microprocessor that launched the Information Age.

If the Perez model is correct, we should have 20 or 30 more years of productivity and growth (a "Golden Age") ahead of us before the next big technology revolution kicks in. During that time Internet technologies will continue to evolve, and the Internet platform will continue to drive the engine of innovation worldwide.

The American Competitiveness Initiative: Role of High End Computation

Raymond Orbach
Under Secretary for Science , U.S. Department of Energy

The DOE Office of Science is delivering computational science breakthroughs today and leading the way to tomorrow's scientific discoveries. Our capabilities include two Leadership Computing Facilities, at Oak Ridge and Argonne National Laboratories, and the National Energy Research Scientific Computing Center (NERSC) at Lawrence Berkeley National Laboratory. Each facility provides more than 100 teraflops performance (or more than 100 trillion calculations a second), the powerful dedicated Energy Sciences Network (ESnet), and the path-breaking Scientific Discovery through Advanced Computing (SciDAC) and Innovative and Novel Computational Impact on Theory and Experiment (INCITE) programs for tackling the biggest scientific challenges. During the past seven years, we have launched programs to develop tools to create increasingly detailed simulations, extract the science from massive datasets, and support the computing and networking demands of large-scale experimental facilities, thereby changing the very fabric of scientific research. Our combination of facilities, applications expertise, applied mathematics and computer science research is transforming science in areas such as climate research, nanotechnology, astrophysics, energy and the environment throughout the U.S. research community and in partnerships spanning the globe. U.S. industry is substantially reducing R&D costs and shortening time to market. High-end computation is transforming basic scientific research and U.S. global competitiveness.

A critical and ongoing priority in implementing the Council's **National Innovation Initiative (NII)** is support for legislative initiatives to strengthen America's capacity for innovation—talent, investment and infrastructure. The Council also continues to explore the new competitive landscape with studies on Innovation Universities and Regional Innovation Hot Spots.

The Council's **High Performance Computing (HPC)** initiative seeks to better leverage U.S. leadership in this critical technology across our economy. Greater use of this cutting-edge computing power would drive increased levels of inquiry, exploration and knowledge generation. During the next three years, the Council will pursue efforts to enhance HPC capabilities and expand HPC's use among American enterprises.

Renew

access to secure and sustainable energy.

A secure and sustainable, environmentally prudent and balanced energy system will drive future economic prosperity for the country and companies alike. Within the private sector, growing global energy demands and energy supply vulnerabilities will help drive a transformation in America's energy portfolio. The private sector can play a starring role in this transformation as energy innovator, adaptor, investor, and agent of change. New energy realities have already caused leading companies to address their energy competitiveness in internal operations and in the marketplace. Some have set ambitious goals to diversify the kinds of energy they consume and to increase energy efficiency, some have established internal energy metrics, and launched programs to drive similar practices throughout their supply chains.

Securing Our Energy Future

Shirley Ann Jackson, Ph.D.
President, Rensselaer Polytechnic Institute
Co-chair of the Council's Energy Security, Innovation and Sustainability Initiative

During the next 50 years, if current trends continue, humans will use more energy than in all of previously recorded history. Where will it come from? From which fuels will this energy be derived? Can our planet—a planet of limited resources—sustain the impact? As the global appetite for energy has risen, the competition has intensified, with each country strategizing on how best to ensure a secure and sufficient supply of energy at affordable prices. But this is no simple supply-demand curve. It is more like a delicate tightrope balancing act, with disaster waiting if we lean too far in either direction. One challenge we face is the extraordinary global reliance on oil. In an energy-hungry society, oil makes up approximately 36 percent of the global energy diet—with more than 85 million barrels consumed per day. If India and China, during the next decade or more, were to increase consumption to just half the U.S. rate—matching the consumption rate of Germany or Japan—the result would be a net increase of 100 million barrels per day, more than double current production levels. Even the most bullish experts would not consider such an output to be realistic. The effect is not limited to oil consumption. Consider the electricity sector. In a single year, China added to its grid roughly the equivalent of the entire electrical generating capacity of France. What is significant about those statistics is not only the anticipated growth in demand, but that so much of that growth will take place in countries that are not prepared to reduce their dependencies on fossil fuels. The challenge for countries and corporations that wish to be competitive is to manage energy supply and demand, in a cost-effective and sustainable way. There is extraordinary economic opportunity in creating solutions to the global energy security challenge. Finding those solutions will require commitment, investment and innovation of the highest order.

