Developing effective risk communication:

How to find out what the audience needs

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Risk communication

- The goals of risk communication include
  - Improving public understanding
  - Promoting behavior change to reduce risks and to increase public disaster preparedness
- To evaluate whether these goals are achieved, we can conduct
  - Randomized controlled trials
  - Meta-analyses

Features of effective communications

1. Content reflects scientific knowledge of diverse experts, ensuring
   - Accuracy
   - Balance
2. Content is based on research (interviews and survey) with members of the intended audience, increasing likelihood of
   - Using wording that recipients understand
   - Covering what recipients need to know

Research with intended audience is often omitted

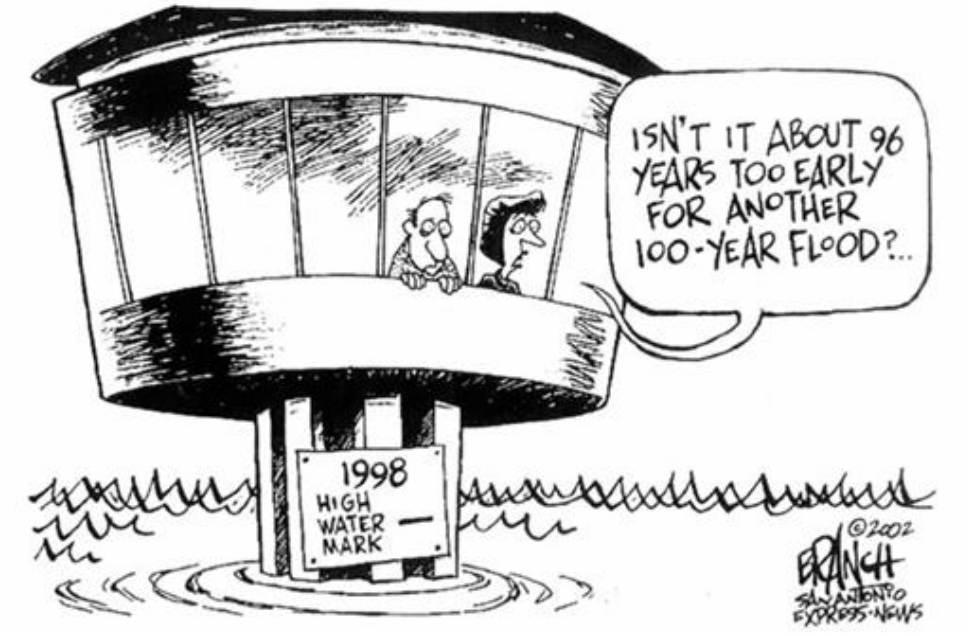
- Experts often design communications without finding out what their audience needs
- Potential reasons include
  - Domain experts are overconfident about how well they know their non-expert audiences
  - Existing communications are often not evaluated, so experts never find out whether (or not) their communications were effective
  - Domain experts may lack the training to conduct interviews and surveys

Failing communications

- The few communications that are evaluated often turn out to be ineffective
- When designing communications without input from the intended audience, experts
  - Use difficult wording
  - Omit information their audience needs to make and implement informed decisions

Example: difficult wording

- When describing flood risk and protection, experts talk about a “100-year flood”
- Non-experts expect “100 year flood” to happen at regular 100-year intervals



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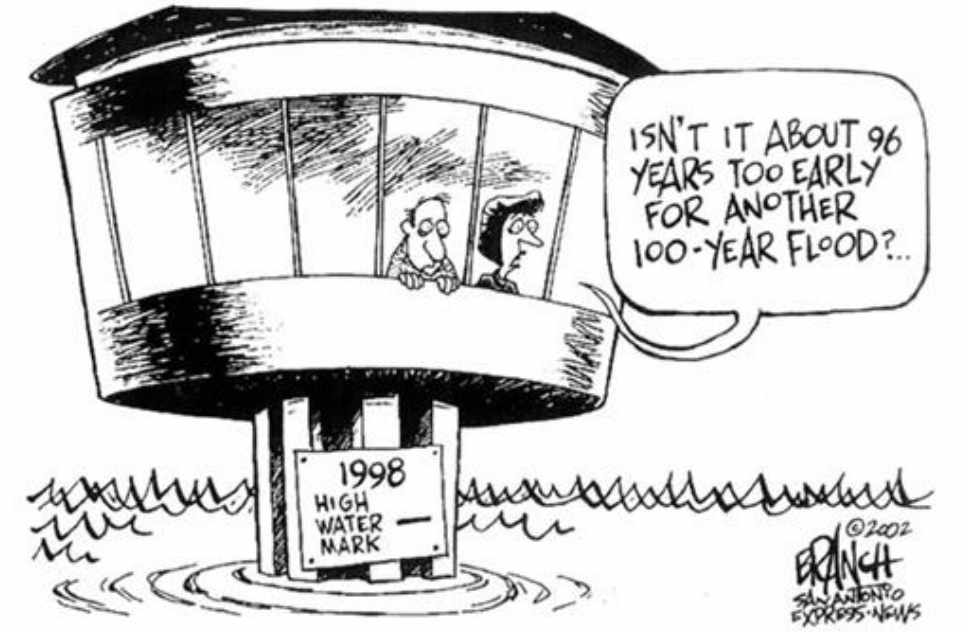

