Information Technology Centers: The NSF will be creating a number of centers for Information Technology Research (ITR), as part of the President's ITR multi-agency initiative. This Program was established in 2000 and NSF plans during Fiscal Year 2000 to invest $30 million in new centers. Review of proposals is currently underway (see proposal solicitation at http://www.nsf.gov/pubs/1999/nsf99167/nsf99167.htm).

NSF is in the process of creating two **Centers for Learning and Teaching** (CLTs) that will focus on science and mathematics education at all levels. A new call for proposals has been released (http://www.nsf.gov/cgi-bin/getpub?nsf00148) that will lead to the creation of approximately eight new CLTs.

NSF has recently launched two competitions that will create new centers in 2001:

Nanoscale Science and Engineering Centers (NSECs, see announcement, http://www.nsf.gov/pubs/2000/nsf00119/nsf00119.htm), and

Physics Frontier Centers (http://www.nsf.gov/cgi-bin/getpub?nsf00108).

3. Future S&T Directions

The Industrial Revolution changed manufacturing by enhancing physical processes, subsequently leading to mass production. The E-revolution is introducing processes in cyber-space to the business community and consumers. This E-revolution moved in to high gear in the 1990's, when the Internet became the tool of many businesses, particularly manufacturing and service providers. E-commerce has brought about efficiencies not imagined as late as the 1970's and 1980's. A combination of globalization and the E-revolution is driving competition to enhanced levels.

As the cost of producing and delivering products has generally fallen, the cost of research has risen, not because of manufacturing efficiency issues, labour costs or production cost increases, but due to the acceleration of technology advances. For example, in technology terms, speed and size have new definitions. With tremendous advances in technology required just to be world competitive, and costs rising due to technological complexity, and the level of expertise and advanced equipment required to perform research, S&T collaboration has become a necessity. In the US, this is being balanced by the political drive to protect scientific discovery for national security reasons.

The driver of basic S&T in the US is the Administration and Congress. What the political system sees as a National **problem** is transformed in to S&T **funding** for US departments and agencies. Thus reviewing the major issues of today, we can get a glimpse of the research of tomorrow. The US political view of major current issues are:

- **Keeping the Peace, Security and War-fighting, bio-warfare, E-warfare, terrorism**