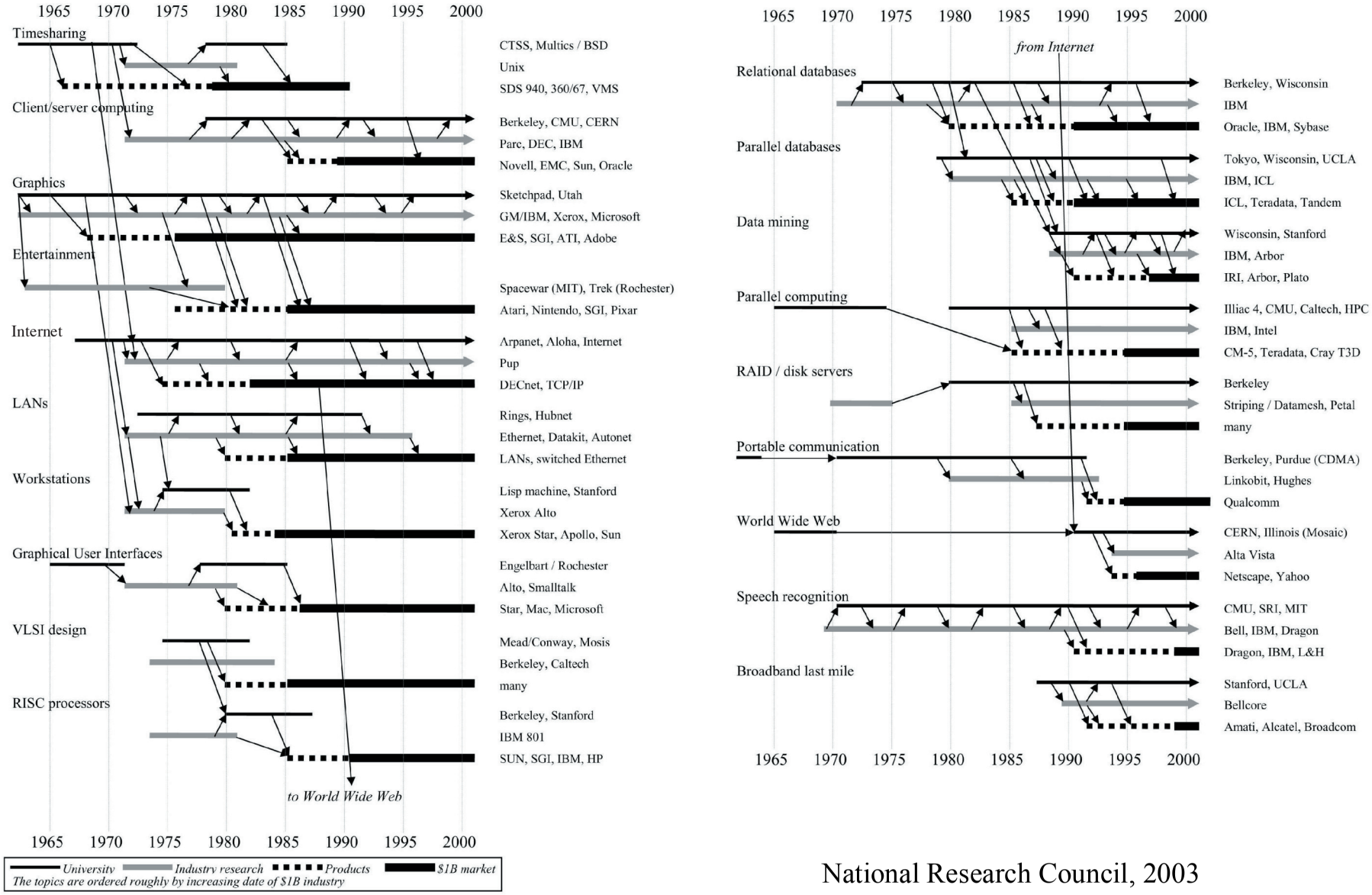
Testimony of Edward D. Lazowska
Before the House Committee on Government Reform
Subcommittee on Technology, Information Policy, Intergovernmental Relations and the Census
Hearing on "Defining Federal Information Technology Research and Development"
July 7, 2004

