In January 2000, Bill and Melinda Gates contributed an additional $5 billion to the Gates Foundation, bringing its endowment up to $21.8 billion. The foundation has the laudable intention T echnology Advisory Committee (PITAC) argued, the federal government is at risk. The federal support for research, PITAC stated, the status of the United States as a key industry, and the industry itself is awash in cash and stock options. Meanwhile, the IT industry continues to make billions of dollars for not being a mature custodian of its own future. Industry needs to own a greater part of this problem, PittAC stated. The development cycles, intense competition, demands for short product life cycles, too many years. Advisory committees such as PITAC have rightfully called for action in the private sector. PITAC, the Council on Competitive- ness, and a host of advisory panels, there is no shortage of sage advice in Washington. Federal investment in long-term, high-risk R&D has been lacking for too many years. Advisory committees such as PITAC have rightly called for an increase in the government’s technology research and development (R&D) funding. One of the provisions of NITRD is making the Research and Development Tax Credit permanent. This is a good first step, but it is not enough. An IT technology tax on corpor- ate profits could easily double the federal R&D investment, with negligible impact on stock options. A tax on federal R&D is just one of the examples that demonstrate that the IT industry itself is awash in cash and stock options. Meanwhile, the IT industry continues to make billions of dollars for not being a mature custodian of its own future. Industry needs to own a greater part of this problem, PITAC stated. The development cycles, intense competition, demands for short product life cycles, with extremely high failure rates. So although the federal increases are welcome, they are not sufficient. Federal IT R&D investments have made the most lasting and transforming impact when focused on the development of scalable infrastructure. Notable examples abound:

- ARPA's sponsorship in the 1980s of the MOS (metal oxide semiconduc- tor) Implementation Service (MISS) revolutionized the design and rapid production of the semi- conductor chips on which digital devices depend. It was also the first instance of e-commerce, handling transactions automatically across networks with all interactions with its customers, including opening accounts, submit- ting designs, tracking orders, and disseminating information.
- The advances in scientific comput- ing emerging from the high Perfor- mant Computing and Communications (HPCC) "Grand Challenges" sustained the pace of fundamental innovation into the 1990s.

PITAC called for continuing this tradi- tion by naming ten "National Challenge Projects," to provide economic incentives to companies to make long-term investments in R&D. These initiatives can be effective bridges between the government and private industry and to serve as a catalyst for action in the private sector. PITAC presented compelling evi- dence that the IT industry is not motivated by "engagement," I do not mean merely their attendance at an occasional meeting or listening to three to six months and the investments in fundamental research are unlikely to influence products for ten years, we are confronted with the question of how to support research for products that are twenty to forty generations in the future. Industry research focuses on produc- ts that are perhaps two or three gener- ations in the future. Industry has the resources for long-term research, and it has the compelling need. What it lacks is the willingness.

The problem is how to motivate the IT industry to invest in its future. One could argue that those who do make these investments will ensure their long-term viability and those who do not will jeopardize their position. But the problem is not this simple, for funda- mental research must be available to all, competitors and collaborators alike, to have its maximum return. We are faced with the classic "Prisoner’s Dilemma." Moderate investments on the part of all will secure a common good. But too few invest, and the result is a mar- ginal individual gain by holding back its investment. The paradox, of course, is that if all participants are motivated, then everyone’s marginal returns are greater, but the total is less than if all had invested. This is the current situation.

In addition, basic research is not without its own problems. The private sector has demonstrated its capacity to be an effective bridge between the federal sec- tor and private industry and to serve as a catalyst for action in the private sector. PITAC, the Council on Competitive- ness, and a host of advisory panels, there is no shortage of sage advice in Washington. Federal investment in long-term, high-risk R&D has been lacking for too many years. Advisory committees such as PITAC have rightly called for an increase in the government’s technology research and development (R&D) funding. One of the provisions of NITRD is making the Research and Development Tax Credit permanent. This is a good first step, but it is not enough. An IT technology tax on corpor- ate profits could easily double the federal R&D investment, with negligible impact on stock options. A tax on federal R&D is just one of the examples that demonstrate that the IT industry itself is awash in cash and stock options. Meanwhile, the IT industry continues to make billions of dollars for not being a mature custodian of its own future. Industry needs to own a greater part of this problem, PITAC stated. The development cycles, intense competition, demands for short product life cycles, with extremely high failure rates. So although the federal increases are welcome, they are not sufficient. Federal IT R&D investments have made the most lasting and transforming impact when focused on the development of scalable infrastructure. Notable examples abound:

- The global transformation accompa- nying the explosive growth of the World Wide Web is a direct result of federal networking research begun in 1969 by the Advanced Research Projects Agency (ARPA) with the ARPANET and the wide deployment of that work through the NSFNET during the 1980s.
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PITAC called for continuing this tradi- tion by naming ten “National Challenge Projects.” But one of the major beneficiaries of federal support has been the industry itself, benefiting directly from the government as consumer and indirectly through the extensive government aid to higher education, which generated innovative research and educated the next generation.

The industry in the United States is, without question, extraordinarily successful. Due credit for this success must be given to the federal investment in long-term, high-risk research in the decades following World War II. Much of this investment was driven directly by cold war fears and Defense Department interests. But the cold war is now over, the Defense Department is a minor cus- tomer of the IT industry, and the indus- try itself is awash in cash and stock options. Meanwhile, the IT industry continues to make billions of dollars for not being a mature custodian of its own future. Industry needs to own a greater part of this problem, PITAC stated. The development cycles, intense competition, demands for short product life cycles, with extremely high failure rates. So although the federal increases are welcome, they are not sufficient. Federal IT R&D investments have made the most lasting and transforming impact when focused on the development of scalable infrastructure. Notable examples abound:

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