Addressing Public Concerns

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Committee on Criteria for Installing Automatic and Remote-Controlled Shutoff Valves on Existing Gas and Hazardous Liquid Transmission Pipelines

October 28, 2022

The Role of Communication in Pipeline Safety Risk Management

Prepared by:

Projects Course

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December 7, 2017

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https://www.cmu.edu/epp/news/50-years-of-epp-projects/index.html
https://www.cmu.edu/epp/prospective/undergraduate/epp-project-courses/index.html

Overview

Background: Risk communication science
Proposal: A structured communication program
Results: Some pipeline speculations

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All Communications Involve

Content: what is said
Process: how it is said

Content and Process Affect One Another

Sound content increases trust in the speaker.
Sound process increases trust in the content.

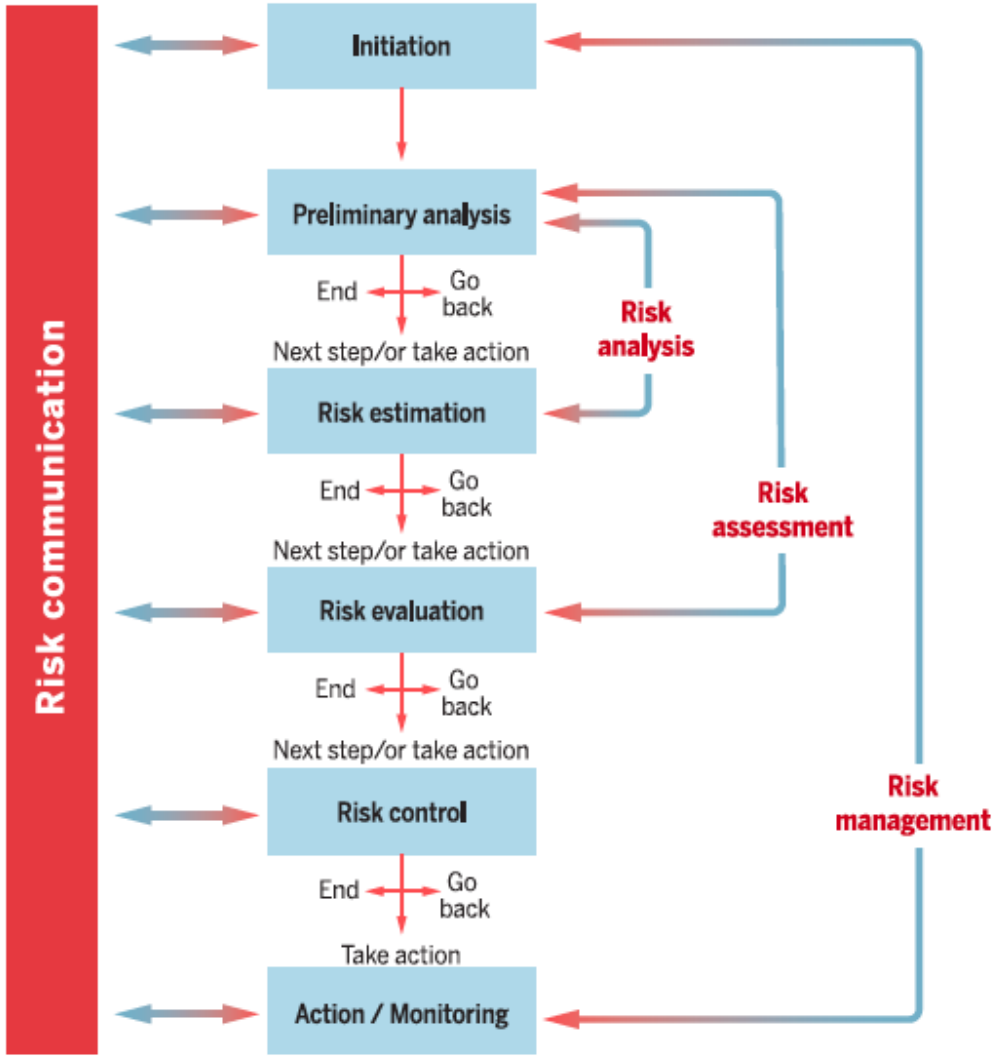
Content and Process Affect One Another

Sound content increases trust in the speaker.
Sound process increases trust in the content.
Poor content and process undermine one another.

A Sound Process

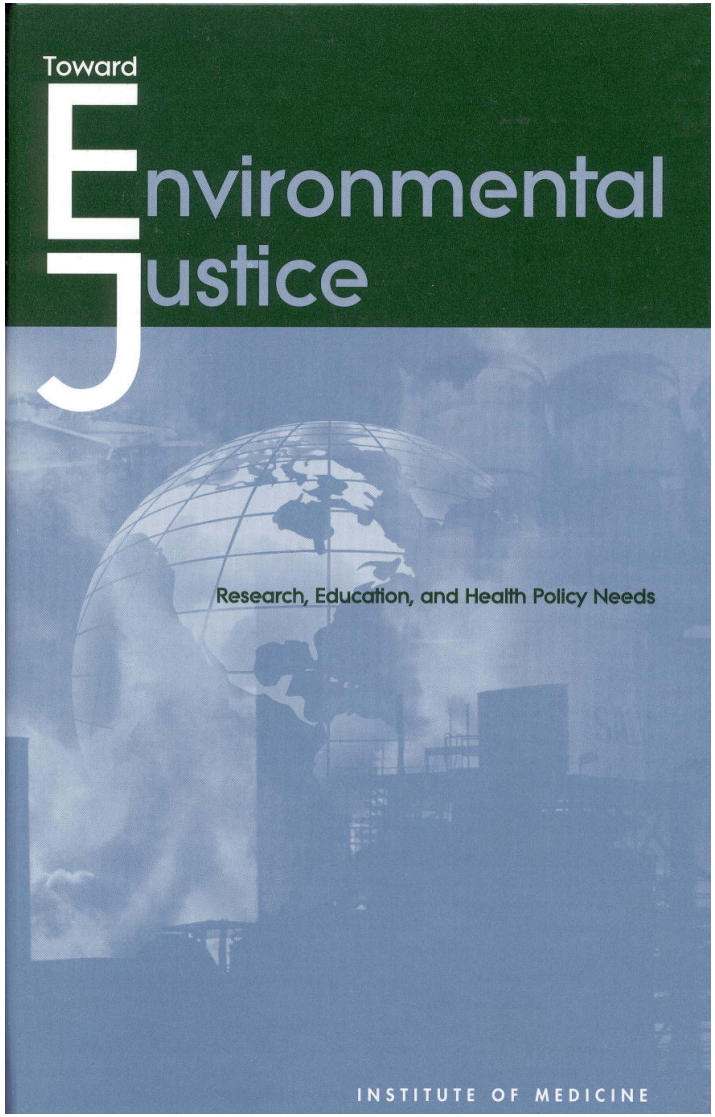
engages stakeholders in respectful, two-way communication, in order to get the right facts, as well as get the facts right.

