Anticipatory Governance:

A Strategic Vision for Building Reflexivity into Emerging Technologies

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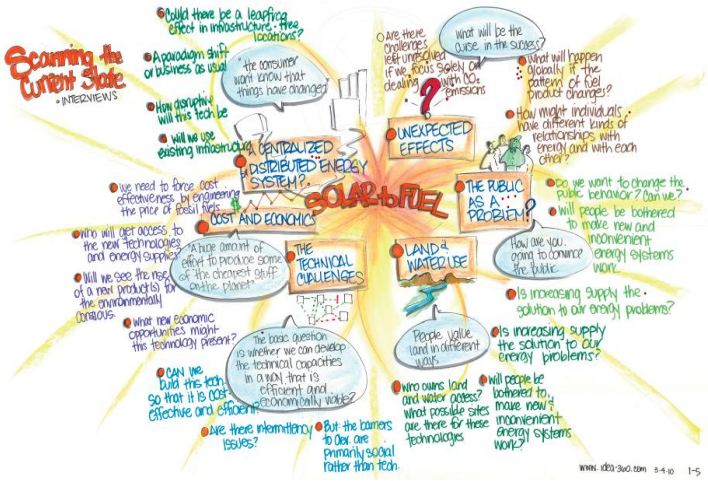
CSPO

The Center for Nanotechnology in Society
ARIZONA STATE UNIVERSITY

ASU
ARIZONA STATE UNIVERSITY

NSEC/Center for Nanotechnology in Society at Arizona State University



- **Research** the societal implications of nanotechnologies
- **Train** a community of scholars with new insight into the societal dimensions of nanoscale science & engineering (NSE)

- **Engage** the public, policy makers, business leaders, and NSE researchers in dialogues about the goals and implications of NSE
- **Partner** with NSE laboratories to introduce greater reflexiveness in the R&D process

NSEC/CNS-ASU Research Programs

Anticipatory Governance

Provides strategic vision

1. Foresight
   All governance requires a disposition toward future
2. Engagement
   Crucial normatively, strategically, pragmatically
3. Integration
   Scientists know things we don't, and vice versa
4. Ensemble-ization
   Because none of these works in isolation

Real-Time Technology Assessment

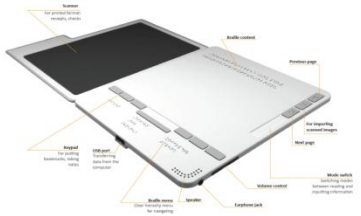
Provides methodological orientation

1. Research and Innovation Systems Analysis
2. Public Opinion and Values
3. Anticipation and Deliberation
4. Reflexivity and Integration

Thematic Research Clusters

Provides thematic focus

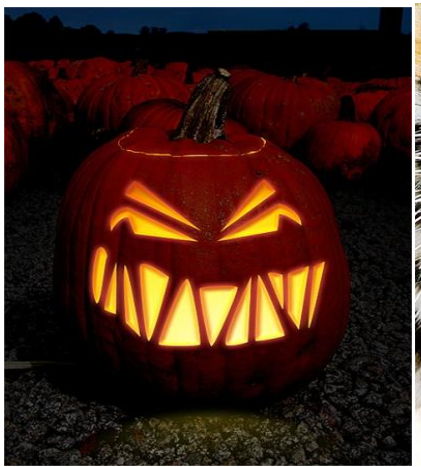
1. Equity, Equality and Responsibility
2. Urban Design, Materials & the Built Environment (Nano & the City)



Anticipatory Governance as Strategic Vision

A broad-based capacity extended through society that can act on a variety of inputs to manage emerging knowledge-based technologies while such management is still possible.

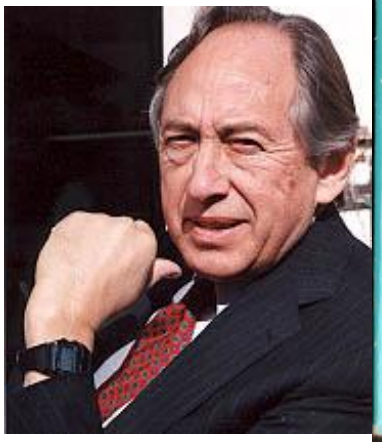
Anticipate: from *ante-* and *capere*, "to take [into possession]" "beforehand"; related to capable and capacity and not a synonym for "expect," "predict," or "foresee"

