

Science and Practice of Risk Communication

Baruch Fischhoff

Department of Engineering and Public Policy
Institute for Politics and Strategy
Carnegie Mellon University

<http://www.cmu.edu/epp/people/faculty/baruch-fischhoff.html>

Flight Plan to Recovery
Airport Cooperative Research Program
Transportation Safety Board
May 28, 2020

People Face Stressful Decisions

Making ends meet

Doing their jobs safely

Taking care of loved ones at home

Taking care of loved ones remotely

Finding food, supplies, and medications

Supporting the vulnerable in their community

Interpreting health states

Navigating healthcare

Travel

...

Their Information Sources Are Imperfect

They may see biased, unqualified evidence.

Their generally useful mental models may lead them astray.

They may be confused by jargon and vague terms (“soon,” “likely”).

They may have to decode non-scientists’ poorly informed, contradictory, or spun claims.

People Need to Know

How big the risks are

What causes (and reduces) them

How good the evidence is

What is likely to change,

in the world or in the evidence

Whom they can trust

Without That Knowledge

They have to guess, drawing on their own imperfect mental models.

They are vulnerable to misinformation and disinformation.

They will lose trust in those who failed to provide it.

Both Process and Content Matter

Process

Proactive: demonstrating concern.

Collaborative: reflecting shared fate.

Adaptive: responding to changing needs.

