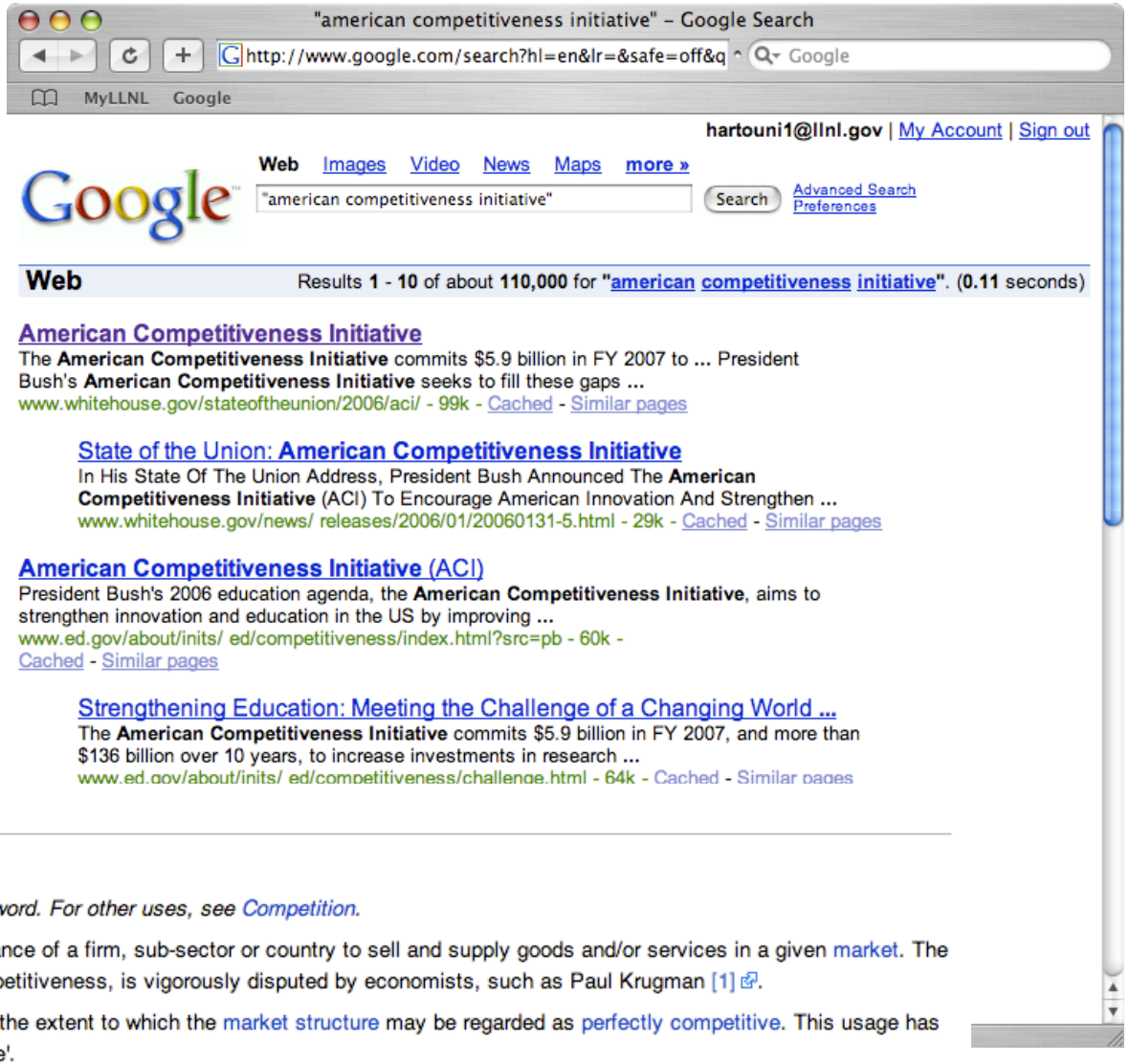
American Competitiveness and the Nuclear Science Long Range Plan

Ed Hartouni
Competitiveness Working Group
Joint Town Meeting on Quantum Chromodynamics
January 14, 2007

Competitiveness

Federal investments in Research and Development will be targeted to those fields which contribute to the competitiveness of the United States.

The Long Range Plan should highlight and explain the contributions that Nuclear Science makes to the competitiveness of the Nation.