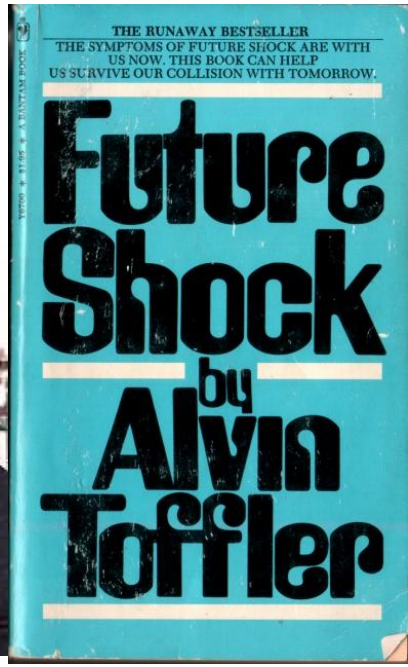


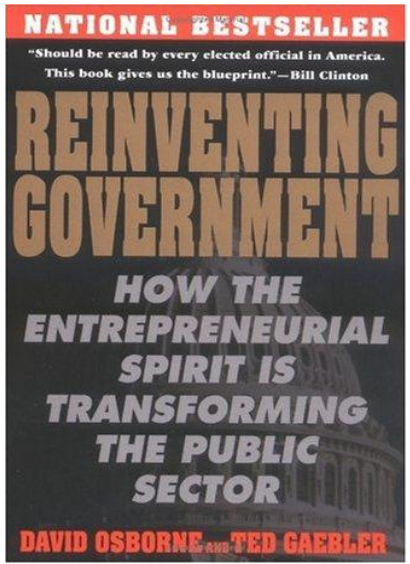
Anticipatory Governance – Genealogy

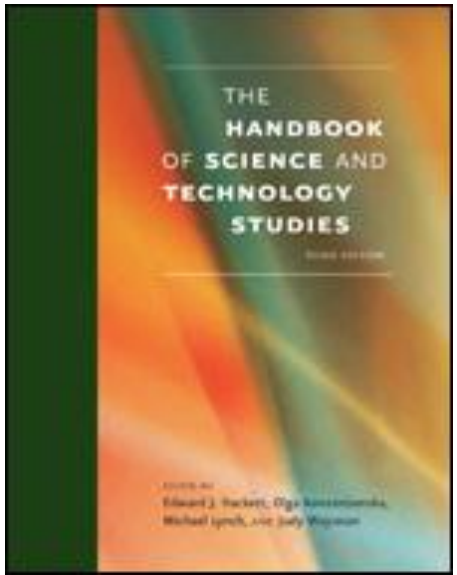
Detlev Bronk

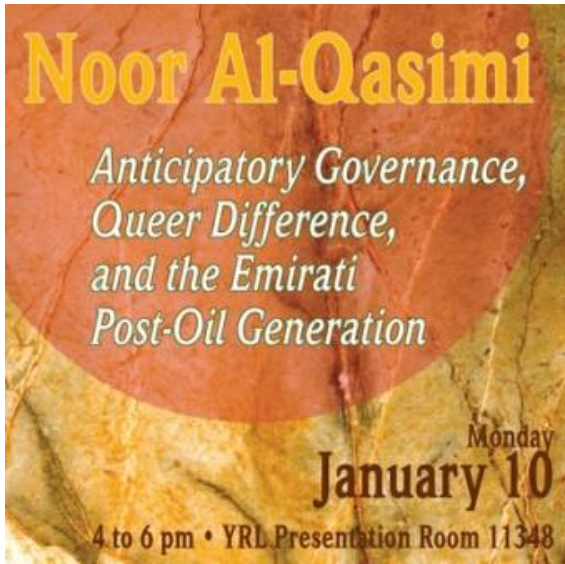
"Competent social scientists should work hand-in-hand with natural scientists, so that problems may be solved as they arise, and so that many of them may not arise in the first instance."









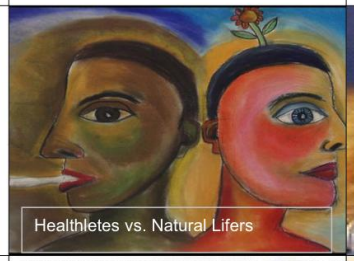


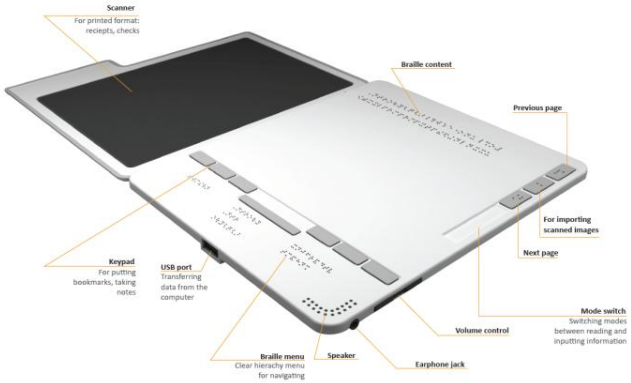
Anticipatory Governance – Not Government