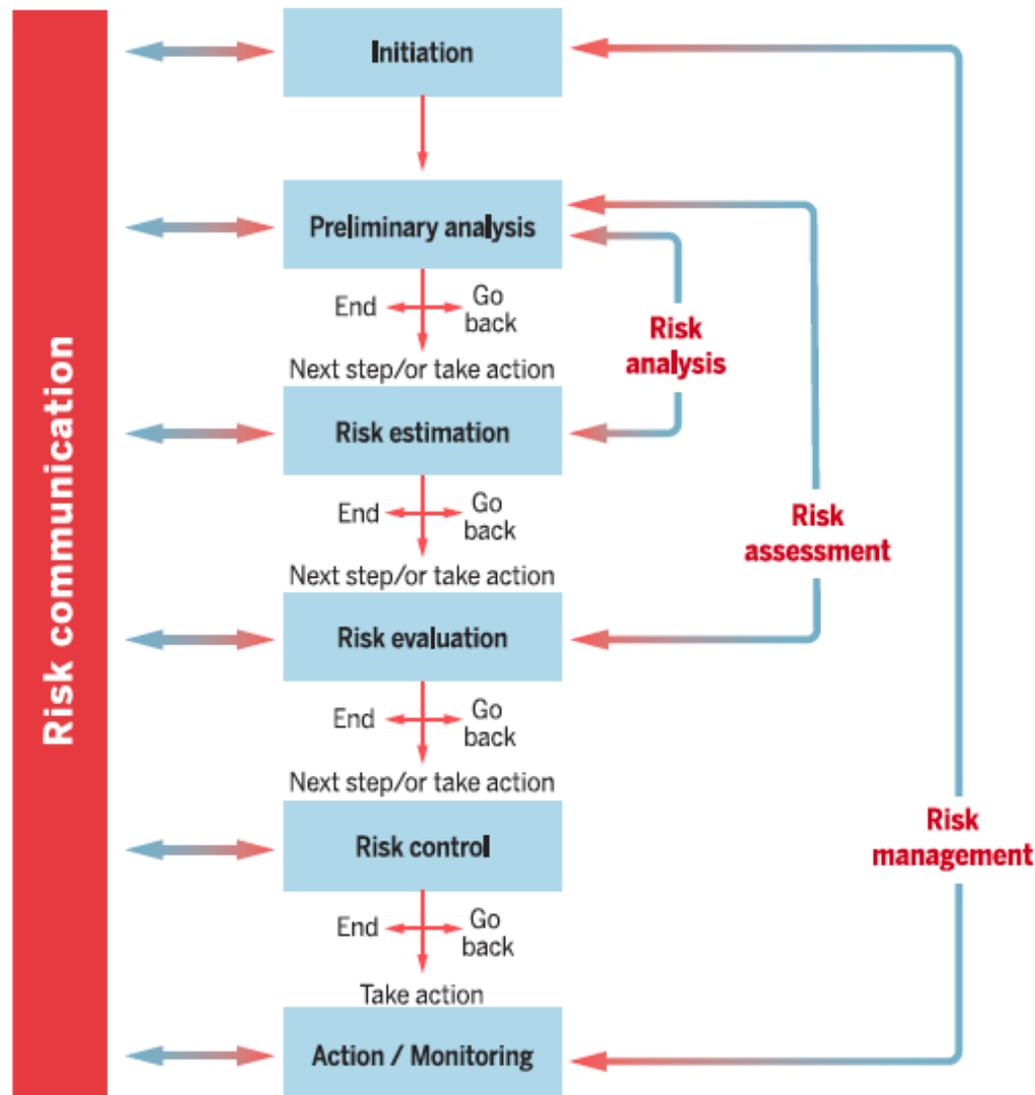
Content

Relevant: based on analysis of decisions.

Comprehensible: based on behavioral research.

Effective: based on empirical tests.

A Strategic Approach to Process



Fischhoff, B. (2015). The realities of risk-cost-benefit analysis. *Science*, 350(6260), 527.
<http://dx.doi.org/10.1126/science.aaa6516>

A Strategic Approach to Process

Focuses risk management on partner concerns

Responsive to inevitable surprises

Demonstrates partnership

Demonstrates senior leadership commitment

A Strategic Approach to Content

Analysis: What decisions do people face?

Description: How do people deal with those decisions?

Intervention: How can people be helped to make better decisions?

Some Applications

radon
pre-term birth
pharmaceuticals
climate change
phishing
breast cancer
nuclear incidents
tornadoes
xenotransplantation
smart meters
HIV/AIDS
...

sexual assault
intelligence analysis
EMF
avian flu
palliative care
breast implants
nuclear energy in space
Plan B (morning after pill)
small modular reactors
vaccines (anthrax, MMR)
critical care medicine
...

