



Geo-what? Challenges in communicating geological risks and concepts

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climate  change

Scotland's centre of expertise connecting
climate change research and policy

Challenges to communication: Geoscience



Public dialogue and public acceptance is particularly challenging for:

a) **Remote, uncertain or unfamiliar** things

→ **geology / the subsurface**

b) **Technical, sensitive or emerging**, concepts

→ **the energy system** (& other things)

Poor Geo-energy!

[e.g. Radwaste disposal, CCS, UG, and energy storage (incl. compressed air / hydrogen storage)].

Challenges to communication: Geoscience



“Many – perhaps most – of the great issues of science are qualitative”.

Platt (1964)

Barriers to e.g. the low-carbon transition and the use of georesources are not primarily technical, they are societal.

This talk:

Language-based challenges:

- a) Concepts & Context
- b) Terminology
- c) Uncertainty & Change
- d) Protocols

Other challenges wrapped up in this include:

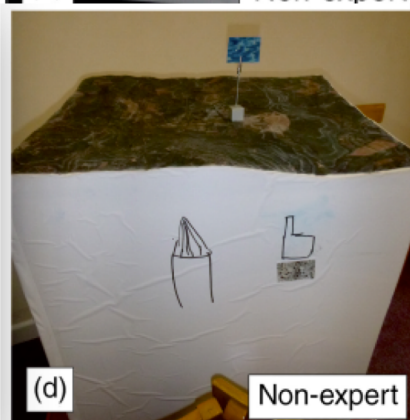
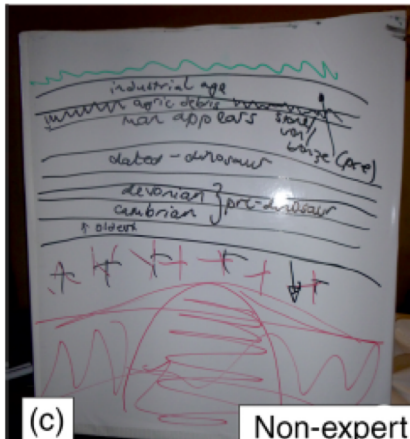
- e) Trade-offs
- f) The nature of science & expertise
- g) Politics/Political framing
- h) History of change/political past.

“Why is Building Public Interest and Promoting Inclusive Dialogue important?”



Challenges to communication: (1) Concepts & Context

(a) the subsurface

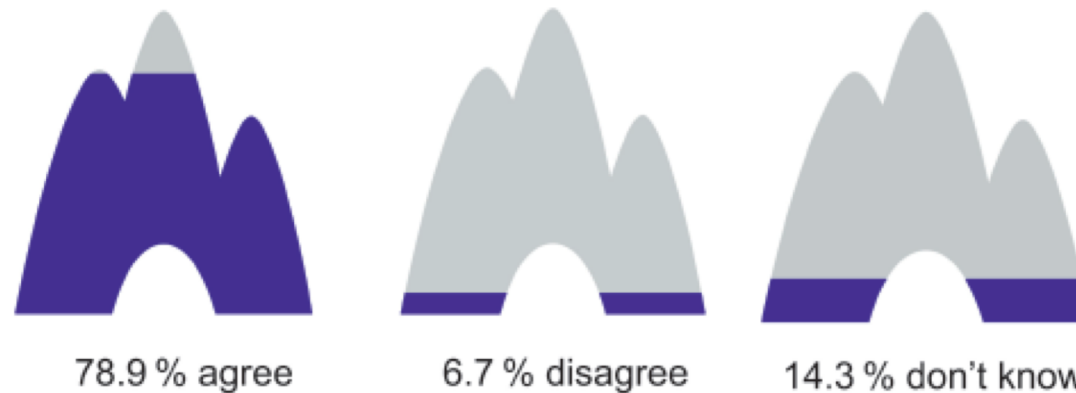


A typical human has a volume of 66.4 L (0.066 m³).

Someone trying to understand the processes that have developed our planet is trying to understand something 10²³ larger in volume than themselves.

Shipton et al. (submitted).