Competitiveness

From Wikipedia, the free encyclopedia

This page refers to the economic and econometric sense of the word. For other uses, see Competition.

Competitiveness is a comparative concept of the ability and performance of a firm, sub-sector or country to sell and supply goods and/or services in a given market. The usefulness of the concept, particularly in the context of national competitiveness, is vigorously disputed by economists, such as Paul Krugman [1].

The term may also be applied to markets, where it is used to refer to the extent to which the market structure may be regarded as perfectly competitive. This usage has nothing to do with the extent to which individual firms are "competitive'.

Statement of Dr. John H. Marburger, III President's Science Adviser and Director, Office of Science and Technology Policy to the United States House of Representatives Committee on Science Fiscal Year 2006 Federal R&D Budget February 16, 2004

CONCLUSION

Making choices is difficult even when budgets are generous. But tight budgets have the virtue of focusing on priorities and strengthening program management. This year's R&D budget proposal maintains levels of funding that allow America to maintain its leadership position in science and move ahead in selected priority areas. It is responsible in its treatment of security-related science and technology, and it rewards good planning and management.

America currently spends one and a half times as much on Federally funded research and development as Europe does, and three times as much as Japan, the next highest investor in R&D. Our scientists collectively have the best laboratories in the world, the most extensive infrastructure supporting research, the greatest opportunities to pursue novel lines of investigation, and the most freedom to turn their discoveries into profitable ventures if they are inclined to do so.

We lead not only in science, but also in translating science to economically significant products that enhance the quality of life for all people.

This budget will sustain this leadership and maintain science and technology capabilities that are the envy of the world.

Rising Above The Gathering Storm: Energizing and Employing America for a Brighter Economic Future

Committee on Prospering in the Global Economy of the 21st Century: An Agenda for American Science and Technology, National Academy of Sciences, National Academy of Engineering, Institute of Medicine

Although the US economy is doing well today, current trends in each of those criteria indicate that the United States may not fare as well in the future without government intervention. This nation must prepare with great urgency to preserve its strategic and economic security. Because other nations have, and probably will continue to have, the competitive advantage of a low wage structure, ***the United States must compete by optimizing its knowledge-based resources, particularly in science and technology,*** and by sustaining the most fertile environment for new and revitalized industries and the well-paying jobs they bring. We have already seen that capital, factories, and laboratories readily move wherever they are thought to have the greatest promise of return to investors.

SOME COMPETITIVENESS INDICATORS

US Economy

• The United States is today a net importer of *high-technology* products. Its trade balance in high-technology manufactured goods shifted from *plus* $54 billion in 1990 to *negative* $50 billion in 2001.

• In one recent period, low-wage employers, such as Wal-Mart (now the nation's largest employer) and McDonald's, created 44% of the new jobs while high-wage employers created only 29% of the new jobs.

• The United States is one of the few countries in which industry plays a major role in providing health care for its employees and their families. Starbucks spends more on healthcare than on coffee. General Motors spends more on health care than on steel.

• US scheduled airlines currently outsource portions of their aircraft maintenance to China and El Salvador.

• IBM recently sold its personal computer business to an entity in China.

• Ford and General Motors both have junk bond ratings.

• It has been estimated that within a decade nearly 80% of the world's middle-income consumers would live in nations outside the currently industrialized world. China alone could have 595 million middle- income consumers and 82 million upper-middle-income consumers. The total population of the United States is currently 300 million and it is projected to be 315 million in a decade.

• Some economists estimate that about half of US economic growth since World War II has been the result of technological innovation.

• In 2005, American investors put more new money in foreign stock funds than in domestic stock portfolios.

Rising Above The Gathering Storm

SOME COMPETITIVENESS INDICATORS (cont.)

Research

• In 2001 (the most recent year for which data are available), US industry spent more on tort litigation than on research and development.
• In 2005, only four American companies ranked among the top 10 corporate recipients of patents granted by the *United States* Patent and Trademark Office.
• Beginning in 2007, the most capable high-energy particle accelerator on Earth will, for the first time, reside outside the United States.
• Federal funding of research in the physical sciences, as a percentage of GDP, was 45% less in FY 2004 than in FY 1976. The amount invested annually by the US federal government in research in the physical sciences, mathematics, and engineering combined equals the annual *increase* in US health care costs incurred every 20 days.