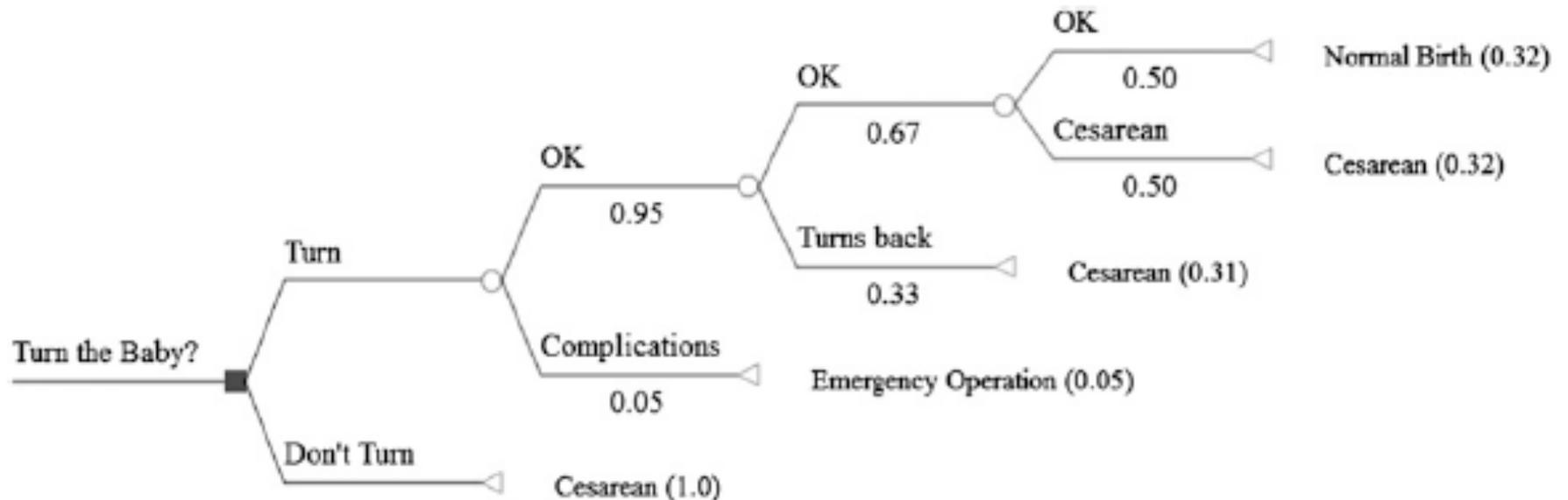
A Strategic Approach to Content

Analysis: What decisions do people face?

Description: How do people deal with those decisions?

Intervention: How can people be helped to make better decisions?

Analyze Decisions Facing Partners



vonWinterfeldt, D. (2013). Bridging the gap between science and decision making. *PNAS*, 110, 14055-14061