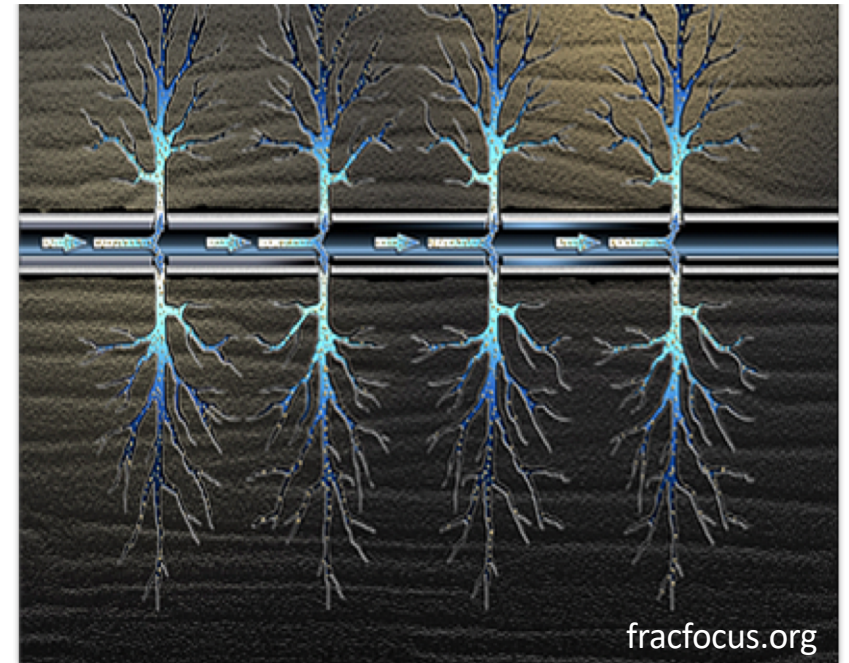
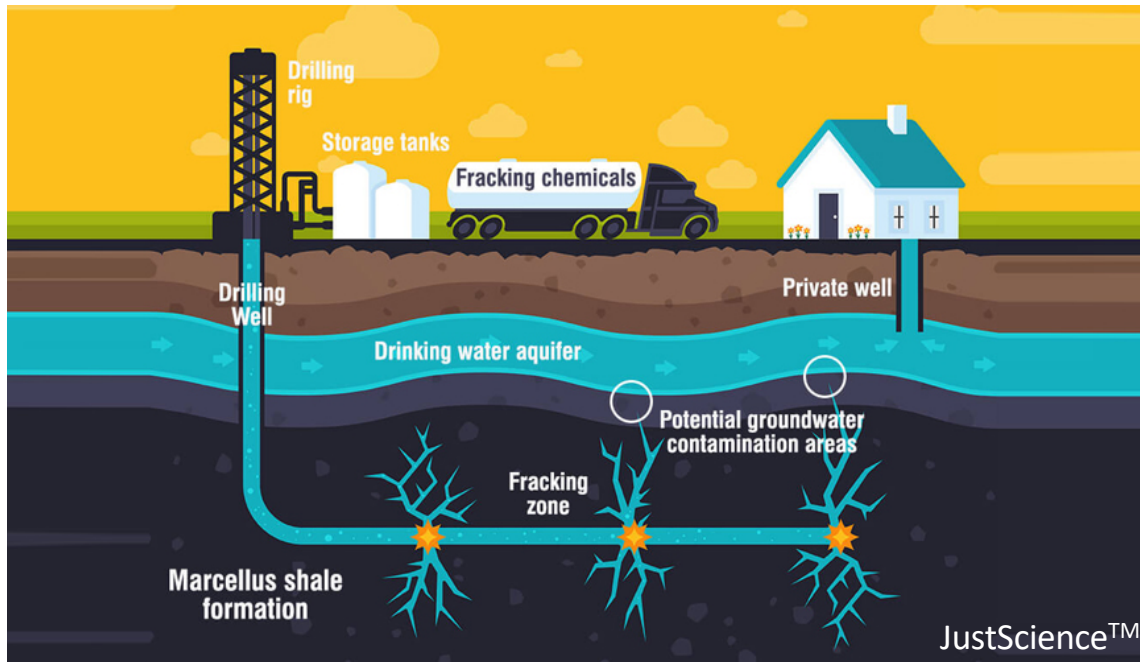
‘Water naturally forms channels underground in order to flow through rock’