- Advances in information technology (IT) are changing our lives, driving our economy, and transforming the conduct of science.
- America is the world leader in IT innovation because of a complex interplay of universities, industry, and the federal government.
- Essentially every aspect of IT upon which we rely today – every billion-dollar sub-category of the IT industry – bears the clear stamp of federally-supported university-based research. These relatively modest investments have played an essential role in the past, and will play an essential role in the future. [see figure 1]
- Don't confuse the IT industry's research and development (R&D) expenditures with fundamental research that's guiding our way to the future. The vast majority of corporate R&D in IT – far more than 95% – involves the engineering of the next version of the product. This "development" is essential. But the transforming ideas – and our nation's long-term leadership – come from research. IT companies do very little of that. It is a natural and essential role of government to support fundamental research – R&D that looks out 5, 10, or 15 years, rather than just one product cycle.
- An important aspect of federally-supported university-based research is that it produces people – researchers and practitioners – as well as ideas. There is a huge projected shortfall in IT workers over the next 10 years – the vast majority of the entire projected workforce shortfall in all of science and engineering is in information technology. And these are jobs that require a Bachelors-level education or greater. [see figure 2]
- While the overall federal investment in research has been increasing over the past 30 years, the vast majority of this increase has been in the biomedical fields. Compared to that, all other fields have been flat-lined. [see figure 3]
- Recent increases in federal support for IT research, while important, have fallen far short of the level recommended by PITAC in 1999. The overall level of support continues to be dangerously inadequate in the context of the importance of the field and the opportunity for further advances. [see figure 4]
- While many federal agencies are engaged in supporting IT R&D, two of these agencies have played by far the dominant role in driving IT innovation over the past 50 years: NSF and DARPA. No other agencies come close.
- The research community has significant concerns about the continued low level of funding for the CISE Directorate at NSF. Additionally, the research community has significant concerns about several aspects of DARPA's programs that discourage university participation in defense-related IT research.
- There are additional concerns about the Department of Homeland Security's failure to invest in cybersecurity R&D. Of DHS's new R&D budget of nearly $1 billion, less than 2% is being invested in cybersecurity R&D. And even this shockingly low level of investment was the result of a Congressional outcry – DHS initially proposed less than 1%. IT systems constitute the "control loop" of most other elements of our nation's critical infrastructure (e.g., the electric power grid, the air traffic control grid, the financial grid, the telecommunications grid), and constitute a significant vulnerability.
- The track record is clear: the relatively modest federal IT R&D investment pays enormous dividends: changing our lives, driving our economy, and transforming the conduct of science.

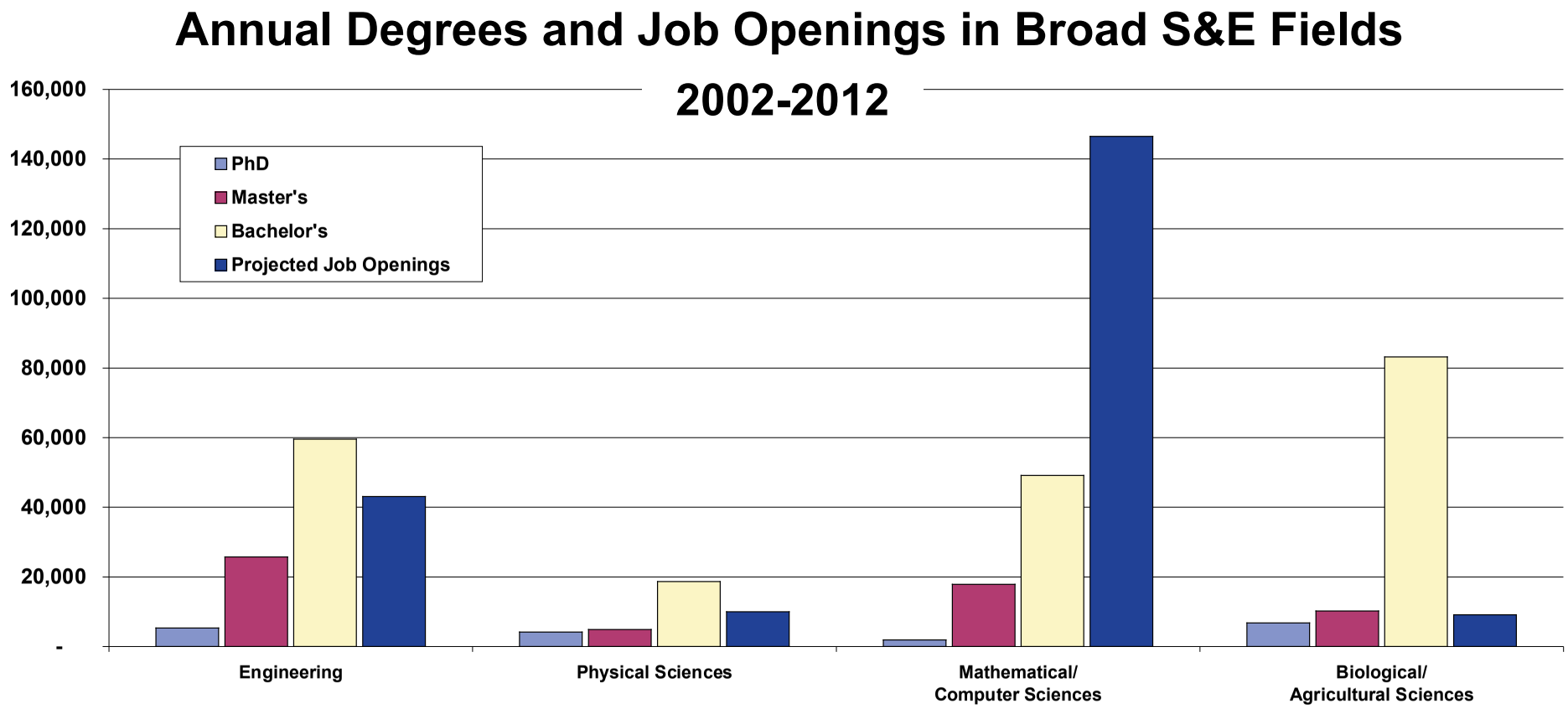
Lazowska holds the Bill and Melinda Gates Chair in Computer Science & Engineering at the University of Washington. He is Co-Chair of the Government Affairs Committee of the Computing Research Association, and Co-Chair of the President's Information Technology Advisory Committee.