Summarize Relevant Evidence

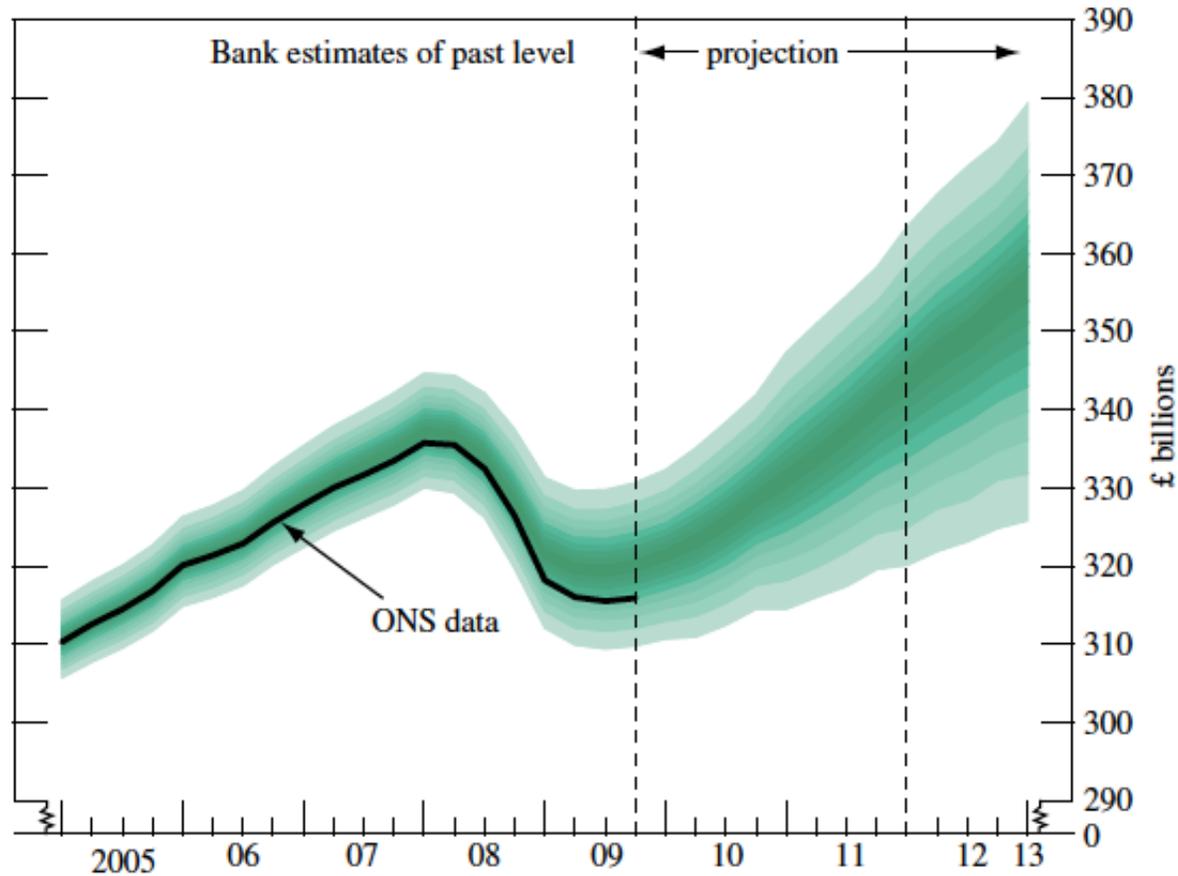


Figure 7. GDP level fan chart. February 2010 *Inflation Report*.

Aikman, D., Barrett, P., et al. (2011). Uncertainty in macroeconomic policy-making: art or science. *Philosophical Transactions of the Royal Society*, 369, 4798-4817.

Standing Committee on Emerging Infectious Diseases and 21st Century Health Threats

CHAIR

Harvey V. Fineberg

MEMBER

Kristian G. Andersen

MEMBER

Ralph Baric

MEMBER

Mary T. Bassett

MEMBER

Trevor Bedford

MEMBER

Georges C. Benjamin

MEMBER

Donald M. Berwick

MEMBER

Richard E. Besser

MEMBER

R. A. Charo

MEMBER

Peter Daszak

MEMBER

Jeffrey S. Duchin

MEMBER

Ellen P. Embrey

MEMBER

Baruch Fischhoff

MEMBER

Diane E. Griffin

MEMBER

Robert M. Groves

MEMBER

Margaret A. Hamburg

MEMBER

Dan Hanfling

MEMBER

John L. Hick

MEMBER

Kent E. Kester

MEMBER

Patricia A. King

MEMBER

Jonna A. Mazet

MEMBER

Phyllis D. Meadows

MEMBER

Tara O'Toole

MEMBER

Alexandra Phelan

MEMBER

David A. Relman

MEMBER

Mark S. Smolinski