A Model for Sound Process



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

A Call for Better Process



http://www.nap.edu/catalog/6034/toward-environmental-justice-research-education-and-health-policy-needs

BOX 1-1 THREE PRINCIPLES FOR PUBLIC HEALTH RESEARCH TO ADDRESS ENVIRONMENTAL JUSTICE ISSUES

1. **Improve the science base.** More research is needed to identify and verify environmental etiologies of disease and to develop and validate improved research methods.
2. **Involve the affected populations.** Citizens from the affected population in communities of concern should be actively recruited to participate in the design and execution of research.
3. **Communicate the findings to all stakeholders.** Researchers should have open, two-way communication with communities of concern regarding the conduct and results of their research activities.

http://www.nap.edu/catalog/6034/toward-environmental-justice-research-education-and-health-policy-needs

A Model for Sound Content

Analysis. Identify the facts most relevant to the choices that people face.

Description. Find out what they know already.

Intervention. Design messages to fill critical gaps.

Evaluation.

Repetition, until adequate.

Fischhoff, B. (2013). The sciences of science communication. *PNAS, 110* (Suppl. 3), 14033-14039. doi:10.1073/pnas.1213273110

Some Applications

plague
perchloroethylene
LNG
climate change
detergent
breast cancer
nuclear power
herpes (stigma)
xenotransplantation
smart meters
phishing
…

domestic radon
methylene chloride
EMF
sexual assault
low birth weight
breast implants
nuclear energy in space
Plan B (morning after pill)
neonates
vaccines (anthrax, MMR)
tornadoes
…

Applications Draw on

a small core of analytical methods

- decision trees
- influence diagrams
- dose-response analyses
- epidemiological models
- simulations (e.g., GCMs)
- operations research (e.g., queueing)
- …

Applications Draw on

a small suite of empirical methods.

- interviews (open-ended ←→ structured)
- surveys
- observation
- experiments (lab, field)
- revealed preferences (econometrics)
- agent-based modeling
- …

Applications Draw on

growing bodies of research on specific topics

- numerical estimates
- exponential processes
- physical processes (mental models)
- uncertainty
- scientific quality control
- misinformation
- …

Applications Draw on

vast, growing bodies of research on basic behavioral principles.

Testing Is Essential

The Need

People tend to exaggerate how well they understand one another and then blame their audience for their communication failures.

A Fast, Inexpensive Solution

Ask people from the target audience to read draft messages aloud, saying whatever comes into their mind, regarding what is there and missing; testing the message, not them.

Original Investigation FREE

January 31, 2022

Assessing How Consumers Interpret and Act on Results From At-Home COVID-19 Self-test Kits

A Randomized Clinical Trial

Steven Woloshin, MD, MS[1,2]; Barry Dewitt, PhD[3,4]; Tamar Krishnamurti, PhD[5]; et al

Author Affiliations | Article Information

JAMA Intern Med. 2022;182(3):332-341. doi:10.1001/jamainternmed.2021.8075

A Authorized instructions

YOUR TEST IS POSITIVE FOR COVID-19

A positive test result indicates that you very likely currently have COVID-19 disease.
COVID-19 is a viral illness that causes multiple symptoms including fever, a cough, sore throat and shortness of breath (refer to COVID-19 information section).

What you need to do:

1. **Consult a healthcare professional as soon as possible. Please tell them that you tested positive for COVID-19.**
   Provide your healthcare professional with:
   - Your Test Result Record (sent to you via email and in your COVID-19 Home Test App).
   - The Product Overview for Healthcare Professionals (in your COVID-19 Home Test App).
   - The Fact Sheet for Healthcare Professionals (in your COVID-19 Home Test App).

   If you have no symptoms, particularly if you live in an area with low numbers of COVID-19 infections and have had no exposure to anyone diagnosed with COVID-19, additional molecular testing to confirm your result may be required. Please advise the healthcare professional you have tested positive and have no symptoms. See FAQ 'Can I have a false positive test result' on our website http://ellumecovidtest.com/FAQ.
2. **You should self-isolate at home as per CDC recommendations to stop spreading the virus to others. Please consult the CDC recommendations regarding self-isolation www.cdc.gov/coronavirus.**

Press the YOUR RESULT & WHAT IT MEANS button on the result screen in the App to find out more about your result and when you can be with others again.

YOUR TEST IS NEGATIVE FOR COVID-19

A negative test result indicates that you are unlikely to currently have COVID-19 disease.
A negative test result means that proteins, small parts of the virus that causes COVID-19, were not found in your sample. However, you may have had COVID-19 previously.
To confirm a previous infection, you will need to take a different type of test (antibody test).

What you need to do:
Please consult a healthcare professional if you develop symptoms, symptoms persist or become more severe.

Negative results, particularly if you have no symptoms of COVID-19, may require additional molecular testing to confirm your result. Please see FAQ 'Can I have a false negative test result' on our website http://ellumecovidtest.com/FAQ.

So, what is making you sick? There are many other viruses that cause similar symptoms to COVID-19 and these may be the cause of your symptoms. Regardless of the test result, it is important that while you are sick you should practice social distancing and good hygiene and should not attend work.

If you develop symptoms or your symptoms persist or become more severe, if you are concerned about your health or you develop one of the emergency warning signs (see COVID-19 information section) then you should seek medical attention immediately.

B Intervention instructions

If your test result was positive: assume you have COVID-19.