Interplay of university research, industrial research, and development for IT in the US



National Research Council, 2003

Figure 1.



SOURCES: Tabulated by National Science Foundation/Division of Science Resources Statistics; degree data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey; and NSF/SRS: Survey of Earned Doctorates; Projected Annual Average Job Openings derived from Department of Commerce (Office of Technology Policy) analysis of Bureau of Labor Statistics 2002-2012 projections

Figure 2.

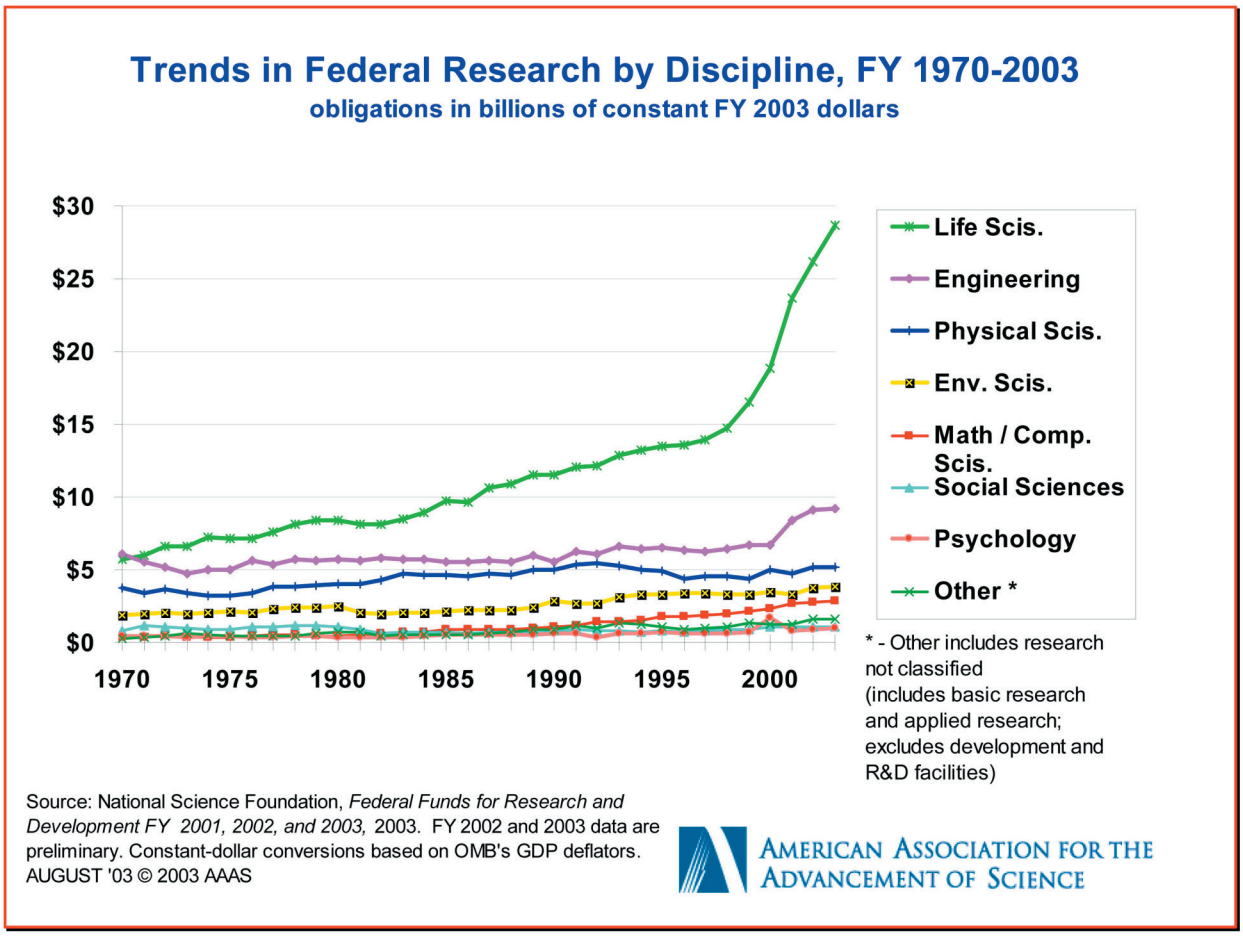


Figure 3.

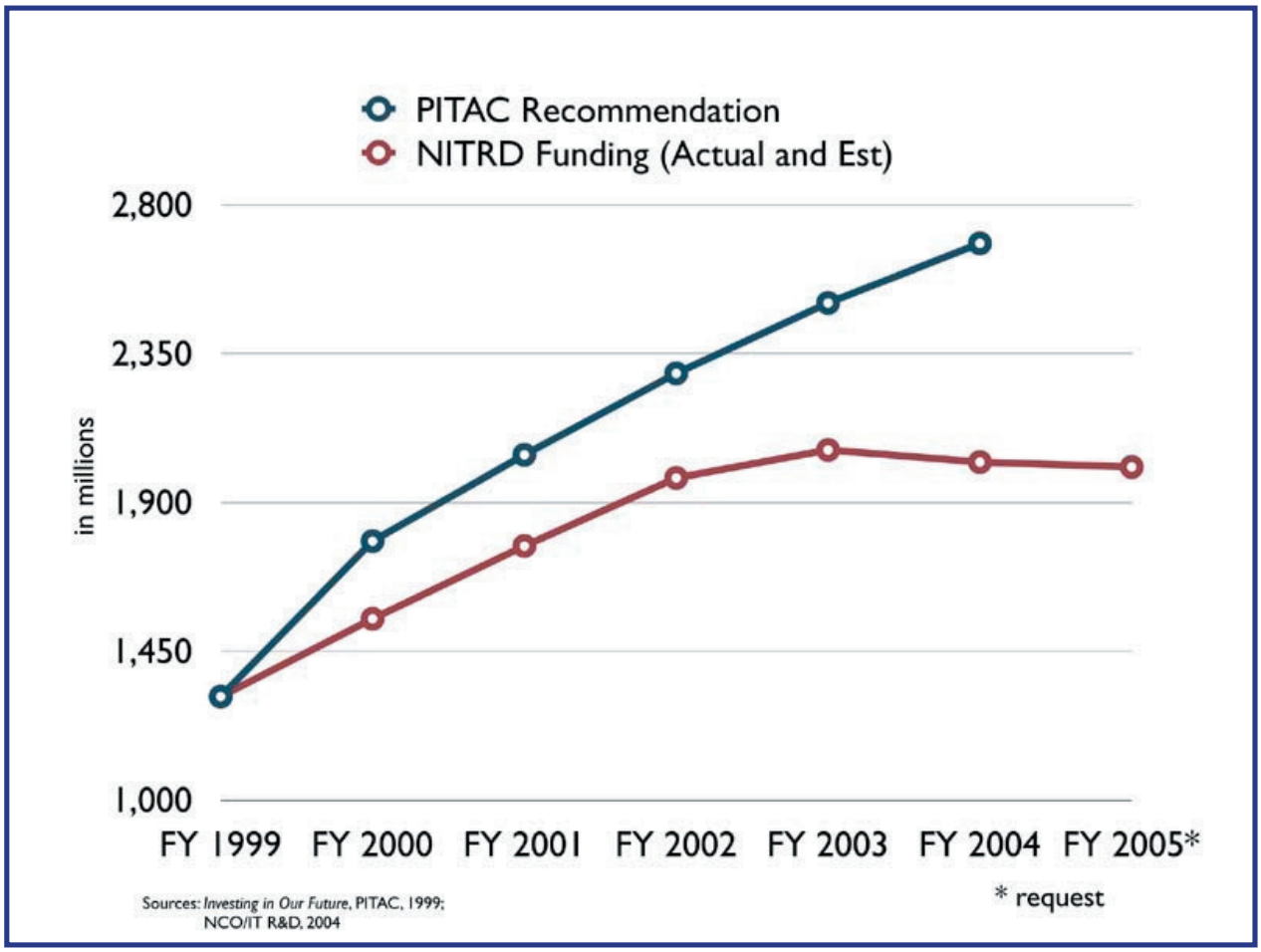


Figure 4.