MEMBER

David R. Walt

[https://www.nationalacademies.org/our-work/
standing-committee-on-emerging-infectious-diseases-and-21st-century-health-threats](https://www.nationalacademies.org/our-work/standing-committee-on-emerging-infectious-diseases-and-21st-century-health-threats)

Standing Committee Consensus Reports

Illness severity severity in young adults

Effectiveness of social distancing

Data elements and system design in modeling

Surface stability and incubation (2)

Crisis standards of care

Bioaerosol spread

Homemade fabric face masks

Viral shedding

Laboratory testing

Previous NASEM Consensus Reports

Reusability of facemasks during an influenza pandemic

Crisis standards of care

Reusable elastomeric respirators

Airport public health preparedness

Public transit emergency preparedness

Infectious disease crises and global security

...

<https://www.nap.edu/collection/94/coronavirus-resources>

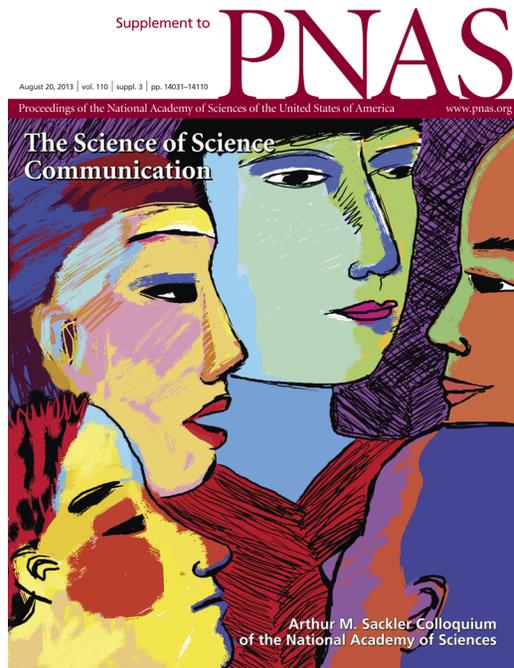
A Strategic Approach to Content

Analysis: What decisions do people face?