> Contact your health care provider immediately > Stay at home > Avoid contact with others until you have further instructions from your doctor

If your test result was negative...

No test is perfect. A negative result means there was no evidence of the COVID-19 virus in your sample, but does not guarantee you are free of the virus. If the amount of virus in your body is low, the test might not detect it.
The guide below will help you know what to do now to keep yourself and others safe.

Interpreting your negative test result:

IF	IF	IF	IF
You've had COVID-19 symptoms within the last ten days.	You've had COVID-19 symptoms within the last ten days.	You've had close contact with someone known to have COVID-19 in the last two weeks.	You have NOT had any COVID-19 symptoms in the last ten days.
AND			AND
You've had close contact with someone known to have COVID-19 in the last two weeks.			You have NOT had close contact with someone with COVID-19 in the last two weeks.
THEN	THEN	THEN	THEN
Assume you have COVID-19 Contact your doctor immediately. - Stay at home - Avoid contact with others (including in your own home) until you have further instructions from your doctor.	You could still have COVID-19 Contact your health care provider. - Stay at home - Avoid contact with others (including in your own home) for at least ten days since your symptoms started and you have had NO fever for at least twenty-four hours and your symptoms are improving.	You could still have COVID-19 Contact your doctor about your results. - Stay at home - Avoid contact with others (including in your own home) for ten days after your last contact with a COVID-19 positive person.	It is unlikely you have COVID-19 now - Make sure you STAY SAFE (see below)

KEY TERMS

Possible COVID-19 Symptoms
- loss of smell
- severe cough
- severe fatigue
- loss of appetite
- fever above 100.4°F or chills
- nausea or vomiting
- diarrhea
- sore throat
- runny nose
- difficulty breathing
- muscle / body aches
- headache

Close contact is sustained contact for longer than ten minutes with a person while standing closer that six feet apart.

No matter your result, everyone should STAY SAFE

Protect yourself and the vulnerable members of your community

- Wear a mask around anyone not in your household, especially indoors
- Stay at least 6 feet apart from others
- Avoid crowds
- Wash your hands often

Key Points

Question How do people interpret results of at-home COVID-19 self-test kits when they use instructions authorized by the US Food and Drug Administration or instructions developed with decision science principles, or no instructions, and do they choose to self-quarantine per federal recommendations or quarantine unnecessarily?

Findings randomized clinical trial of 360 adults in the US found that a substantial proportion misinterpreted the negative results of at-home self-tests by failing to consider the implications of a high pretest probability of infection and ignoring the federal self-quarantine recommendations. Decision science–based instructions may increase the contribution of at-home self-test kits to public health.

Meaning The findings of this randomized clinical trial indicate that people who use at-home COVID-19 self-test kits may fail to self-quarantine or may quarantine unnecessarily because they misinterpret the implications of test results. Redesigned instructions may increase the benefits and reduce the harms from at-home self-test kits.

Bottom Lines

- Improvised communications can be worse than nothing.
- Scientifically sound communications can have a high return on a minimal investment.

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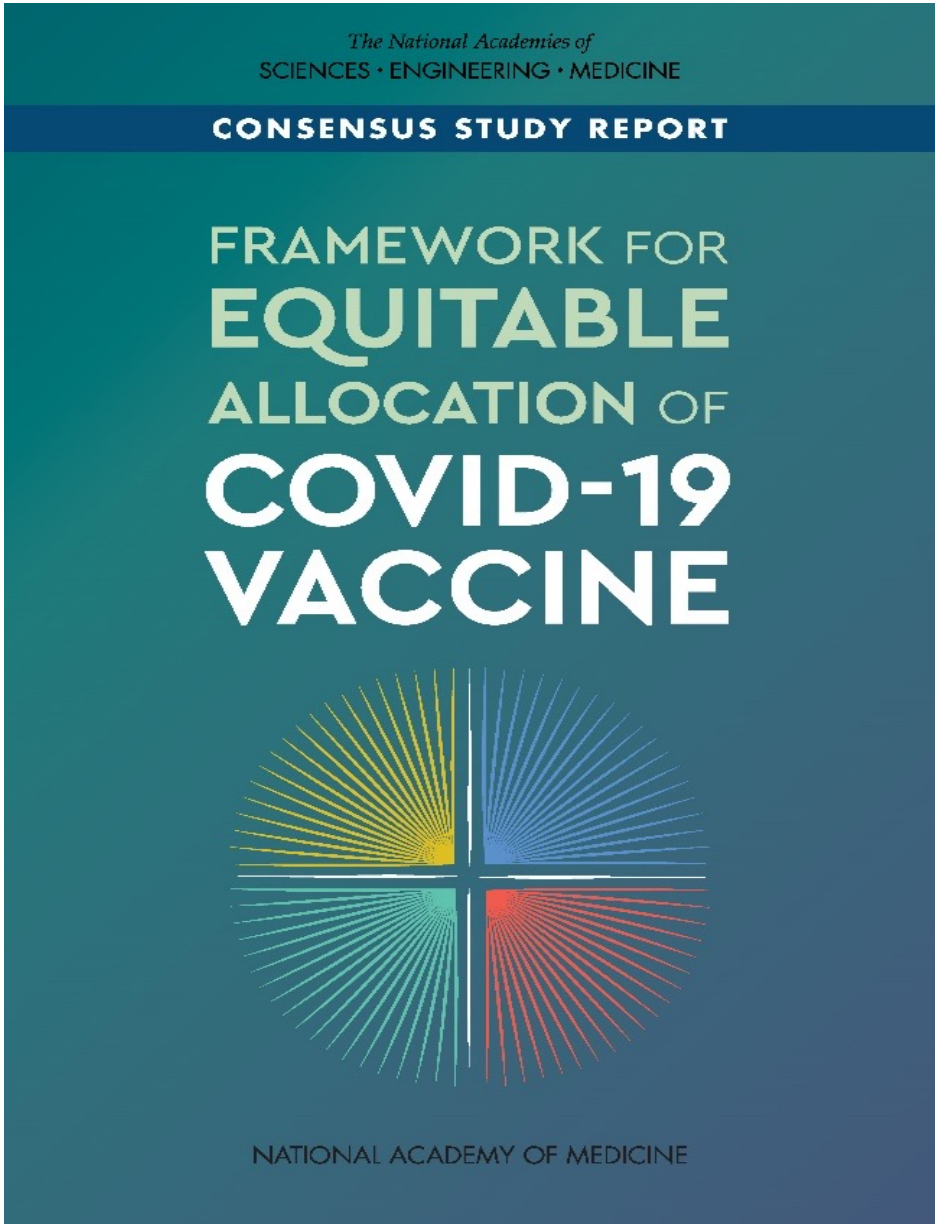

