



## **Center for Science, Policy, & Outcomes**

**A Project of Columbia University  
in the City of New York**

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## **Science is the Principal Driver of Change**

- Social change
  - Internet
- Economic change
  - Science-based economy
- Environmental change
  - Climate
- National security change
  - Nuclear weapons

Science has the power to completely transform civilization. For some, science has made life comfortable and secure. For others, it has meant death and destruction.



## **Science Policy is the Key Variable**

We are being propelled into this new century with no plan, no control, no brakes.

Bill Joy

Co-founder and Chief Scientist, Sun Microsystems

Given the impact of science, science policy is the critical variable and yet almost entirely ignored.



## **Foundations of Science Policy**

**Republic of Science**

**Market Failure Model**

**Unpredictability**



## Focus on American Science Policy

- American science is the prototype
- Most basic research is funded by the U.S.
  - In 1998, total R&D expenditures in the United States reached \$227.2 billion.
  - U.S. R&D investments continue to outdistance, by more than 2-to-1, R&D investments made in Japan, the second largest R&D-performing country.
  - The U.S. spent more money on R&D activities in 1997 than any other country. The U.S. spent as much by itself as the rest of the G-7 countries—Canada, France, Germany, Italy, Japan, and the United Kingdom—combined.



## Current Approach to Science Policy: Internal Focus



- Addresses
  - Conduct of S&T
  - Products and processes of S&T
- Assumes
  - All societal outcomes will be positive
  - Linear model of innovation and societal benefit



## Indications of Societal Transformation

- GMOs controversy
- Affordability of AIDS drugs
- 40 million Americans without medical insurance
- The aging of our population
- Public school system/new knowledge economy
- Rising atmospheric carbon dioxide levels



## Organizing Question

How can science and science-based technology most effectively contribute to an improved quality of life for the the greatest number of people?

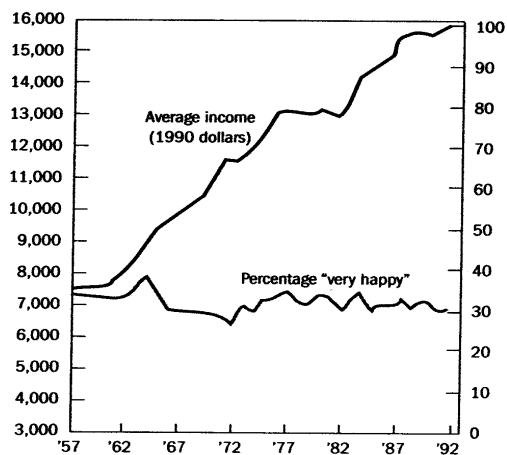


## CSPO Goals

CSPO aims to create knowledge, cultivate public discourse, and foster policies that help society grapple with the immense power of science.



## Perceived Quality of Life



► Average U.S. per capita income vs. percentage of U.S. population which considers itself "very happy," 1957-1992.



## Health Indicators

### Health Attainment, 1999 (Disability-adjusted life expectancy)

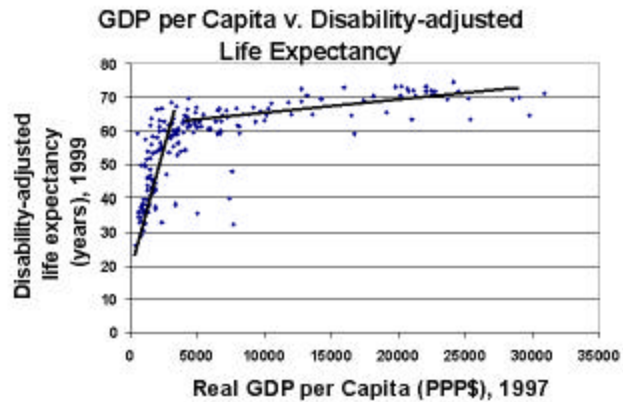
### Health Expenditures as % of GDP

1. Japan (74.5)	7.1%
3. France (73.1)	9.8%
4. Sweden (73.0)	9.2%
12. Canada (72.0)	8.6%
14. U.K. (71.7)	5.8%
22. Germany (70.4)	10.5%
24. U.S. (70.0)	13.7%
96. Iran (60.5)	4.4%
134. India (53.2)	5.2%

Source: WHO, The World Health Report 2000



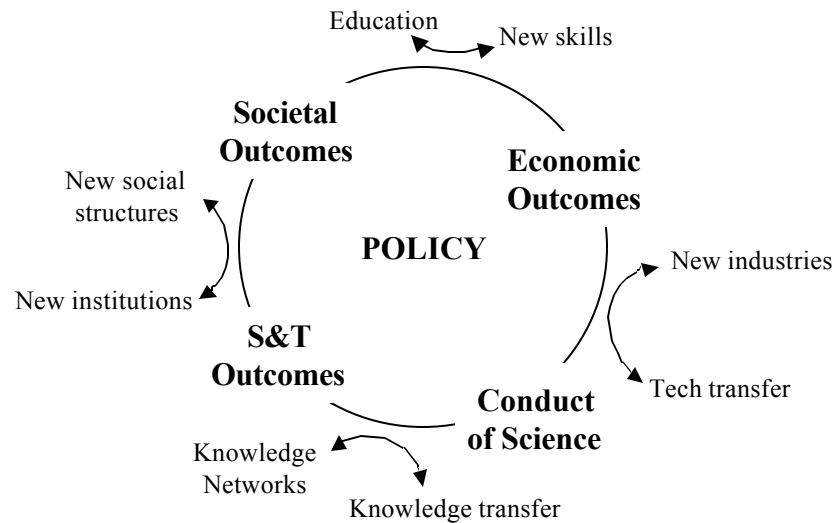
## Health vs. Wealth



Source: WHO, The World Health Report 2000



## Cycle Dynamics



## CSPO Focus

- Relationships among national and trans-national research investments, new developments in S&T, and societal outcomes in nations and worldwide
- How well existing science initiatives achieve specified outcomes
- New policy frameworks to help increase positive outcomes of science, prevent or reduce negative ones, and extend benefits
- Help policy-makers craft outcome-based science policies; stimulate discussion among stakeholders; promote public knowledge of policy issues and options
- On the ground educational opportunities for students; forums for professionals



## Lessons

- Desired outcomes can drive the science
- Societal value of new knowledge is determined by how it is used, and by whom
- Societal outcomes reflect who is making science policy
- Desired outcomes emerge when scientific advance is well-matched by societal needs



## Current Projects

### Choosing between different types of research

- New science policy
- Science, technology, and destiny
- Societal outcomes map for health research

### Enhancing the benefits of new knowledge and innovation

- Nanotechnology and society
- Dual agenda for states' technology programs

### Designing research programs to match knowledge creation with knowledge needs

- Extracting societal benefit from earth systems research
- Prediction in public policy
- Outcome-based extreme events research agenda



## CSPO Value Added

Replace the Cold War science policy model	New Science Policy project
Build reflexivity into the research process	Nanotechnology and Society project
Match knowledge creation with knowledge needs for societal problem-solving	Environmental Research project
Enhance public discourse on science policy	Science and Civil Society conference
Enhance informed public involvement in making research choices	Outcomes of Health Research project