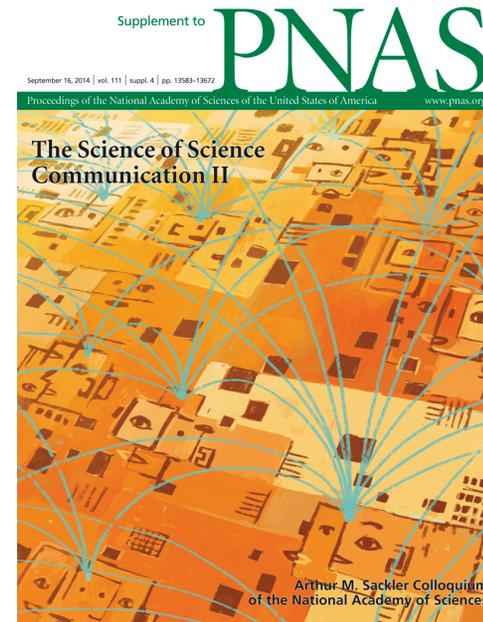
***Description:* How do people deal with those decisions?**

Intervention: How can people be helped to make better decisions?

Basic Research on Communication



http://www.pnas.org/content/110/Supplement_3



http://www.pnas.org/content/111/Supplement_4

Information

Summary

Directions

Partnership Awards

f t in +1

The Science of Science Communication III: Inspiring Novel Collaborations and Building Capacity

www.pnas.org/cgi/doi/10.1073/pnas.1805863115

Research on Pandemic Disease

Bruine de Bruin, W., Fischhoff, B., Brilliant, L., & Caruso, D. (2006). Expert judgments of pandemic influenza. *Global Public Health* 1(2), 178-193.

Fischhoff, B., Bruine de Bruin, W., Guvenc, U., Caruso, D., & Brilliant, L. (2006). Analyzing disaster risks and plans: An avian flu example. *Journal of Risk and Uncertainty*. 33, 133-151.

Fischhoff, B., Wong-Parodi, G., Garfin, D., Holman, E.A., & Silver, R. (2018). Public understanding of Ebola risks: Mastering an unfamiliar threat. *Risk Analysis*, 38, 71-83. doi: 10.1111/risa.12794

Some Principles of Judgment

People are good at tracking what they see,
but not at detecting sample bias.

People have limited ability to evaluate the
extent of their own knowledge.

People have difficulty imagining themselves
in other visceral states.

People have difficulty projecting non-
linear trends.

People confuse ignorance and stupidity.

...

Some Principles of Choice

People consider the return on their investment in making decisions.

People dislike uncertainty, but can live with it.

People are insensitive to opportunity costs.

People are prisoners to sunk costs, hating to recognize losses.

People may not know what they want, especially with novel questions.

...

Cognitive Processes Interact with Social and Emotional Ones

Emotions can both cloud and focus thinking.
Poor communications can needlessly increase anxiety.

Poor communications can generate hostile emotions and undermine trust.

Social pressure can lead people to act against their own best judgment.

Individual Differences

There appear to differ in decision-making competence, reflecting individuals' life experiences and outcomes.

Differences in decision-making style are important to recognize, but have proven hard to measure.