Energy Workforce

Michael Langford
President, Utility Workers Union of America
Co-chair of Energy Security, Innovation and Sustainability Initiative

As we look to our new energy future, it is imperative that we consider our workforce—those who produce and generate our energy and those who build, maintain and operate our vast energy infrastructure. We need a workforce that is trained and ready to adapt to the challenges on the horizon. While new technologies will contribute to more efficient energy production, they will not compensate, for example, for the labor shortages expected as a result of the retirement of half of the country's 412,000 power workers during the next 10 years. This is an enormous amount of knowledge that is walking out the door, and we need to plan ahead to ensure that our talent pipeline does not dry up. We will need to attract hundreds of thousands of new workers to the industry—and through equipping our workers with the necessary skill sets and the opportunities for lifelong learning—ensure that we have the best trained, highest skilled, safest and most productive workers in every facet of our energy industry.

Energy and Competitiveness

James Owens
CEO, Caterpillar
Co-chair of Energy Security, Innovation and Sustainability Initiative

The availability of secure, competitively priced energy will be critical to assuring that American business can compete and our citizens prosper in the 21st century. Rising energy prices and shortages take a toll on competitiveness. Energy policies focused on expanding global production—through greater efficiencies and technical solutions that also protect the environment—are absolutely essential. But we can't rely on policies alone. Ultimately, the private sector, with government support, must come together to provide solutions. We must ensure that our best companies, experts and inventors have the freedom, flexibility and resources to develop and deploy more energy, more cleanly and from sources here and abroad.

The Council's new **Energy Security, Innovation and Sustainability (ESIS)** program is founded on the premise that the future economic prosperity of the United States is inextricably tied to our ability to create a sustainable, environmentally prudent and balanced energy system. Creating the conditions that foster investment in 21st century energy infrastructure, propel private sector innovation, and elevate energy management to a strategic level will help improve dramatically our economy, environment, national security and standard of living. It will also move the United States to the forefront of a remarkable new era of technological advances, market opportunities, industrial transformation and innovation of all kinds at every scale.

Achieve
advantage with creative and cutting-edge talent.

Being an American is not an entitlement to a secure, high-wage job. India and China alone could enlarge the global labor pool that competes for the world's work by almost one billion workers. High-speed communications and the digitization of work processes are enabling the commoditization of work involving routine skills, and every day it is easier to ship work around the world. Even technical work requiring skills that once commanded a premium is now often outsourced, offshored or automated. American workers can establish a new competitive edge at the intersection of disciplines—for example, science and business, math and economics, cultural anthropology and marketing, or art and telecommunications. Educational institutions must continue to adapt to prepare Americans for the rapidly changing global economy. And through partnerships and other means, these institutions must ensure that individuals can constantly upgrade their skills to exploit the cutting edge of scientific discovery, technological change and market opportunity.

Innovation and Diversity

Lucinda Sanders
CEO, National Center for Women and Information Technology

Innovation thrives on diversity of ideas and input. From penicillin to the iPhone®, the most influential innovations of our time reflect the personal perspectives and experience of their creators. Research shows a strong return on investment to companies that diversify their workforce, including better decision-making, higher return to shareholders, and technological design more applicable to a wider range of customer needs. Employing gender diversity in the innovation process yields different products and different ideas, contributing to better U.S. economic performance. Diversity of thought is critical in the scientific, technical, mathematical and engineering (STEM) disciplines, areas vital to our nation's future. In some of these disciplines, however, workforce professionals are still culled from a very narrow segment of our population. This is especially true in information technology (IT). Women receive only 28 percent of computer science degrees (down from 37 percent in 1984) and represent only one-quarter of professional workers in IT occupations. Women start fewer than 5 percent of IT companies, hold fewer than 5 percent of IT patents, and hold fewer than 5 percent of corporate Chief Technology Officer positions. The statistics are even worse for under-represented minorities. This problem comes at a critical juncture for America: As our economy globalizes and the marketplace for innovation flattens, many of our products and services become commodities and we find ourselves competing with other countries in a global economic race. What will differentiate U.S. performance and lead to high-value economic activity for our nation? Our diverse workforce!