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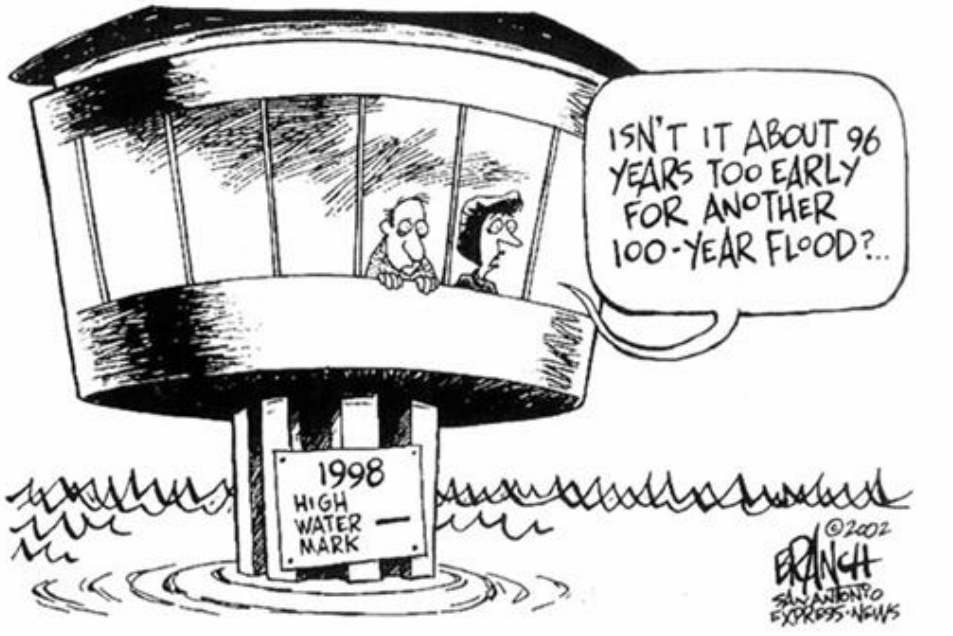
- It may be better to describe flood as “1% chance per year”
- However, note that people worry more about flood *levels* than about flood *frequency*



Example: Omitting information

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Encouraging people to wash their hands will be ineffective if they don't know *how* to wash their hands

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Mental Models Approach

1. Expert model: What should people know?
   - Conduct interdisciplinary literature review
   - Convene expert panel
   - Conduct risk analysis
2. Lay model: What do people already know?
   - Conduct interviews to identify beliefs, barriers to behavior change, relevant wording
   - Conduct follow-up surveys to examine prevalence of interviewees' beliefs
3. Communication: What do people still need to know?
   - Compare expert model and lay model
   - Address misunderstandings and other barriers to behavior change in interviewees' preferred wording
4. Evaluation: Does the communication work?
   - Conduct validation study

Interview and survey procedure

- Interviews
  - Are designed to identify people's beliefs and barriers to behavior change in their preferred wording
  - Start with "Tell me what you know about.." and follow up with "can you tell me more about.."
  - Are repeated until no more new ideas emerge (n≈20)
- Surveys
  - Are less labor-intensive than interviews, and better for use with larger samples
  - Can be conducted by mail or online
  - Ask participants to rate agreement with interviewees' beliefs and self-report behaviors

(Bruine de Bruin & Bostrom, *PNAS*, in preparation)

Sexually Transmitted Infections (STIs)

- Goal: To reduce STIs in young American women
- Background: Most American sex education is ineffective and just repeats the basic facts
- Interviews and surveys: Young women already know about STIs and how to prevent them -- but lack skills to communicate with partners
- Communication: An interactive video that taught negotiation skills (and not just basic facts) reduced STIs compared to controls
- Take-home message: To implement behavior change, people need to know more than just the basic facts

(Bruine de Bruin et al., *HIV/AIDS Prevention in Children and Youth, 2007;* Downs et al., *Social Science & Medicine*, 2004)

Carbon Capture and Sequestration (CCS)

- Goal: To inform public debate about CCS
- Background: CCS aims to reduce CO_2 emissions, but public resistance may hinder widespread deployment in the US
- Interviews and surveys: Most people have not heard of CCS, but they become concerned about the risks when they learn about the risks and benefits of CCS, and want to talk about wind and solar instead
- Communication: Information about the risks, costs and benefits of 10 low-carbon technologies increased acceptance of some CCS
- Take home message: To make informed decisions, people need to understand all options and their risks and benefits

(Fleishman, Bruine de Bruin & Morgan, *Risk Analysis*, 2010; Palmgren et al., *Environmental Science & Technology*, 2004)

Examples of other applications

- Pandemic influenza
  (Bruine de Bruin et al., *Global Public Health*, 2006; Downs, Bruine de Bruin, & Fischhoff, *Vaccine*, 2008)
- Xenotransplantation
  (Bruine de Bruin et al., *Risk Analysis*, 2006)
- Smart meters
  (Krishnamurti et al., *Energy Policy*, 2012)
- Climate change
  (Bostrom et al., *Risk Analysis*, 1994)
- Hurricane modification
  (Klima, Bruine de Bruin, & Morgan, *Risk Analysis*, 2012)

Expertise needed for developing effective communication

- Diverse domain experts are needed to ensure accuracy and balance of content
- Social scientists are needed to conduct interviews and surveys with members of the intended audience, to increase likelihood of
  - Using wording that is understood by recipients
  - Covering content the audience needs

Recommendations

- Conduct interview and survey research in China to inform Chinese communications
- Develop and test communications in China
- Build database of effective communications
- Conduct meta-analyses to identify features of effective communications
- Publish guidelines on effective communications

Relevant references

Bruine de Bruin, W., & Bostrom, A. (2012). *How to find out what to address in science communications: An introduction for scientific experts.* Invited paper for the *Proceedings of the National Academy of Sciences*

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