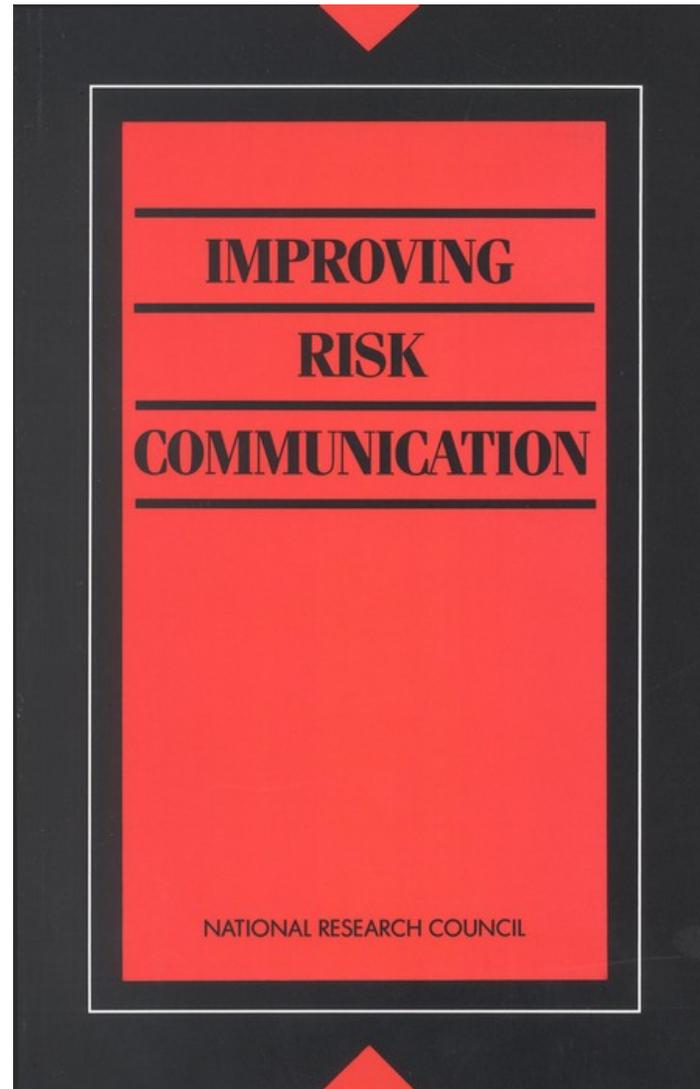
A Strategic Approach to Content

Analysis: What decisions do people face?

Description: How do people deal with those decisions?

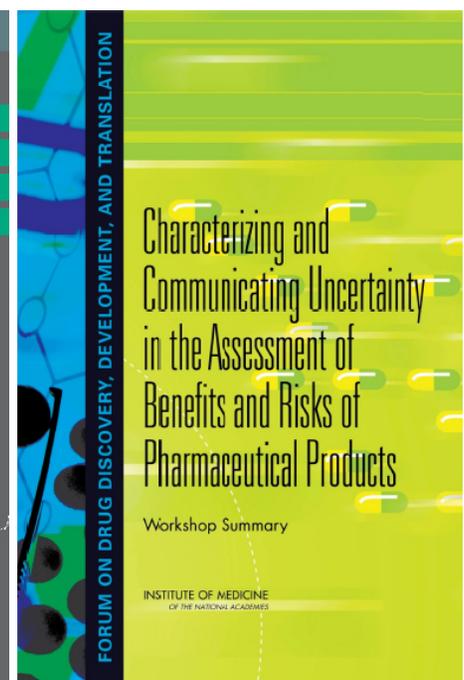
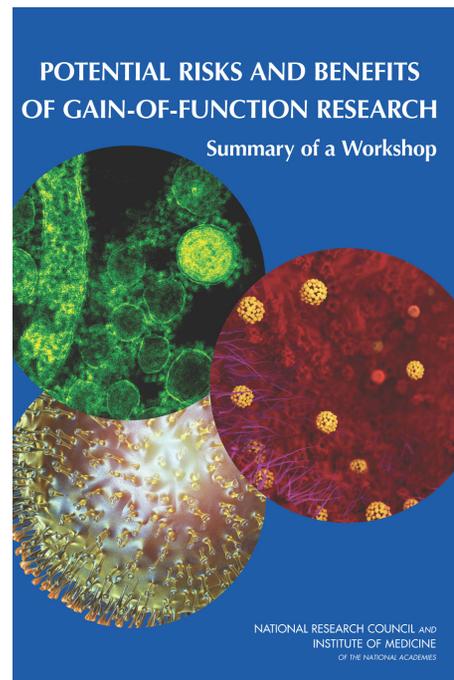
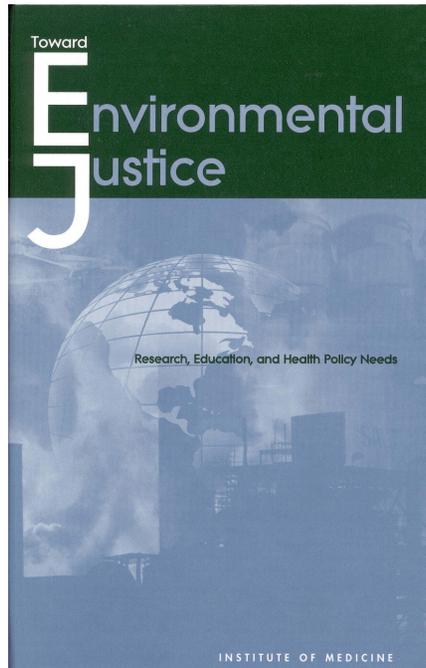
***Intervention:* How can people be helped to make better decisions?**