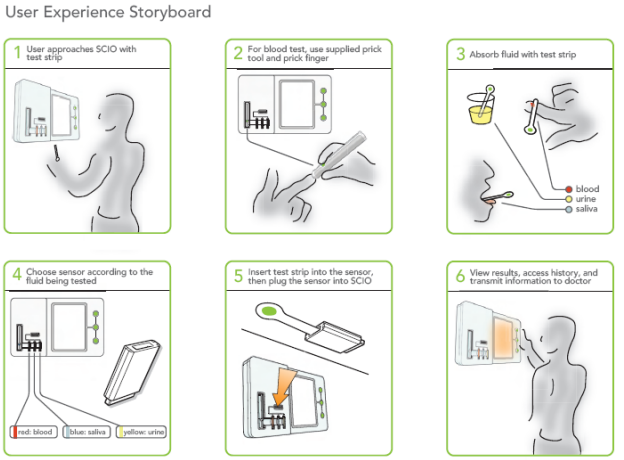
- Not “do” or “ban”
  - “Science finds, genius invents, industry applies, man adapts”
  - Moratoriums proposed by ETC Group and Friends of the Earth
- Wide array of mechanisms
  - Regulation
  - Licensing/restrictions
  - Liability/indemnification
  - Intellectual property
  - R&D funding & tax credits
  - Testing
  - Treaties
  - Public Understanding of Science
  - Informal Science Education
  - Public engagement
  - Public action
  - Routinization
  - Codes of conduct
  - Standards
  - Laboratory decisions

Anticipatory Governance for Sustainability: Foresight and Reflection

Scenarios Matrix

Responsibility for Health		Value to Society: HIGH	Value to Society: LOW
	Individual		
	Institutional		





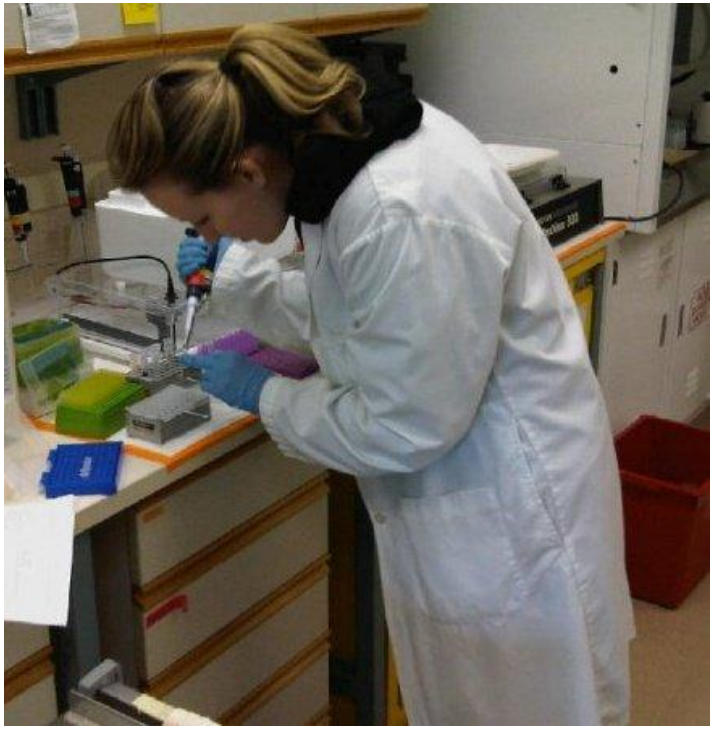
Outcomes: changed research agenda and strategy

Anticipatory Governance for Sustainability: Engagement and Reflection

NISE network
NANOSCALE INFORMAL SCIENCE EDUCATION

Outcomes: changed strategic focus and different communication on museum floor

Anticipatory Governance for Sustainability: Integration and Reflection



CORRESPONDENCE

Research thrives on integration of natural and social sciences

Emerging collaborations between social and natural scientists face challenges, as you acknowledge (*Nature* **462,** 825–826, 2009). But, like A. D. Manning and J. Fischer in Correspondence (*Nature* **463,** 425; 2010), you sidestep a practical question that keeps many laboratory doors closed: what if interactions with 'soft' scientists harm the quality of my 'hard' research?