Talent and Creativity

George Campbell
President, Cooper Union for the Advancement of Science and Art.

Given that conceptual knowledge and innovation are the lifeblood of today's global economy, the university is a crucial component of the competitiveness ecosystem. Among the critical challenges facing the academy is educating our students to be better prepared for a world defined by globalization. How do we nurture creativity and innovation among all students during the education process? The founder of Cooper Union, New York industrialist and inventor Peter Cooper, fully grasped that the confluence of science and art offer a tremendous stimulus to creativity. At a fundamental level, the arts and sciences have a great deal in common. Each seeks to uncover something about the essential nature of reality. Each relies heavily on visual representation. Each embraces an aesthetic culture, buttressed by human intuition. Each demands a high level of creativity. The great novelist, Vladimir Nabakov wrote: "There is no science without fancy and no art without facts." What's new in these science and art collaborations is the increase in examples of art contributing to science. Biomedical engineers are working with graphic designers and animation specialists to improve three dimensional imaging and navigation techniques in robotic surgery. High speed photographic images have been used to illuminate non-linear scientific phenomena. Motion graphics have contributed significantly to the simulation of submicroscopic interactions. The World Wide Web was an outgrowth of the integration of computer sciences and graphic design as is the burgeoning area of electronic game design, now responsible for $20 billion in economic activity in the United States. What is important in this discussion of the ecosystem is that the union of creative energies inherent in the conduct of science and in the practice of art has shown enormous potential in raising the innovation quotient. Success will come from the ability to compete at the highest level, on the basis of quality and of leadership in the area of innovation.

The Council's **Regional Innovation Initiative**'s collaboration with the U.S. Department of Labor's Workforce Innovations in Regional Economic Development (WIRED)–a program based on recommendations from the Council's ***Innovate America*** report–highlights the critical roles academia, organized labor, business, and government should play in supporting lifelong learning for all Americans.

Increasing the proficiency of the American workforce through multidisciplinary education remains a core focus of **NII** implementation and part of the Council's federal and state advocacy agenda, including its ongoing partnership with the National Governors Association and support of initiatives such as the professional science master's degree program.

In partnership with the Economic Development Administration of the Department of Commerce, the Council is launching a new initiative to develop leadership strategies, best practices and tools to help regions link stakeholders and leverage assets more effectively and to prepare a feasibility plan for the creation of a National Center on Regional Leadership.

Transform
risk intelligence into enterprise resilience.

Businesses make money by taking risks, but lose money by failing to manage them strategically. According to Deloitte Research, the cost of failure to manage risk on an enterprise-wide basis can be huge. Almost half of the 1000 largest global companies suffered declines in share prices of more than 20 percent as a result of failing to manage risk systematically. The ability to manage emerging risks, anticipate the interactions between different types of risk and bounce back from disruptions will be a competitive differentiator in the 21st century. The resilient enterprise will be risk intelligent, flexible, agile, and adaptive.

Creating the Resilient Organization

Charles O. Holliday, Jr.
Chairman and CEO, DuPont

A first step for a resilient organization is to understand that every company now faces an era of turbulence and change. This is not just about malicious attacks. Ninety-three percent of companies that lost their data center for 10 days or more were bankrupt within a year. What caused the disruption—whether a hurricane, a terrorist attack, or operating error—didn't matter. What mattered was the lack of systems and processes to deal with it.

At DuPont, we train every year—at least three times a year—for different kinds of security threats. Not one of these has ever materialized, and we hope never will. But the exercises build fundamentally robust processes and skills that are useful in coping with many types of challenges that we face.

A second critical step is to embed resilience into the corporate culture, to make it a fundamental way the company operates. Every manager must walk the talk. The resilience message becomes part of our training programs, our communications strategies, and the metrics that we apply to benchmark our performance.