Free PDF of the report and related materials (summaries under Resources tab).
: https://www.nationalacademies.org/our-work/a-framework-for-equitable-allocation-of-vaccine-for-the-novel-coronavirus

Committee Membership

- **William Foege *(Co-Chair)***, Emory Rollins School of Public Health
- **Helene Gayle *(Co-Chair)***, The Chicago Community Trust
- **Margaret Brandeau,** Stanford University
- **Alison Buttenheim,** University of Pennsylvania School of Nursing
- **R. Alta Charo**, University of Wisconsin Law School
- **James Childress,** University of Virginia
- **Ana Diez Roux,** Drexel Dornsife School of Public Health
- **Abigail Echo-Hawk (Citizen of the Pawnee Nation),** Urban Indian Health Institute, Seattle Indian Health Board
- **Christopher Elias,** Bill and Melinda Gates Foundation
- **Baruch Fischhoff,** Carnegie Mellon University
- **David Michaels, G**eorge Washington University Milken Institute School of Public Health
- **Jewel Mullen,** University of Texas at Austin Dell Medical School
- **Saad Omer,** Yale Institute for Global Health
- **Daniel Polsky,** Johns Hopkins University
- **Sonja Rasmussen,** University of Florida College of Medicine and College of Public Health and Health Professions
- **Arthur Reingold,** Berkeley School of Public Health
- **Reed Tuckson,** Tuckson Health Connections, LLC
- **Michael R. Wasserman,** California Association of Long Term Care Medicine

Report Organization

- **Chapter 1**: Introduction
- **Chapter 2**: Lessons Learned from Other Allocation Efforts
- **Chapter 3**: A Framework for Equitable Allocation of COVID-19 Vaccine
- **Chapter 4**: Applying the Framework for Equitable Allocation of COVID-19 Vaccine in Various Scenarios
- **Chapter 5**: Administering and Implementing an Effective and Equitable National COVID-19 Vaccination Program
- **Chapter 6**: Risk Communication and Community Engagement
- **Chapter 7**: Achieving Acceptance of COVID-19 Vaccine
- **Chapter 8**: Ensuring Equity in COVID-19 Vaccine Allocation Globally

Discussion Draft

SESSION II	Public Comment Period with Confirmed Speakers

12:20 p.m. **Public Comment Period: Minority Communities**

Randall Morgan, W. Montague Cobb/NMA Health Institute

Elizabeth Ofili, Association of Black Cardiologists

Ellen Provost, Alaska Native Tribal Health Consortium EpiCenter

Elena Rios, National Hispanic Medical Association

Jim Roberts, Alaska Native Tribal Health Consortium

Winston Wong, National Council of Asian Pacific Islander Physicians

12:50 p.m. **Public Comment Period: State and Local Government and Healthcare**

Aaron Payment, Chairperson Sault Ste. Marie Tribe of Chippewa Indians

Oscar Alleyne, National Association of County and City Health Officials

David Gerstner, Dayton (OH) Metropolitan Medical Response System

Syra Madad, New York City Health and Hospitals (NY) (Individual)

Marcus Plescia, Association of State and Territorial Health Officers

Christian Ramers, Family Health Centers of San Diego (CA)

A Commitment to Transparency

To ensure that the framework is equitable and is seen as equitable, the committee designed it to

- be easily understood by diverse audiences
- be reliably translated into operational terms
- distinguish scientific and ethical judgments

p. S-6

Risk-Based Criteria

- Risk of acquiring infection
- Risk of severe morbidity and mortality
- Risk of negative societal impact
- Risk of transmitting infection to others

Distinct, Mutually Reinforcing Efforts

Risk Communication and Community Engagement

Provide the facts that people need in order to feel respected, make personal choices, evaluate programs, and understand their rationale. (Chapter 6)

Health Promotion

Provide official recommendations, through trustworthy channels, along with the resources for acting on them. (Chapter 7)

Distinct, Mutually Reinforcing Efforts

Risk Communication and Community Engagement

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Provide official recommendations, through trustworthy channels, along with the resources for acting on them. (Chapter 7)

With a firewall between them

Strategic Organization

National Coordination

gather and analyze decision-relevant information
create (and test) message prototypes, drawing on the sciences of science communication

Community Partners

adapt messages to local conditions
deliver messages proactively from trusted sources
report on experience and emerging issues

Overview

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Speculation 1

Proactive communication can limit

- the spread of misinformation (by providing a foundation of knowledge and trust)
- the role of surrogate battles (where pipeline safety is secondary to other issues)