Gibson et al., 2016

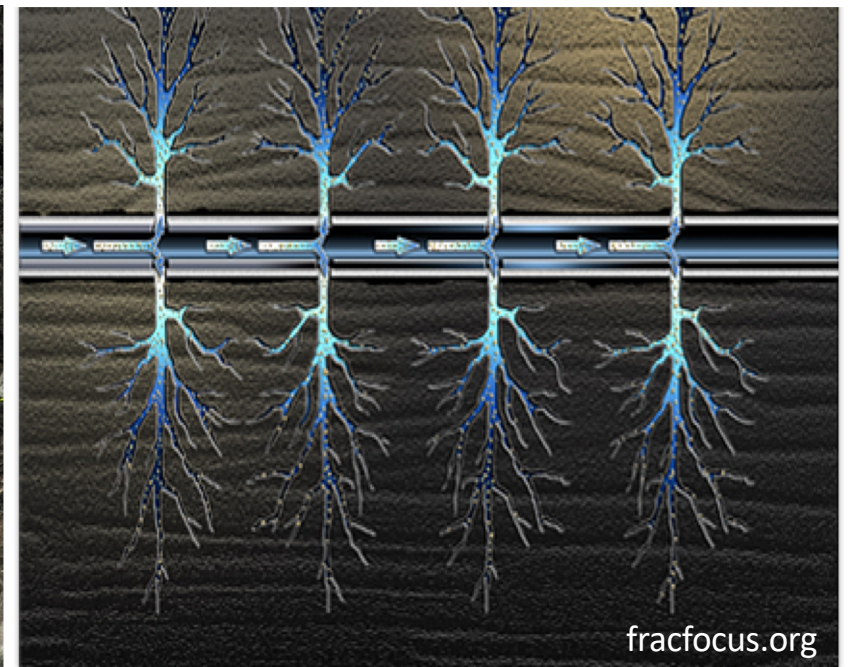
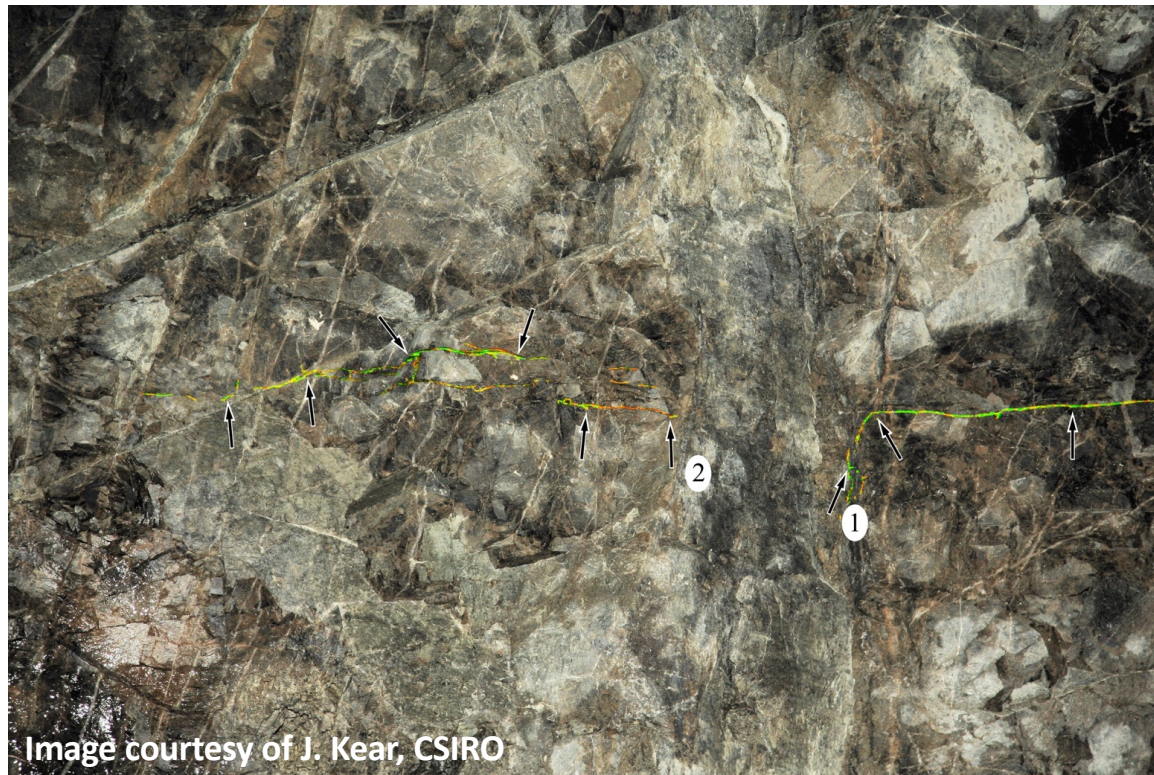
Challenges to communication: (1) Concepts & Context

