Highlights

Trends in IT

- **Information technology (IT) continues to develop and diffuse at a rapid rate.** Exponential quality improvements and cost reductions in microprocessors, storage, and networking are enabling new applications and the expanded use of IT.
- **The number of Internet hosts and servers continues to expand domestically and internationally.** In January 2001, more than 100 million computers were connected to the Internet.
- **The United States continues to be a leader in Internet access and use.** Internet use throughout the world is strongly dependent on telecommunication access charges.
- **Mobile phones are expected to be a major means of accessing the Internet in many countries.** The United States lags behind many other countries in mobile phone penetration. In June 1999, there were 28 mobile phones per 100 inhabitants in the United States compared with more than 60 per 100 inhabitants in Finland and Norway and 27 per 100 inhabitants in all Organisation for Economic Co-operation and Development (OECD) countries.

Societal Implications of IT

- **Businesses have invested heavily in IT.** Industry spending on IT equipment and software rose from less than $200 billion in 1993 to more than $600 billion in 2000.
- **Electronic commerce is having a major impact in traditional businesses.** Approximately 90 percent of electronic commerce (e-commerce) transactions are business to business rather than business to consumer. E-commerce is especially important in manufacturing, which has a history of pre-Internet e-commerce. E-commerce shipments accounted for 12 percent of the total value of manufacturing shipments, or $485 billion.
- **Retail e-commerce sales are still relatively modest.** The Census Bureau estimates 2000 retail e-commerce sales to be $27.3 billion.
- **Increasingly strong evidence suggests that IT is contributing to productivity and economic growth in the overall economy.** Productivity growth is especially evident in IT-producing sectors of the economy, but evidence of positive effects in IT-using sectors exists as well.
- **The Internet access gap between the richest and poorest areas of the world is large and, by some measures, still growing.** In 1997, Internet host penetration rates in North America were 267 times greater than rates in Africa; by October 2000, the gap had grown to a multiple of 540.
- **In the United States, Internet access is increasing for virtually all demographic groups.** The share of households with Internet access increased from 26.2 percent in December 1998 to 41.5 percent in August 2000.
- **Internet access remains greatest among people with the most income and education and is more common among Asian Americans and whites than blacks and Hispanics.** The share of black and Hispanic households with Internet access was about 18 percent lower than the national average. The growth rate in Internet access, however, was highest among these groups.
- **People with disabilities are only half as likely to have access to the Internet as people without disabilities.** IT may greatly aid people with disabilities by making work from home more viable and by providing aids to people with visual and hearing impairments.
- **Government is making increasing use of the Internet to provide constituent information and services and to conduct procurement and payment transactions.** Internet use is increasing at all levels of government. Interagency websites make it possible for government to organize services around segments of the population. State and local governments use the Web for a variety of services, such as issuing licenses, filing taxes, and applying for jobs.

Implications of IT for Science and Engineering

- **Modeling and simulation are becoming increasingly powerful complements to theory and experimentation in many areas of science and engineering.** The fastest supercomputers now run at more than 10 trillion operations per second. Modeling and simulation are increasingly used in a wide range of applications, including climate modeling, engineering design, and genomics.
- **Large, shared scientific databases have become key resources in many areas of science and social science.** Examples include gene and protein databanks, collections of satellite sensing data, and social science databases.
- **Electronic versions of journals, preprint servers, and other electronic resources are changing how researchers receive and disseminate technical information.** Research libraries are faced with competing demands for electronic and paper journals. Academic journals are facing challenges to their business models.

- **IT supports increased and larger scale research and development collaborations.** Many multi-institution projects now use advanced collaborative tools, Internet videoconferencing, remote access to scientific instruments, and shared databases.
- **IT has contributed to a market environment characterized by rapid innovation.** In most industries, companies know they must constantly innovate if they are to succeed in a market influenced by continuing improvements in IT.
- **IT affects the organization of innovation, within and among organizations.** IT can speed the flow of technical information within firms. It can also support innovation-related activities that are increasingly performed outside large firms by large and small companies that collaborate with each other and with academic institutions and government agencies.
- **Innovation in IT is accelerating and is different in some respects from innovation in other areas of technology.** IT patents' share of all U.S. patents increased from 9 percent in 1980 to 25 percent in 1999. IT patents cite other technology patents more extensively than scientific papers.
- **IT certificate courses are changing the way IT workers are trained.** Companies and associations have created more than 300 new certifications since 1989. Approximately 1.6 million individuals had earned about 2.4 million IT certificates by early 2000; half were earned by students outside the United States.
- **Use of IT in both traditional university courses and distance education continues to expand.** Many questions remain about the extent to which IT will change higher education.