Another Point of View: US Competitiveness

"Americans are having another Sputnik moment", writes Robert J. Samuelson, "one of those periodic alarms about some foreign technological and economic menace. It was the Soviets in the 1950s and early 1960s, the Germans and Japanese in the 1970s and 1980s, and now it's the Chinese and Indians."a Sputnik moments come when the nation worries about its scientific and technological superiority and its ability to compete globally. And, according to Samuelson, the nation tends to be overly concerned.

Sputnik led to the theory of a "missile gap that turned out to be a myth. The competitiveness crisis of the 1980s suggested that Japan would surge ahead of us because they were better savers, innovators, workers, and managers. But in 2004, per capita US income averaged $38,324 compared to $26,937 for Germany and $29,193 for Japan."

Similarly, Samuelson argues that our current fears are unfounded, another "illusion" in which "a few selective happenings" are transformed into a "full blown theory of economic inferiority or superiority." He argues that low wages and rising skills in China and India could cost us some jobs, but that US gains and losses in response to the rising economic power of those countries will tend to balance out.

Samuelson indicates that he believes "the apparent American deficit in scientists and engineers is also exaggerated." He notes that only about one-third of our science and engineering graduates work in science and engineering occupations and that if there were a shortage, salaries for those jobs would increase and scientists and engineers would return to them. Of greater importance, Samuelson concludes, is that the United States must continue to draw on the strengths that overcome its weaknesses: "ambitiousness; openness to change (even unpleasant change); competition; hard work; and a willingness to take and reward risk".

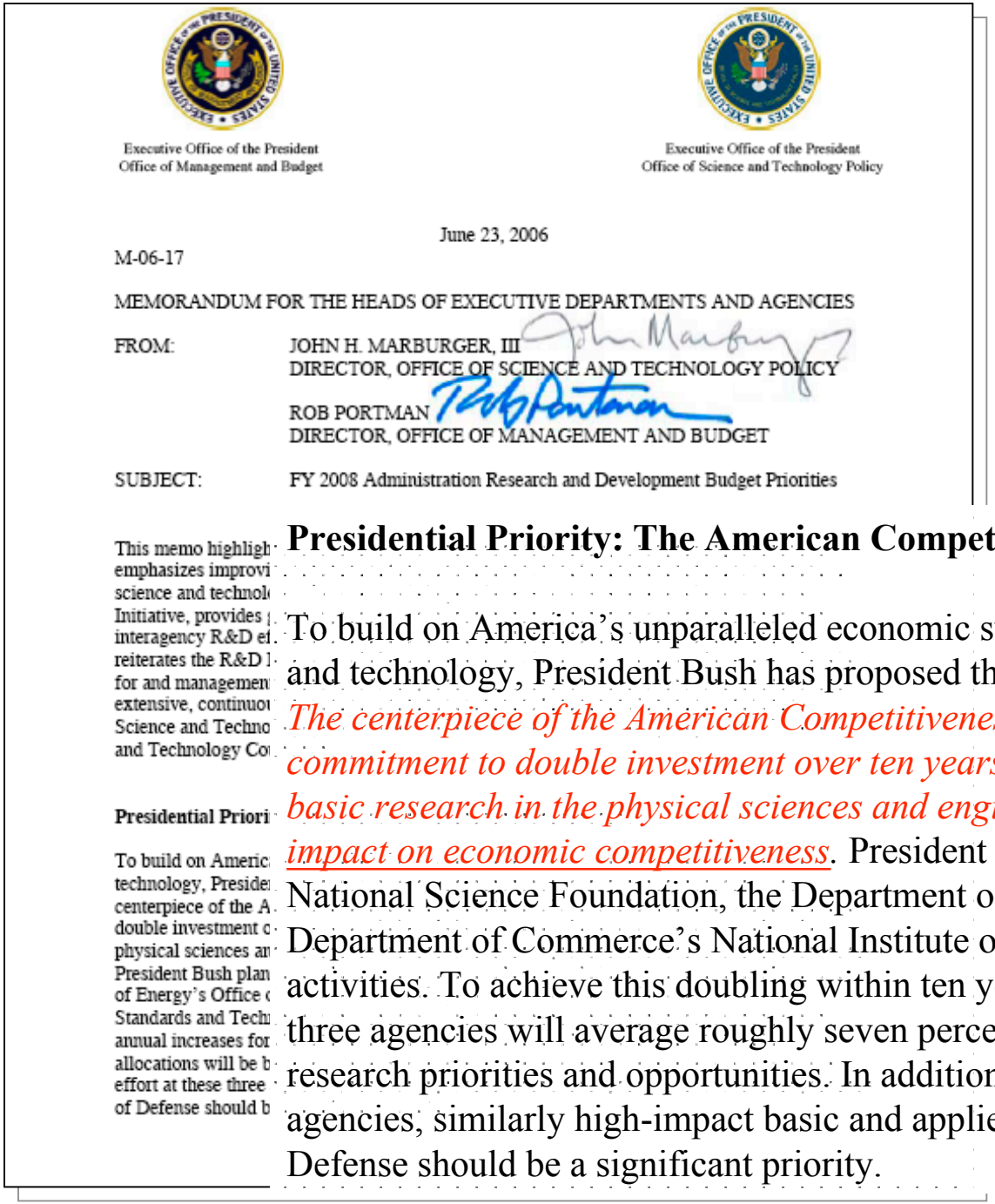
R.J. Samuelson. Sputnik scare, updated. Washington Post, Aug. 26, 2005, pA27