(a) the subsurface



Challenges to communication: (1) Concepts & Context

(a) the subsurface

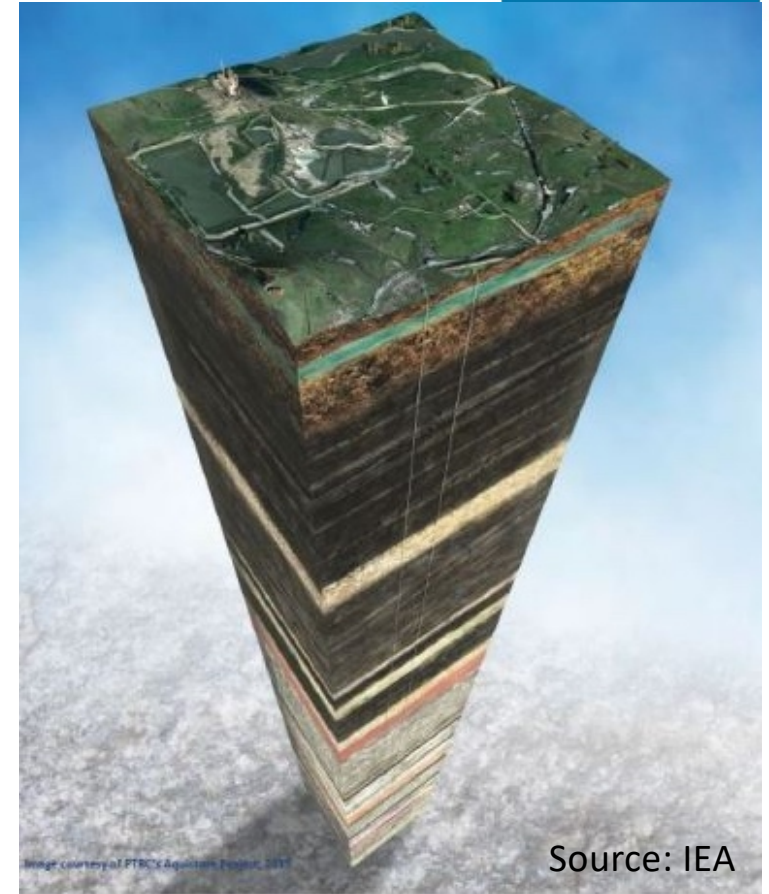


No scale, sorry...

Challenges to communication: (1) Concepts & (b) risks

Context

CCS: You have been injecting megatonnes of pressurised CO₂ into rock formations deep underground for years. A leak occurs.
What does that leak look like?



Challenges to communication: (1) Concepts & (b) risks - *what does a CO₂ leak look like?* Context



Daylesford, Victoria (Australia). March 2017



Latera region, Italy. November 2017.

Photos: J. Roberts

Challenges to communication: (1) Concepts & (b) risks - *what does a CO₂ leak look like?* Context



Daylesford, Victoria (Australia). March 2017



Latera region, Italy. November 2017.