The third step is to take advantage of the upside to resilience. Wherever there is hazard, there is also opportunity. We look at the volatility and risk inherent in the energy markets and see tremendous opportunity for investment in R&D and new market opportunities. Similarly, risks in the food supply chain open new opportunities for biotechnology solutions.

Resilience must be baked into the DNA of a company, a university or a governmental organization. And when you bake it in with solid, powerful processes, training programs and agile systems, you are indeed putting together a capability to respond to whatever disruption might come your way.

The Risk Intelligent Enterprise: Gaining Competitive Advantage Through Smart Risk Management

James H. Quigley
CEO, Deloitte Touche Tohmatsu

What does it mean to be "risk intelligent", and how can an enterprise achieve this status?

A "risk intelligent" business is one that develops a comprehensive understanding of risk and risk interactions, enabling it to make better and more informed decisions. The capability needs to be integrated into all facets of the business, particularly strategy and governance. Risk needs to be addressed on a consistent basis, including every time a new acquisition is considered, if the company enters a new market, or develops a new product. Risk affects how value is created and protected. Importantly, how a company approaches risk management frequently means the difference between a flourishing brand and the tainted legacy of executives who simply fail to ask: "What can go wrong, where, and how quickly?"

It is important to recognize that a lot of sophisticated risk management already goes on within businesses today. The finance department is effectively managing credit risk, IT is handling security and privacy risks, and so on. The problem is, the people managing these processes do not always talk to, or even know about each other, and thus a complete picture of risk facing the enterprise is absent. Risks, of course, do not exist in isolation. A privacy risk can quickly turn into a reputation risk, then a litigation risk, and then a financial risk. So enterprises have to build bridges across these barriers. They should put all the risk specialists in the same room and have formal, documented discussions about the uncertainties the company is facing, and how these should be managed. Further, they should exploit technology as an enabler of risk management. Generally speaking, companies are not utilizing the risk management capabilities already built into their existing ERP systems.

These steps are not just useful, they are essential. The perception that the world is an increasingly perilous place is not some radical notion. It is a reality. A Risk Intelligent Enterprise™ knows when to avoid danger and when to take a chance. It does more than stay in business—it prospers.

Building on the successful Resilience Day and release of *Transform. The Resilient Economy: Integrating Competitiveness and Security*, the Council's **Enterprise Resilience** program will engage Council members and policymakers—including a newly created Enterprise Resilience Council—in an ongoing dialogue on how best to change the debate from preparing for catastrophe to managing risk strategically and continuously.

Engage

in the global economy.

The landscape of global competition is radically different today then it was when the Council was founded 20 years ago. The forces of globalization are changing the rules of the game. Although the global economy creates growth, productivity and wealth, it also contributes to a burgeoning trade deficit, wage arbitrage and global redistribution of assets and operations. With analysts estimating that fully 80 percent of the world's consumers will live outside the United States by 2020, disengagement is not a viable path to prosperity.

But much of America's understanding of competitiveness in the global economy is based on 20th century measurements and assumptions. In the global economy, rising corporate productivity co-exists with wage stagnation, low unemployment with high income inequality and mounting trade deficits with great success by U.S. companies in global markets.

What we do know is that the balance between cooperation and competition is changing. Increasingly, the United States:

- Competes and cooperates in a world in which the power of networked communications, the extended global supply chain and access to talent has internationalized operations and job markets—and further differentiated each nation's comparative and competitive advantage
- Competes and cooperates in a world of innovator nations that have the capacity both to create state-of-the-art ideas and technologies, and rapidly capitalize on ideas developed elsewhere
- Competes and cooperates for potentially scarce natural and man-made resources
- Competes and cooperates in a world in which global challenges, such as health pandemics and the environment (global warming, ensuring sustainability, etc.), create national risks and costs.

The goal of the global program is to understand the new dynamics of competitiveness in the global economy and to facilitate open dialogue with key trading partners on collaborative paths to competitiveness.