Speculation 2

Well-developed communications can convey

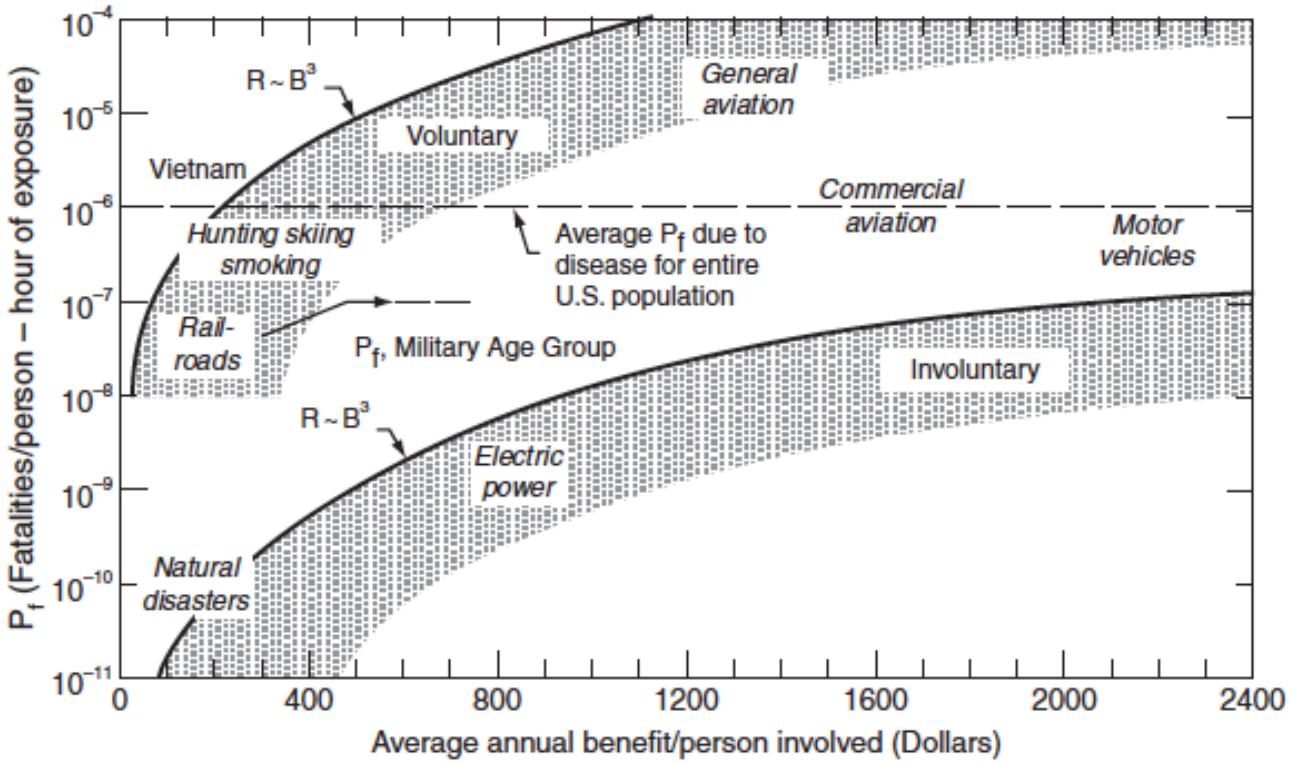
- estimates of the magnitude of risks, and the effectiveness of safety measures.
- mental models supporting those estimates, affording reasons to believe them.

Speculation 3

Safety and safety measures will be judged on more than just risk estimates, including

- “qualitative” risk factors
- trust in the industry and its regulators

Revealed Preferences



3. Risk–benefit trade-offs 'revealed' in statistical estimates of risk and benefit levels from eight hazards. 'R~B³' means that risk (defined as probability of fatality) increases approximately in proportion to benefits raised to the third power. Shaded areas are Starr's informal uncertainty bands

Starr, C. (1969). Social benefit vs. technological risk. *Science, 165*, 1232-1238

Expressed Preferences

Policy Sciences 9 (1978), pp. 127–152

How Safe is Safe Enough? A Psychometric Study of Attitudes Towards Technological Risks and Benefits*

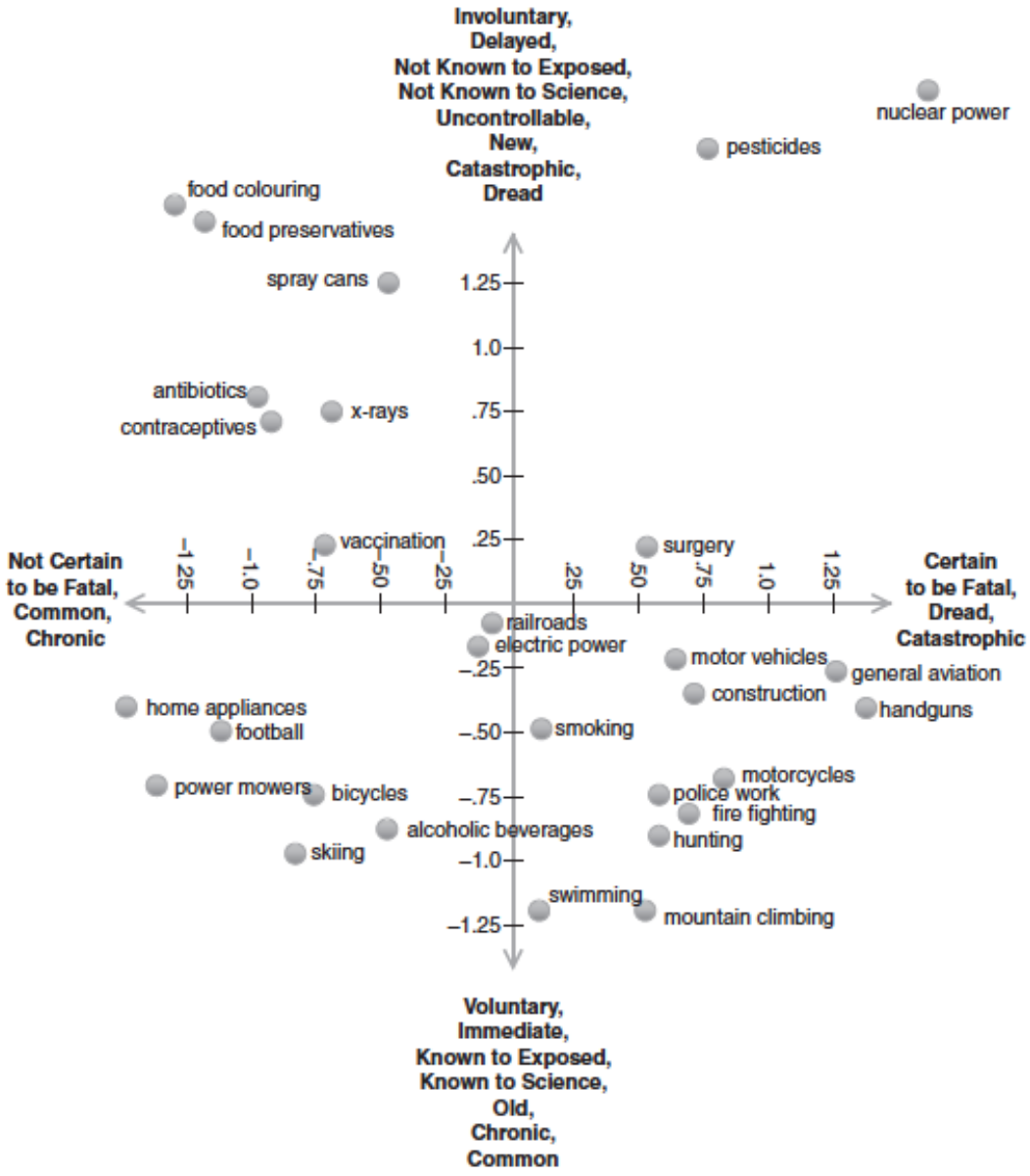
BARUCH FISCHHOFF, PAUL SLOVIC, SARAH LICHTENSTEIN
Decision Research, A Branch of Perceptronics, Eugene, Oregon