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Challenges to communication: (1) Concepts & (b) risks - *what does a CO₂ leak look like?* Context

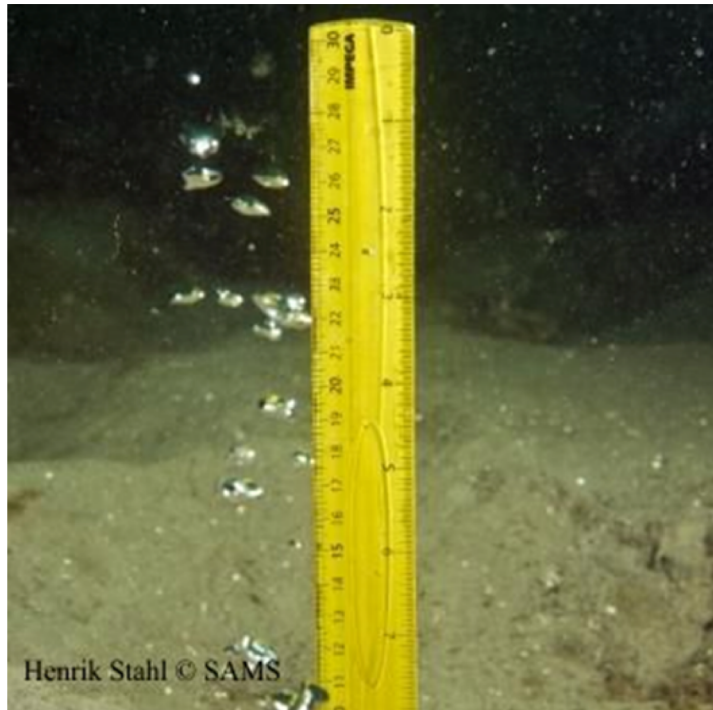


Mefite D'Ansanto (Italy) May 2010.



Crystal Geyser (USA) in 2005

Challenges to communication: (1) Concepts & (b) risks - *what does a CO₂ leak look like?* Context



How much CO₂ is in a bubble?

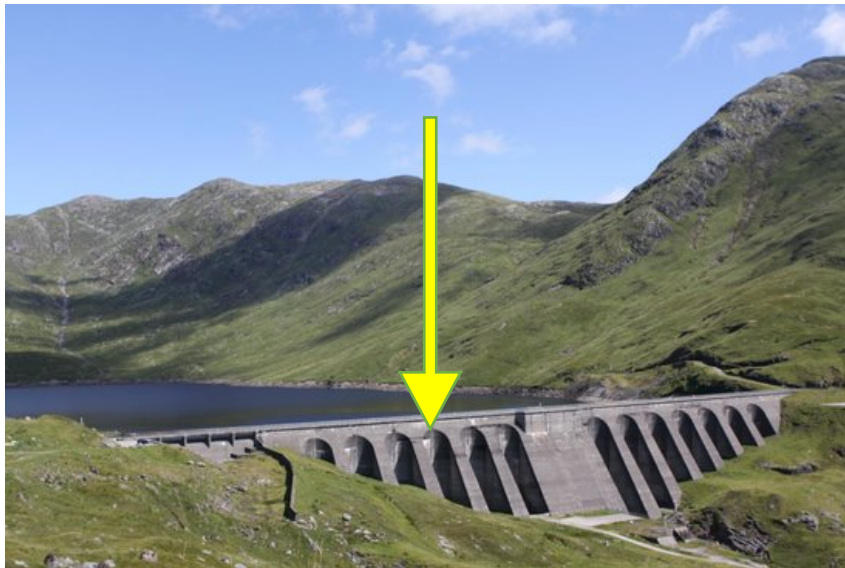
Challenges to communication:

(b) Context of risk

What does a leaking dam look like, and who would notice it?

→ Normalised risk?