Rather, efforts to enhance scientific creativity and societal responsiveness can be mutually reinforcing.

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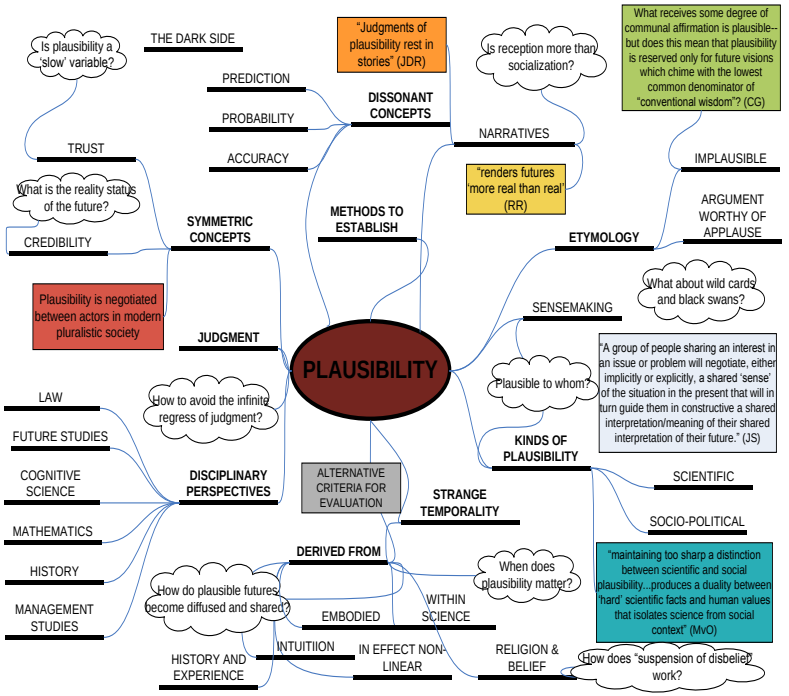
STIR
SocioTechnical Integration Research

Outcomes: "midstream modulation" -- changed discursive and material practice in laboratories

Anticipatory Governance for Sustainability: Risk & Plausibility

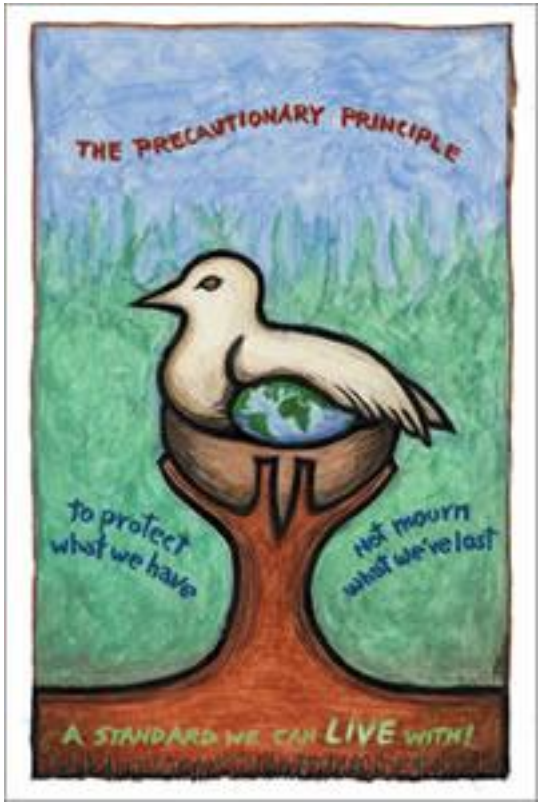
NATIONAL ACADEMY OF SCIENCES RISK ASSESSMENT PARADIGM FOR MICROBES

- **HAZARD IDENTIFICATION**
  Types of microorganisms and disease end-points
- **DOSE-RESPONSE**
  Human feeding studies, clinical studies, less virulent microbes and healthy adults
- **EXPOSURE**
  Monitoring data, indicators and modeling used to address exposure
- **RISK CHARACTERIZATION**
  Magnitude of the risk, uncertainty and variability



Plausibility helps address uses, contexts, and complexities of socio-technical systems that we do not handle well in the risk paradigm

Anticipatory Governance for Sustainability: Precaution & Anticipation



Citizens should have anticipatory, engaged, and integrated experiences with emerging technologies, as do scientists.

Resources for Anticipatory Governance

- Guston. 2010. “Anticipatory Governance of Emerging Technologies.” *Journal of the Korean Vacuum Society* 19(6):432-41.
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Thanks!

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- C. Selin (Foresight), J. Wetmore (Engagement), E. Fisher (Integration)