STEPHEN READ
University of Texas at Austin

BARBARA COMBS
University of Oregon

ABSTRACT

One of the fundamental questions addressed by risk-benefit analysis is "How safe is safe enough?" Chauncey Starr has proposed that economic data be used to reveal patterns of acceptable risk-benefit tradeoffs. The present study investigates an alternative technique, in which psychometric procedures were used to elicit quantitative judgments of perceived risk, acceptable risk, and perceived benefit for each of 30 activities and technologies. The participants were seventy-six members of the League of Women Voters. The results indicated little systematic relationship between perceived *existing* risks and benefits of the 30 risk items. Current risk levels were generally viewed as unacceptably high. When current risk levels were adjusted to what would be considered acceptable risk levels, however, risk was found to correlate with benefit. Nine descriptive attributes of risk were also studied. These nine attributes seemed to tap two basic dimensions of risk. These dimensions proved to be effective predictors of the tradeoff between acceptable risk and perceived benefit. The limitations of the present study and the relationship between this technique and Starr's technique are discussed, along with the implications of the findings for policy decisions.



4. A risk space based on ratings of 30 hazards on 9 risk attributes

Fischhoff, B., & Kadvany, J. (2011). *Risk: A Very Short Introduction*. Oxford: Oxford University Press.

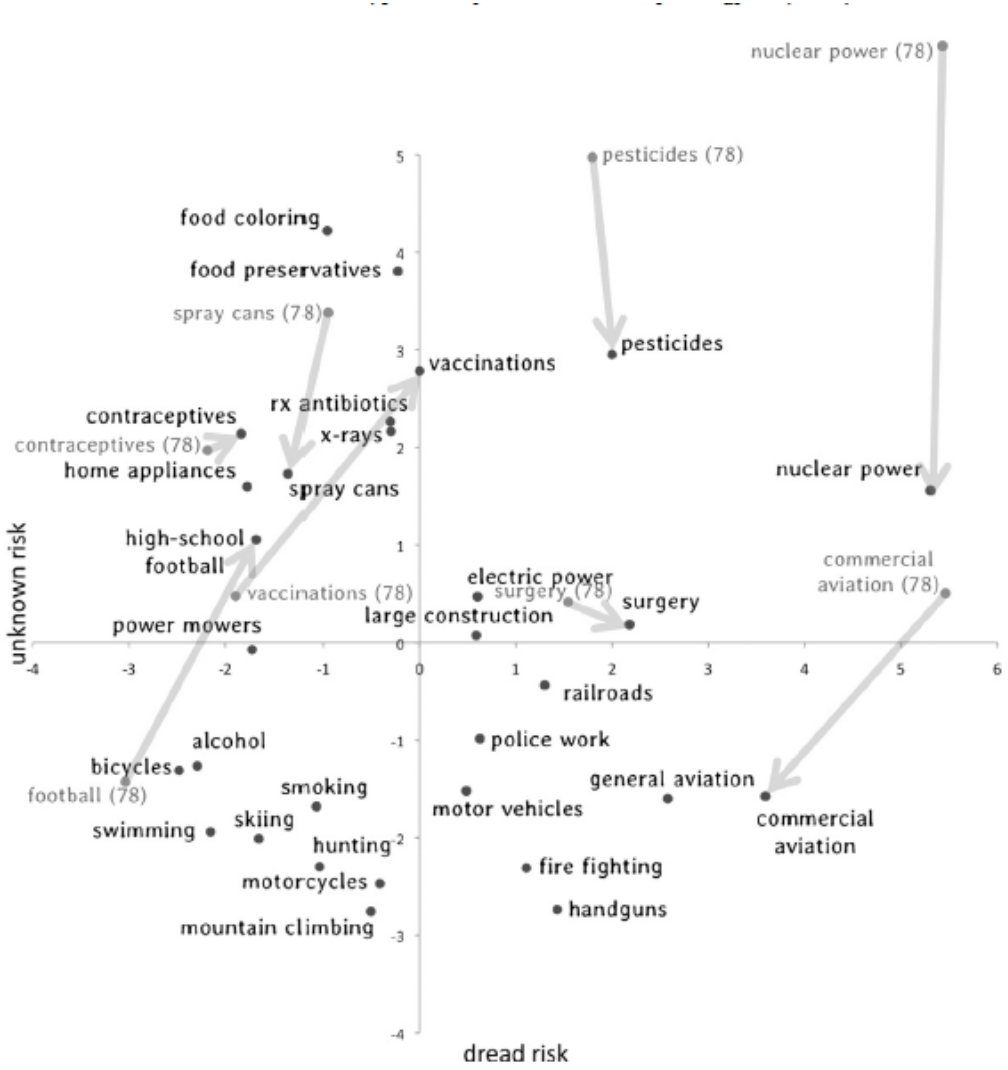


Fig. 3. Movements of selected items in the dread–unknown factor space between FSLRC78 (grey dots) and the current study (black dots). As we do not have sufficient power in this study to analyze these shifts quantitatively, they should be considered as rough qualitative estimates.

Glassman-Fox, K.T., & Weber, E.U. (2016). What makes risks acceptable? Revisiting the 1978 psychological dimensions of risk. Journal of Mathematical Psychology, 75, 157-169.