President Bush's 2006 State of the Union Speech introduces the American Competitiveness Initiative

OVERVIEW

Keeping our competitive edge in the world economy requires focused policies that lay the groundwork for continued leadership in innovation, exploration, and ingenuity. *America's economic strength and global leadership depend in large measure on our Nation's ability to generate and harness the latest in scientific and technological developments and to apply these developments to real world applications.* These applications are fueled by: scientific research, which produces new ideas and new tools that can become the foundation for tomorrow's products, services, and ways of doing business; a strong education system that equips our workforce with the skills necessary to transform those ideas into goods and services that improve our lives and provide our Nation with the researchers of the future; and an environment that encourages entrepreneurship, risk taking, and innovative thinking. By giving citizens the tools necessary to realize their greatest potential, the American Competitiveness Initiative (ACI) will help ensure future generations have an even brighter future.

http://www.whitehouse.gov/stateoftheunion/2006/aci/



Executive Office of the President
Office of Management and Budget

Executive Office of the President
Office of Science and Technology Policy

June 23, 2006

M-06-17

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: JOHN H. MARBURGER, III
DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY

ROB PORTMAN
DIRECTOR, OFFICE OF MANAGEMENT AND BUDGET

SUBJECT: FY 2008 Administration Research and Development Budget Priorities

This memo highligh
emphasizes improvi
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Presidential Priori

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physical sciences an
President Bush plan
of Energy's Office
Standards and Tech
annual increases for
allocations will be b
effort at the three
of Defense should b

Presidential Priority: The American Competitiveness Initiative

To build on America's unparalleled economic success and to remain a leader in science and technology, President Bush has proposed the American Competitiveness Initiative. *The centerpiece of the American Competitiveness Initiative is the President's strong commitment to double investment over ten years in key Federal agencies that support basic research in the physical sciences and engineering that has potentially high impact on economic competitiveness*. President Bush plans to double investment by the National Science Foundation, the Department of Energy's Office of Science, and the Department of Commerce's National Institute of Standards and Technology core activities. To achieve this doubling within ten years, overall annual increases for these three agencies will average roughly seven percent. Specific allocations will be based on research priorities and opportunities. In addition to the doubling effort at these three agencies, similarly high-impact basic and applied research of the Department of Defense should be a significant priority.

In general, the Administration favors Federal R&D investments that:

- advance fundamental scientific discovery to improve future quality of life;
- support high-leverage basic research to spur technological innovation, economic competitiveness and new job growth;
- align with the efforts of the Academic Competitiveness Council and the National Math Panel to enable superior performance in science, mathematics and engineering education;
- enable potentially high-payoff activities that require a Federal presence to attain long-term national goals, including national security, energy security, and a next generation air transportation system;
- sustain specifically authorized agency missions and support the missions of other agencies through stewardship of user facilities;
- enhance the health of our Nation's people to reduce the burden of illness and increase productivity;
- ensure a scientifically literate population and a supply of qualified technical personnel commensurate with national need;
- strengthen our ability to understand and respond to global environmental issues and natural disasters through better observation, data, analysis, models, and basic and social science research;
- maximize the efficiency and effectiveness of the science and technology (S&T) enterprise through expansion of competitive, merit-based peer-review processes and phase-out of programs that are only marginally productive or are not important to an agency's mission; and
- encourage interdisciplinary research efforts that foster advancement, collaboration and innovation on complex scientific frontiers and strengthen international partnerships that accelerate the progress of science across borders.