Photo: TripAdvisor



Challenges to communication:

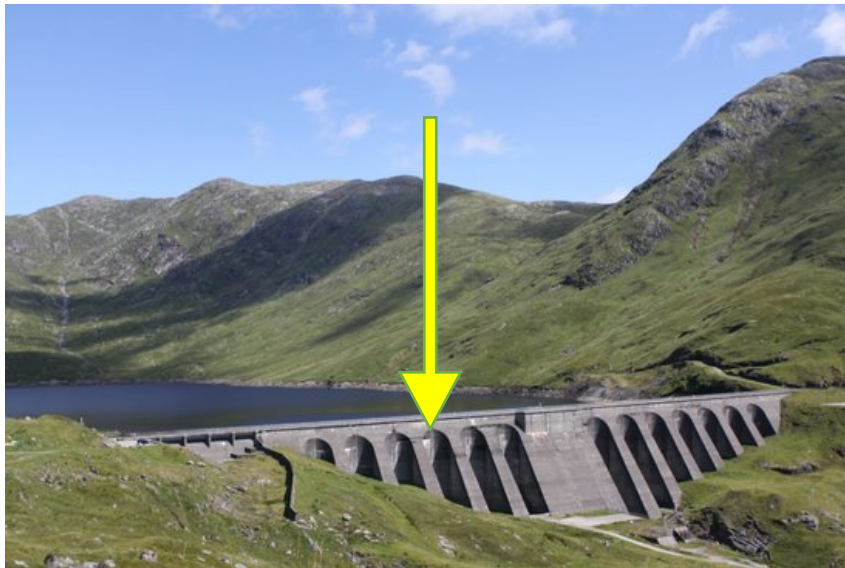
(b) Context of risk

*What does a leaking dam look like,
and who would notice it?*

→ Normalised risk?

What is failure?

Photo: TripAdvisor



Challenges to communication: (2) Terminology



(a) Ambiguity / perspective

What is failure? From whose perspective?

e.g. for CCS - what constitutes failure?

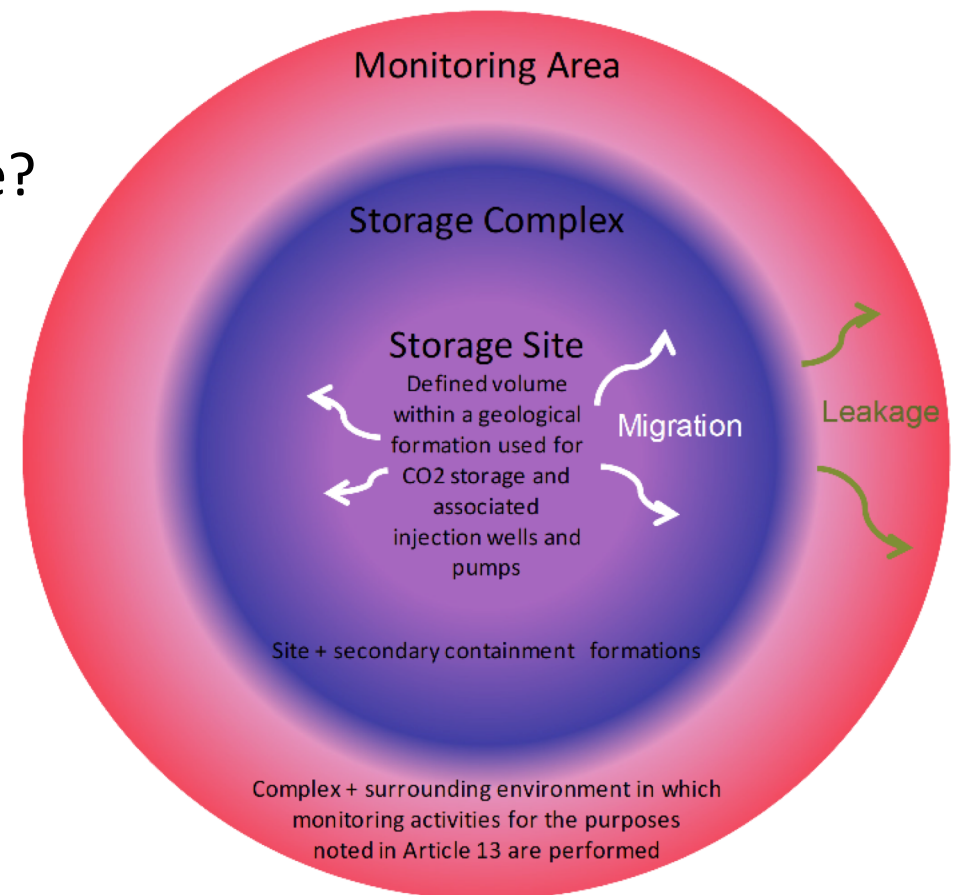
Climate Change?