Gaining trust as well as respect in communicating to motivated audiences about science topics

Susan T. Fiske[1] and Cydney Dupree

Psychology and Public Affairs, Princeton University, Princeton, NJ 08544

Expertise is a prerequisite for communicator credibility, entailing the knowledge and ability to be accurate. Trust also is essential to communicator credibility. Audiences view trustworthiness as the motivation to be truthful. Identifying whom to trust follows systematic principles. People decide quickly another's apparent intent: Who is friend or foe, on their side or not, or a cooperator or competitor. Those seemingly on their side are deemed warm (friendly, trustworthy). People then decide whether the other is competent to enact those intents. Perception of scientists, like other social perceptions, involves inferring both their apparent intent (warmth) and capability (competence). To illustrate, we polled adults online about typical American jobs, rated as American society views them, on warmth and competence dimensions, as well as relevant emotions. Ambivalently perceived high-competence but low-warmth, "envied" professions included lawyers, chief executive officers, engineers, accountants, scientists, and researchers. Being seen as competent but cold might not seem problematic until one recalls that communicator credibility requires not just status and expertise but also trustworthiness (warmth). Other research indicates the risk from being enviable. Turning to a case study of scientific communication, another online sample of adults described public attitudes toward climate scientists specifically. Although distrust is low, the apparent motive to gain research money is distrusted. The literature on climate science communicators agrees that the public trusts impartiality, not persuasive agendas. Overall, communicator credibility needs to address both expertise and trustworthiness. Scientists have earned audiences' respect, but not necessarily their trust. Discussing, teaching, and sharing information can earn trust to show scientists' trustworthy intentions.

] Fiske, S. T., & Dupree, C. (2014). Gaining trust as well as respect in communicating to motivated audiences about science topics. *PNAS*, **111**(Suppl. 4), 13593–13597.

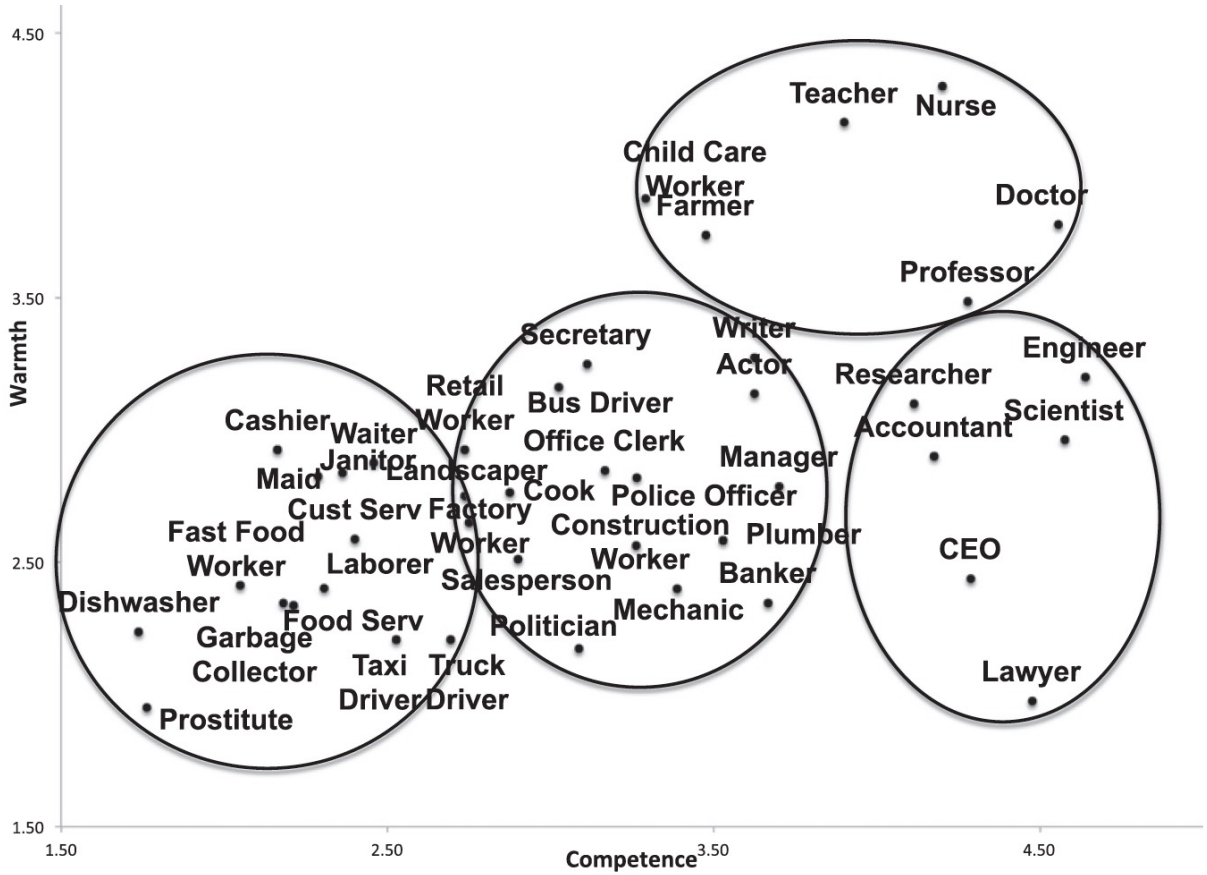


Fig. 2. Warmth–competence ratings of commonly mentioned jobs. Four-cluster solution describes American job holders. Adults completed an online survey rating previously nominated common jobs on their public images of being warm and trustworthy, as well as competent and capable. Jobs' mean ratings on the two dimensions are subjected to statistical cluster analysis (see *SI text*). Note that these data map reported images of job groups, not the accuracy of those images. Although not the focus here, the middle cluster averages are relatively neutral on both warmth and competence, as well as emotions (see *SI text*).

Speculation 4

The pipeline industry, a represented here

- may be scrutinized for others' actions
- may wish to support their practices and communications.

