Information Technology Research:
Meeting the Challenges of the 21st Century

No sector of the economy and few aspects of daily life have been left untouched by the revolutionary advances in information technology of the late 20th century, advances made possible by sustained federal investment in long-term, broad-based, fundamental research in computing, communications, and related fields.

Yet the information revolution is still in its infancy. The pace of progress will be driven by better understanding of information technology at a fundamental level and the new ideas and capabilities that emerge from a vigorous, publicly supported basic research program. Investing in information technology research at a level commensurate with its potential impact will enable the U.S. to meet the challenges of the 21st century in many areas of national importance:

- **Revolutionizing health care** with smart medical devices, computer-aided diagnosis and surgery, and high-performance biomedical research tools, and **expanding rural communities' access to top-quality health care** via telemedicine.

- **Re-inventing education**, customized and delivered according to individual learning needs and styles so that all Americans can share in the benefits of an information-rich society.

- Achieving the **national security imperative of information superiority**, and ensuring other military advantages over our adversaries, as precision strike and focused logistics capabilities were achieved through advances in a variety of information technologies.

- Ensuring the **accessibility, versatility, security, and privacy** of local and global communications systems and other critical infrastructure.

- Formulating **more sophisticated climate and ecosystem models** for better and longer-range forecasts of weather and other environmental conditions and to help policymakers determine appropriate responses to global change.

- Providing the technological means for **digital libraries** that offer precise and instantaneous access to information.

- Designing information infrastructure that upholds the **safety and reliability of public transportation and energy systems**, such as air traffic control and the national power grid.

- Developing virtual laboratories, remote-access and remotely deployed instrumentation, and systems for extracting knowledge and insight from large, complex datasets to **facilitate progress in science and engineering**.

- Making **governmental information-based services less expensive and more responsiveness** to citizens' needs.

- Building robust systems for **rapid response to natural disasters** and other national emergencies.

- Improving **real-time conferencing, collaboratory, and language translation capabilities** for telecommuting and other remote exchanges.

- Intensifying ongoing transformations in **commerce, manufacturing, banking and finance, and entertainment** for the benefit of consumers and businesses alike.