Risk Communication at NASEM



<http://www.nap.edu/catalog/1189.html> (1989)

Risk Communication at NASEM



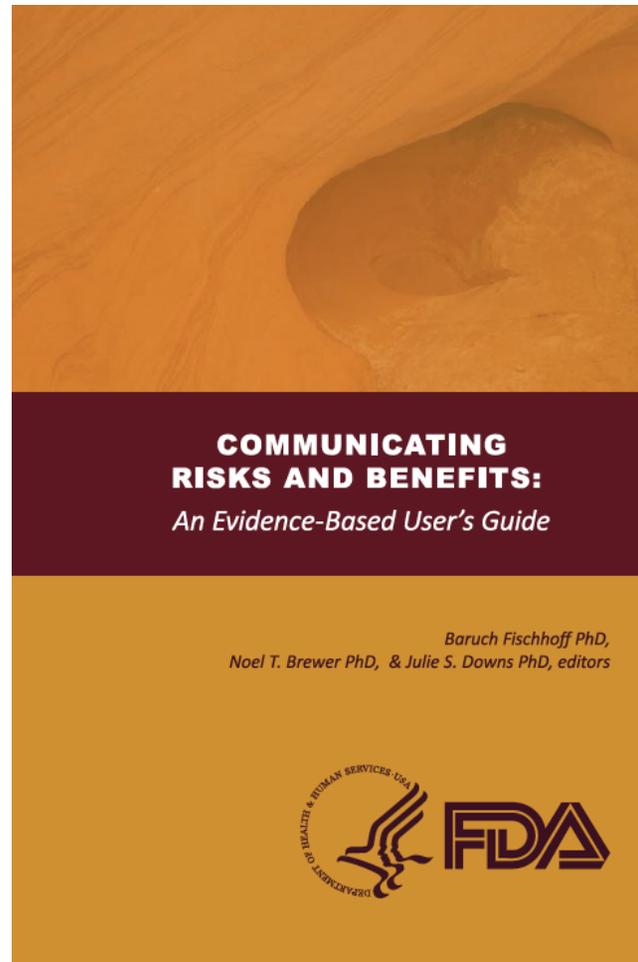
<http://www.nap.edu/catalog/6034/>

<http://www.nap.edu/catalog/21666/>

<https://www.nap.edu/catalog/24738>

<http://www.nap.edu/catalog/18870/>

A Guide to Inexpensive, Scientifically Grounded Communication



<http://www.fda.gov/AboutFDA/ReportsManualsForms/Reports/ucm268078.htm>

Applying the Science Requires

Substantive expertise, to get the facts right

Ties with partners, to get the right facts

A process for rapid message testing

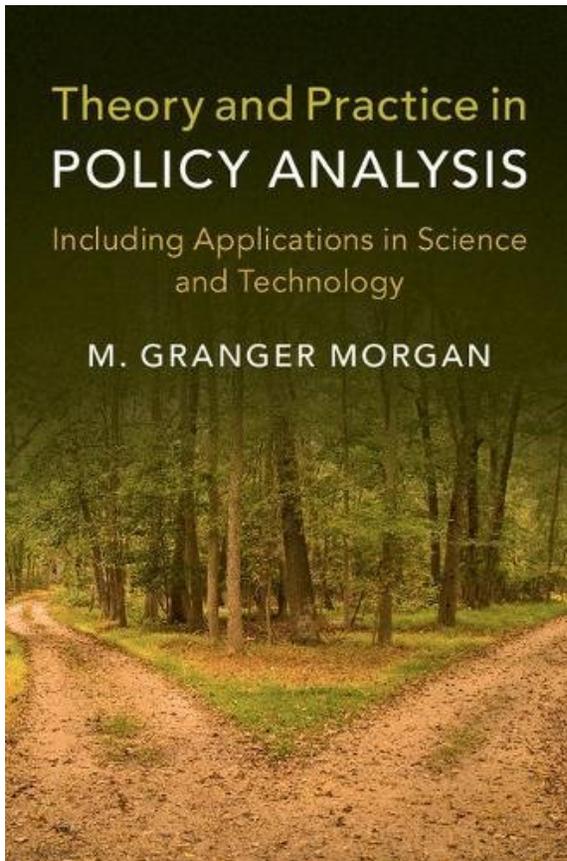
A strategic commitment to risk communication

A Proposal

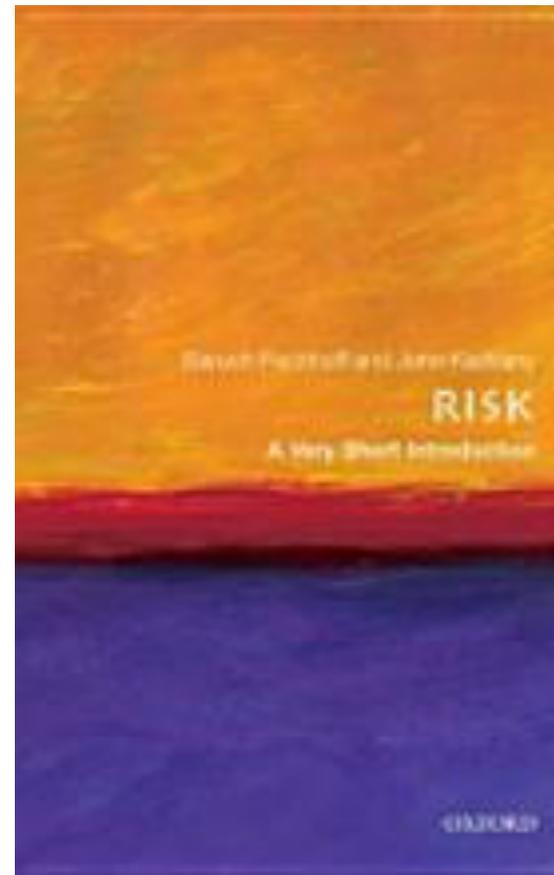
Create a resource center to provide publication-quality support in developing communications.

- quality assurance
- economies of scope
- common templates, terms, framing
- extend organizations' absorptive capacity

Two Introductions



Morgan MG. 2017. *Theory and practice of policy analysis*. New York: Cambridge University Press.



Fischhoff, B., & Kadvany, J. (2011). *Risk: A very short introduction*. Oxford: Oxford University Press.