Speculation 5

Cost-benefit analysis will prove ill-suited to addressing public concerns regarding

- equity
- ”intangibles”
- trust

REVIEW

RISK ASSESSMENT

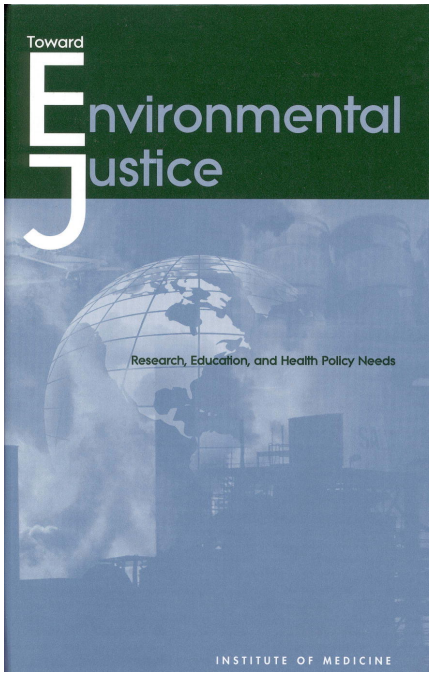
The realities of risk-cost-benefit analysis

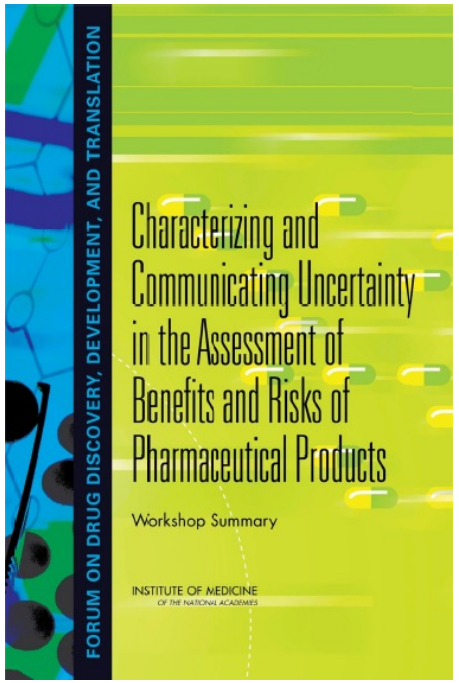
Baruch Fischhoff

Formal analyses can be valuable aids to decision-making if their limits are understood. Those limits arise from the two forms of subjectivity found in all analyses: ethical judgments, made when setting the terms of an analysis, and scientific judgments, made when conducting it. As formal analysis has assumed a larger role in policy decisions, awareness of those judgments has grown, as have methods for making them. The present review traces these developments, using examples that illustrate the issues that arise when designing, executing, and interpreting analyses. It concludes with lessons learned from the science and practice of analysis. One common thread in these lessons is the importance of collaborative processes, whereby analysts and decision-makers educate one another about their respective needs and capabilities.

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

Risk at NASEM





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

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

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

Ralph Cicerone

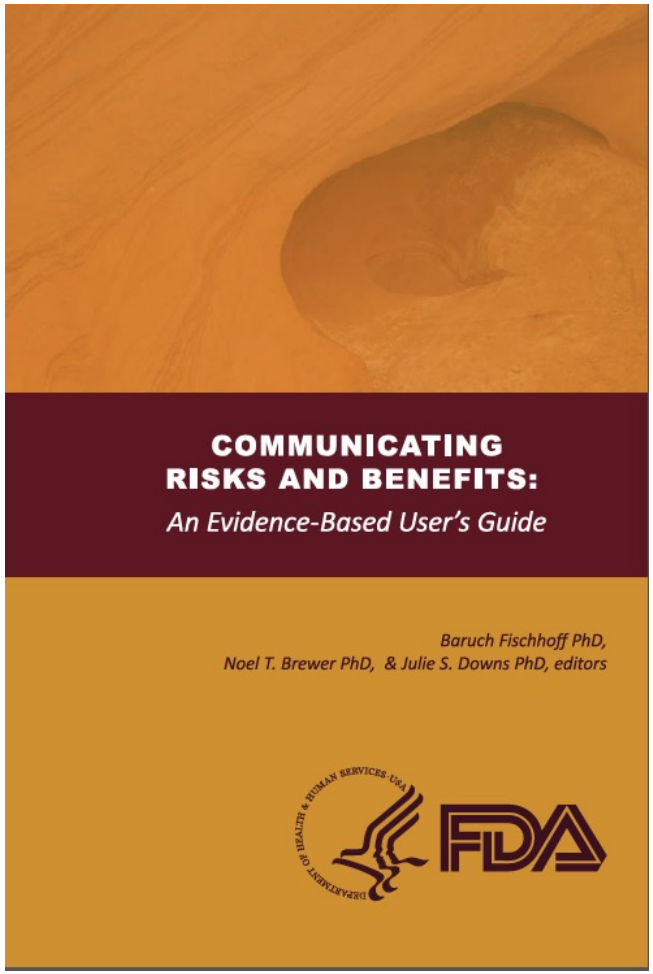
Basic Research on Communication

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

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

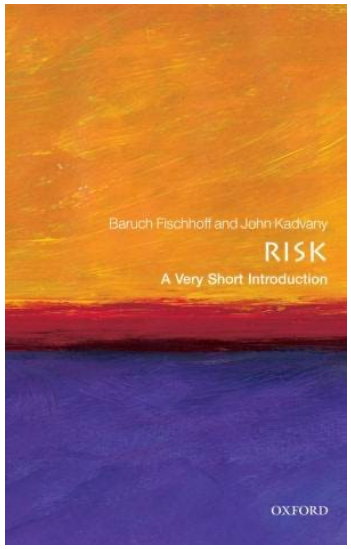
www.pnas.org/cgi/doi/10.1073/pnas.1805863115

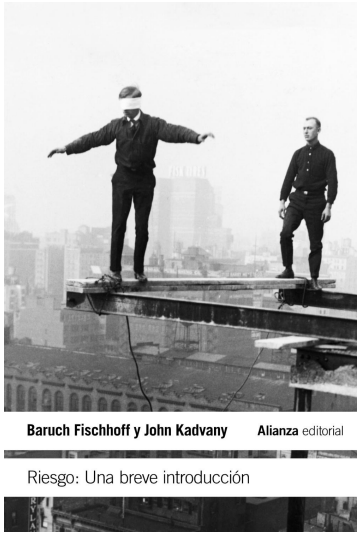
Communicating Risks and Benefits: An Evidence-Based User's Guide



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

Risk: A Very Short Introduction





Fischhoff, B., & Kadvany, J. (2011). *Risk: A Very Short Introduction*. Oxford: Oxford University Press