Science Policy and Social, Economic and Cultural Change

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Technological Determinism

- To what extent does technology determine the “nature of the socioeconomic order?”
- Does technological change impose “certain social and political characteristics upon the society in which it is found?”
- What influence do socioeconomic forces have on technological development?
Technology as a Strong “Mediating Factor”

- Technological progress is itself a social activity
  - invention and innovation is an attribute of some societies but not others
- The course of technological advance is responsive to social direction
  - rewards, inducements and incentives offered by society affect advances in war, arts, agriculture, or industry
Technology as a Strong “Mediating Factor”

- Technological change must be compatible with existing social conditions and institutions
- Adoption and repercussion of technology is largely governed by market considerations
  - political control can buffer disruptive consequences
Technology as American Culture: Franklin & Jefferson

- Newly independent U.S. enamored with progress
- New mechanical technologies as means of achieving a virtuous and prosperous society
- Progress = pursuit of science and technology in the interest of human betterment (intellectual, moral, spiritual) and material prosperity
  - Franklin refuses to patent his inventions, seeing them not as a source of private wealth but as a benefit for all members of society
Technology as American Culture: Writing, Art and Ads

- Tendency of writers to view new technologies both as instruments of power and as triumphant symbols of human progress
- Currier and Ives issued over 200 prints focusing on steam power and the American experience
- Ads prompted a certain way of thinking about technology
  - technology as the cause of human well-being
  - “better living through chemistry”
Technology as American Culture: Criticism

- “What have these arts done for the character, for the worth of mankind? Are men better?” (Ralph Waldo Emerson)
- “We have been going past the danger signals without realizing that our speed, which springs from our mechanical facility, only increases our danger and will make more fatal the crash” (Lewis Mumford)
- “We do not use technologies so much as live them” (Langdon Winner)
Technology as a Political Phenomenon

- Technological systems are not value neutral
  - interests of some are favored over interests of others
  - if societies are to be equitable and effective, we must understand (before they are introduced) the implications new technologies may have
  - technologies are social products as well as social forces
Faced with any proposal for a new technological system, citizens should examine the social contract implied by building the systems in a particular form. How well do the proposed conditions match our best sense of who we are and what we want this society to be? Who gains and who loses power in the proposed change? Are the conditions produced by the change compatible with equality, social justice and the common good? To nurture this process would require building institutions in which the claims of technical expertise and those of a democratic citizenry would regularly meet face to face...
Inquiry

- How should communities organize inquiry in order to promote their collective values?
  - epistemic significance
  - collective research and homogeneity

- What is the collective good that inquiry should promote?
  - Integrated individual preferences
Well-Ordered Science

- Well-ordered science should satisfy preferences of the citizens in the society in which it is practiced.
- Vulgar democracy as well-ordered science?
  - but preferences are often based on impulse or ignorance
  - emphasizes short-term benefits and pursuit of what’s hot now
Three Phases of Ideal Inquiry

- Assignment of resources
- Efficient pursuit of projects, subject to moral constraints
- Application of results
Ideal Procedures

- Exchange information
- Consider how possible inquiries might bear on previous goals or research
- List (and weight) outcomes that inquiry should promote
- Recognize opportunities for satisfying curiosity and for practical intervention, long-term benefits and immediate pay-offs
- Assess possibilities that inquiry will deliver desired outcomes (defer to “experts”)
- Recognize that a particular way of pursuing inquiry will violate rights of some individual or group
Concerns With Current Inquiry: Preferences

- Preferences of large segments of the public are consistently ignored
  - women, children, minorities, developing countries
  - initial decision to favor the interests of one group may be self-perpetuating (the pill)
Concerns With Current Inquiry: Information

- Misinformation or lack of information leads to neglect of real problems
  - areas of science that depend heavily on public funding can be shaped by governmental decisions that respond to widespread ignorance (AIDS)
  - misleading accounts of what can be expected introduce political constraints (biotech)
Concerns With Current Inquiry: Parochialism

- Parochial application does not properly aggregate or leverage inquiry
  - apply technologies we already have to new problems
  - develop new technologies to fulfill the same function more efficiently
What is the place of scientific research in a twentieth century democracy?

Science - the Endless Frontier
Vannevar Bush, 1945
Watershed of WWII: Changes in Federal Research

Federal Share of National R&D Expenditures

Agricultural Research as a Share of Federal R&D

Defense, Space and Atomic Energy as a Share of Federal R&D
Roosevelt’s Letter to Bush
November 20, 1944 (1)

- WWII has effectively organized the nation’s scientific talent and directed research towards immediate practical needs
- Bush is the director of the Office of Scientific Research and Development which “represents a unique experiment of teamwork and cooperation in coordinating scientific research and in applying existing scientific knowledge to the solution of the technical problems paramount in war... “
Roosevelt’s Letter to Bush
November 20, 1944 (2)

- FDR advocates peacetime use of the information, techniques, and research experience developed by OSRD
- For “the improvement of the national health, the creation of new enterprises bringing new jobs, and the betterment of the national standard of living”
Roosevelt’s Letter to Bush
Four Key Questions

- How can government promote and aid in scientific research in public and private institutions?
- How can the nation organize research programs and continue the major wartime advances against disease?
- How can we better foster the education and training of scientific talent in America’s youth?
- Within the bounds of national security, how should American disseminate the store of scientific knowledge developed during the war?
“We have no national policy for science... the government has only begun to utilize science in the nation’s welfare. There is no body within the government charged with formatting or executing a national science policy... Science has been in the wings. It should be brought to the center of the stage -- for in it lies most of our hope in the future...”
Perspectives

Value of inquiry for a wide range of public concerns

vs.

Protect science from outside direction and interference

• importance of basic research
Importance of Basic Research

- In the war against disease
- For national security
- For public welfare
  - economic growth
  - full employment
Key Premises About Basic Research (1)

- Performed without thought of practical ends
  - results in knowledge and an understanding of nature and its laws
- Pacemaker of technical progress
  - creates the fund from which the practical applications of knowledge is drawn
- Intrinsic value of basic discovery
  - culture progress?
Key Premises About Basic Research (2)

- “A nation that depends upon others for its new basic scientific knowledge will be slow in its industrial progress”
- Colleges and universities are uniquely qualified to carry on basic research
  - tradition and special characteristics
“We cannot expect industry to adequately fill the gap.”

- Industry will fully rise to the challenge of applying new knowledge to new products. The commercial incentive can be relied upon for that.

- But basic research is essentially non-commercial in nature. It will not receive the attention it requires if left to industry.
Bush-Kilgore Debate (1)

- Kilgore: federal funding for research should be more directive
  - address social problems
  - attempt to equitably distribute benefits of science and technology
  - political accountability
Bush-Kilgore Debate (2)

- Bush: scientists as the best judges
  - disinterested pursuit of fundamental questions as best policy for long-term results
  - whatever people want from research, basic research is the most effective way of providing it
  - autonomy of scientists (university as centerpiece)
“Scientists are left free to pursue their own curiosity but are saddled with the task of advertising their research as potentially satisfying individuals’ preferences”

- manipulation of public funding
- suspicious outsiders