Agencies should maximize the coordination and planning of their R&D programs through the NSTC. Two areas requiring special agency attention and focus through the NSTC are Federal scientific collections and R&D assessment.

- Agencies should assess the priorities for and stewardship of Federal scientific collections, which play an important role in public health and safety, homeland security, trade and economic development, medical research, and environmental monitoring. Agencies should develop a coordinated strategic plan to identify, maintain and use Federal collections and to further collections research.

- Determining the effectiveness of Federal science policy requires an understanding of the complex linkages between R&D investments and economic and other variables that lead to innovation, competitiveness, and societal benefits. An interagency process has been established and is now encouraged to promote and coordinate individual agency and collaborative actions needed to develop "new science of science policy" for better assessing the impact of R&D investments, defining appropriate metrics for measuring this impact, understanding the effect of the globalization of science and technology, and improving the basis for national science policy decisions.

Organizing Committee:

Mark Chadwick, LANL
Ben Gibson, LANL
Thomas Glasmacher, Michigan State University and NSCL
Ed Hartouni, LLNL (co-chair)
Calvin Howell, Duke University and TUNL (co-chair)
Dennis McNabb, LLNL
David Robertson, University of Missouri

Goals:

- **To collect examples since our last LRP on how the nuclear physics community is contributing to the areas of energy, medicine, security and industry.**

(2) To identify the opportunities and challenges for our community in these areas during the next decade, and

(3) To make recommendations on how the Office of Nuclear Physics at DOE and the Nuclear Physics Program at the NSF might better facilitate the engagement of the nuclear physics community in these important areas in response to national needs.

Agenda - Chicago LPR workshop meetings

http://www-mep.phy.anl.gov/atta/dnp/home_ac.htm

***Friday*, January 19, 2007 Overview Session I: Energy**,
Regency B 20:30 - 22:00

Calvin Howell (Duke Univ./TUNL)

***Saturday*, January 20, 2007 Overview Session II: National Security**,
Regency B 8:30 -10:30

Ed Hartouni (LLNL)

Overview Session III: Medical Applications,
Regency B 10:30 - 13:30

Thomas Glasmacher (MSU/NSCL)

Working Group Sessions14:30 - 16:00
WG Session I: Nuclear Energy and Nuclear Data
WG Session II: Nuclear Medicine and Industry

***Sunday*, January 21, 2007**
9:00 - 10:30 WG Session III

11:00 - 12:30 Closeout Session: Summary and Recommendations, Ed Hartouni and Calvin Howell, Comisky

Speakers

Global Nuclear Energy Partnership, Paul Lisowski, DOE
Advanced Fuel Cycle and nuclear data needs, Phillip Finck, INL
National Nuclear Security, Mark Chadwick (LANL)
Homeland Security, Dennis McNabb (LLNL)
Radiation Effects Testing, Peggy, McMahan Norris (LBNL)
Advances in Charged-particle Beam Therapy, Jonathan Farr (MPRI)
Advances in Medical Imaging Using Nuclear Physics Techniques, Stan Majewski (JLab)

Lee Schroeder (LBNL)
Davis Kulp (Georgia Tech)
Carl Brune (Ohio University)
Filip Kondev (ANL)
Jerry Wilhelmy (LANL)
Steve Wender (LANL)
Dave Vieira (LANL)
Bill Hagan (DHS and SAIC)
Chris Morris (LANL)
E. Frank Moore (ANL)
Robert Ledoux (Passport Systems, Inc.)

Mike Herman (BNL)
Michael Smith (ORNL)
Rod Clark (LBNL)
Mark Stoyer (LLNL)
Brad Sherrill (MSU)
John Becker (LLNL)

Harry Miley (PNNL)

Naresh Menon (Physical Optics Corp.)

How to contribute?

Attend the Chicago workshop and participate in the discussions and the writing.

Provide writing on Competitiveness topics to the committee.

Provide references to existing work.

Send examples of Nuclear Science accomplishments pertinent to Competitiveness.

Contact the chairs or other committee members with your thoughts.