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Subcommittee on Technology, Innovation, and Competitiveness
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DRAFT FOR TESTIMONY

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INTRO

Thank you for the opportunity to appear before the Committee and offer observations on the role of federal policy in the area of High-Performance-Computing as it relates to academic research.

My name is Joseph Lombardo, Director of the National Supercomputing Center for Energy and the Environment—the center is a mature High-Performance-Computing Center located at the University of Nevada Las Vegas. The center was established in 1989 and has played an important role in the High-Performance-Computing community by providing a resource for academic researchers in the fields of Energy and the Environment, and has an impressive track record of sponsored research from a range of federal agencies, including the Department of Energy, Department of Defense, Interior, EPA, Health & Human Services, NOAA, NSF and others.

I'd like to make the following observations.

The history of federal support for High-Performance-Computing has been tied to perceptions that high end computing is crucial to a broad definition of national security—that is, that the strength of the U.S. is tied not only to military hardware but to scientific and technological preeminence. High performance computing is crucial to that preeminence, as it is a basic tool for advanced research across many fields.

Initial federal support came with the Lax Report, issued in 1983 by the National Science Foundation, which perceived that the Japanese 6th Generation Computer would give Japan a large lead over the U.S. in high end computing. The Lax Report recommended federal funding for supercomputing centers in open environments, such as universities, and for training, software engineering, and related activities. This report led to the formation of the NSF Centers as well as other federal and state funded centers across the country.

In the late 1980's and early 1990's, High-Performance-Computing funding was directed through collaborative relationships between government, corporate sector, and academic research consortia, leading to the formation of policies that established a national priority list of "Grand Challenges" in research, addressed through High-Performance-Computing tools. This era saw broadening of the High-Performance-Computing manufacturing base, as well as significant software and tool development. This might be considered the "high water mark" of federal interest and funding for High-Performance-Computing.

Beginning in 1993, federal policy reversed and de-emphasized "Grand Challenge" problems. Grand Challenge problems are extremely difficult to solve, requiring several orders-of-magnitude improvement in computational capability. The focus shifted to distribute computing and moved toward "Commercial off-the-Shelf" technology. Such initiatives led to a broader range of individuals working in scientific computing, but basically starved the high end of the High-Performance-Computing field.

At the end of the 1990's DARPA and other organizations began to see that foreign countries, such as Asian groups, were overtaking the U.S. position in High-Performance-Computing once again, and recommended policies that would fund and support the high end of the field once again. The DARPA High Productivity Computing Systems program is a good example of this shift back toward an emphasis on high end capability. The DARPA program is focused on providing a new generation of economically viable high productivity computing systems for the national security and industrial user community in the 2010 timeframe. This trend has continued with the High-Performance-Computing Revitalization Act, the President's 2006 state of the Union Address, and with the FY 07 Budget which increased DOE's High-Performance-Computing programs by almost \$100 million.

This brief recounting of the history of federal support for High-Performance-Computing demonstrates that national interest, academia, and the High-Performance-Computing community are joined at the hip.

Scientific and technological preeminence for the U.S. is related directly to High-Performance-Computing. Support for federal funding of High-Performance-Computing has ebbed and flowed as a result of perceived foreign competition. Collaborations of federal laboratories and agencies, academic institutions and corporate interests are key to advancing both technologies and applications, but require federal funding to do so.

Based on the above, I would make note of the following observations.

1. Federal policies should recognize High-Performance-Computing as vital to the scientific and technological strength of the U. S. and as such, should be considered as crucial to national security.
2. Federal funding for High-Performance-Computing should encourage development of cutting edge, high end technologies, capable of addressing “Grand Challenge” problems as well as mid-range projects.
3. Federal policies should encourage expansion of applications in fields where High-Performance-Computing is not yet a core research tool—e.g., agriculture, many bio medical areas, and transportation.
4. Federal policies and funding should be allocated to encourage a diverse industry, with a range of companies given opportunity to develop and deploy their technologies. Such broad applications and procurements are crucial to sustain a viable High-Performance-Computing manufacturing community not dominated by a single, corporate interest.

Thank you for your interest and for the opportunity to share my thoughts with the panel. I would be pleased to answer questions the Members may have.