Global Integration and Innovation: Two Sides of the Same Coin

Samuel J. Palmisano
Chairman, President and Chief Executive Officer, IBM Corporation

Globalization—both challenging and historic—has arrived. For the first time in human history, everything is connected—with 1.2 billion people, millions of businesses and perhaps a trillion devices linked by the World Wide Web, and counting. And we know what happens when everything and everyone is connected: Work flows. It flows to the places where it will be done best and most efficiently.

So the question for any company, country or community isn't "What will globalization do to me?" Rather, it's "How can I get work and investment to flow to me?"

The answer is one word: innovation. If globalization is the new playing field, then innovation is the way you win the game—whether that game is in business, geopolitics, academia or technology.

Without question, we face obstacles. In the countries of the developed world, some see globalization as a "race to the bottom," and fear its effect on their own job security, wages and standard of living. In the developing world, too, there are people who fear globalization—but for different reasons. Some are concerned about its supposedly "homogenizing" effect, as a threat to their culture and traditions.

While these fears are understandable, they're largely unfounded. First, global integration is about much more than lower costs. The forces driving it are deeper and subtler than that, and they offer opportunities to everyone, not just low-cost providers. In fact, every day we read about significant new investments being made in the larger economies because of their strengths and what they bring to the table. Second, far from moving us toward some homogenized global culture, I am convinced that global integration is driving greater differentiation. Increased economic value is flowing to those who figure out their unique value—what makes them special.

What the leaders of companies, countries and communities are thinking about today, above all, is what needs to be done to overcome the challenges and take advantage of the opportunities presented by globalization—not only for established institutions, but also for the billions of people who do not yet see themselves as globalization's beneficiaries. I firmly believe that this two-sided coin of innovation and global integration can be an empowering and progressive force for every community and individual on the planet.

The Council's **Global Initiatives** program seeks collaborations around the world with critical U.S. partners—including Mexico, Brazil, Chile, Japan, and the European Union—with the aim of improving education and workforce training to create new knowledge and skills; encouraging investment in new ideas, inventions and services that generate higher returns for companies, workers and economies; and building business environments that support innovation.

Further, a core function of the **Global Initiatives** program and **NII** is benchmarking America's position in the global economy to better understand the economic environment and help create the conditions that enable global innovation to occur to the benefit of American citizens and companies.

Creating Competitive Advantage

Five for the Future is a Call to Action. In this hyper-competitive, rapidly changing environment, it is only prudent to glance in the rear view mirror from time to time. But America needs more than rear view mirror policies. The United States needs a roadmap for success in the global economy—one that charts a strategic direction between complacency and panic. And the time to act is now, when the U.S. margin of leadership is strong.

Our success will, in large measure, be built on our ability to understand how the game has changed and respond with a new set of strategies and capabilities:

- Lead in research discoveries that promise to create whole new industries and markets
- Build on knowledge and technology fusions that have the capacity to transform products and services
- Provide every American with the tools to compete in the global economy
- Develop risk intelligence and resilience in an age of turbulence
- Extract value by being a first mover in addressing global challenges

This demands an environment that supports innovation in all its forms and anticipates the new dynamics that create competitive advantages for robust risk management and productivity-enhancing approaches to sustainability. It offers a framework for policy makers, presidential candidates, private sector decision makers and others to move forward decisively to secure America's competitive future.

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About the Council on Competitiveness

WHO WE ARE

The Council's mission is to set an action agenda to drive U.S. competitiveness, productivity and leadership in world markets to raise the standard of living of all Americans.

The Council on Competitiveness is the only group of corporate CEOs, university presidents and labor leaders committed to the future prosperity of all Americans and enhanced U.S. competition in the global economy through the creation of high-value economic activity in the United States.

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HOW WE OPERATE

The key to U.S. prosperity in a global economy is to develop the most innovative workforce, educational system, and businesses that will maintain the United States' position as the global economic leader.

The Council achieves its mission by:

- Identifying and understanding emerging challenges to competitiveness
- Generating new policy ideas and concepts to shape the competitiveness debate
- Forging public and private partnerships to drive consensus
- Galvanizing action to translate policy into action and change

The Council on Competitivness is a non-partisan, non-governmental action tank located in Washington, D.C.

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