Project 2061** Science for All Americans

Nature of Technology

- Anticipating the effects of technology is as important as advancing its capabilities.
- Science is a way of estimating the behavior of things as well as suggesting kinds of behavior that would never have been imagined.
- The essence of engineering is design under constraint: physical laws; economic; political; ecological; ethical; personnel to operate, maintain; and repair, and the need to test performance.
- All systems involve control: getting feedback, making logical decisions, and activating changes in the system.
- Complex systems usually involve layers of control where coordination is important and ultimately allowing humans to make key decisions.
- All technologies have side effects, some desirable, some undesirable.
- Risk analysis is complex because decisions are always based on incomplete information. Human judgments are sometimes at odds with objective data.
- All systems can fail but hedges against failure can reduce risk such as over designing - making something stronger, bigger, or faster than necessary; redundancy or backup; and engineering the probability of safest failures happening first.
- Increases in human population and the accumulated knowledge and creativity have resulted in providing adequate support for the majority of people on earth but at the expense of and increased risk to other forms of life.
- Technology influences history and history influences technological developments.
- The economic, social, and political consequences of technology imposes restrictions on openness.
- Good decisions about the use or development of technology depends upon seeking answers to key questions such as alternatives, cost/benefit and to whom or for whom, risk, and safe disposal or recycling of materials and waste.

** Project 2061 of the American Association for the Advancement of Science also produced Benchmarks for science literacy. New York: Oxford University Press, 1993