What the public / insurance want?

→ regulatory

...where / which point is failure?

i.e.: what counts as leakage?



European Commission (2011)

Challenges to communication: (2) Terminology

(a) Ambiguity / perspective

e.g. for CCS - what constitutes failure?

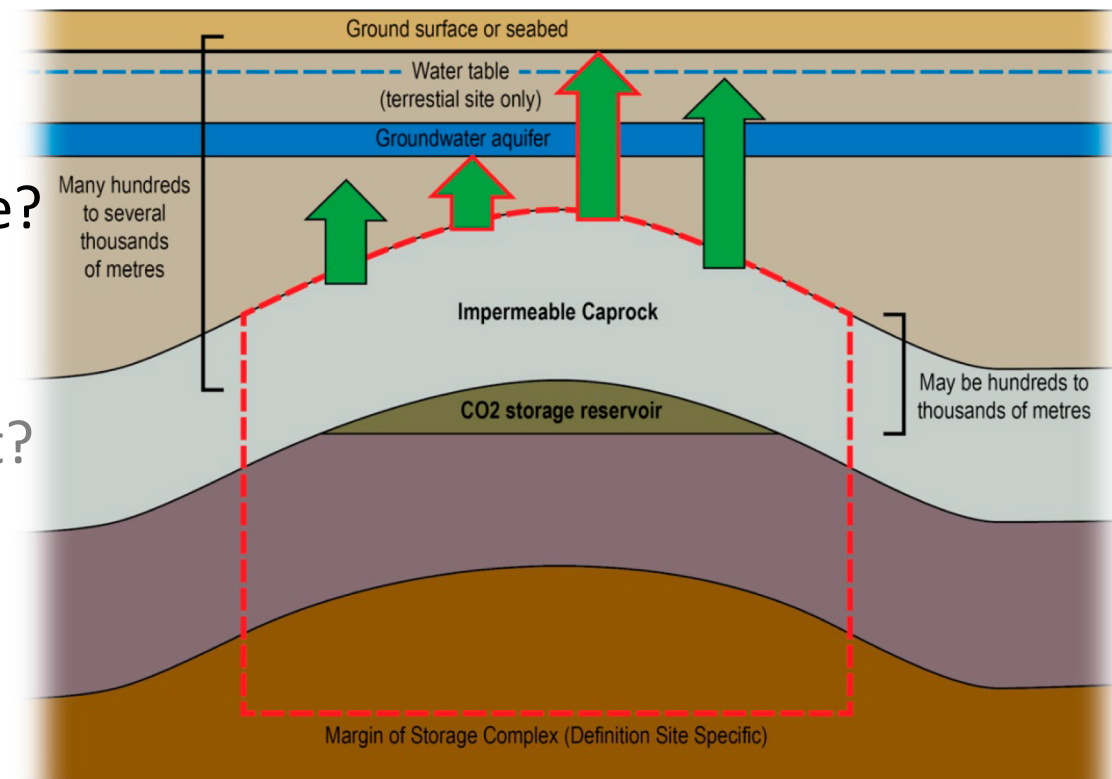
Climate Change?

What the public / insurance want?

→ regulatory

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i.e.: what counts as leakage?



RISCS Final Report (2014)

Challenges to communication: (2) Terminology

(b) Topic specific – deep jargon



Earth-Science Reviews
Volume 166, March 2017, Pages 132-152



Invited review

Shales at all scales: Exploring coupled processes in mudrocks

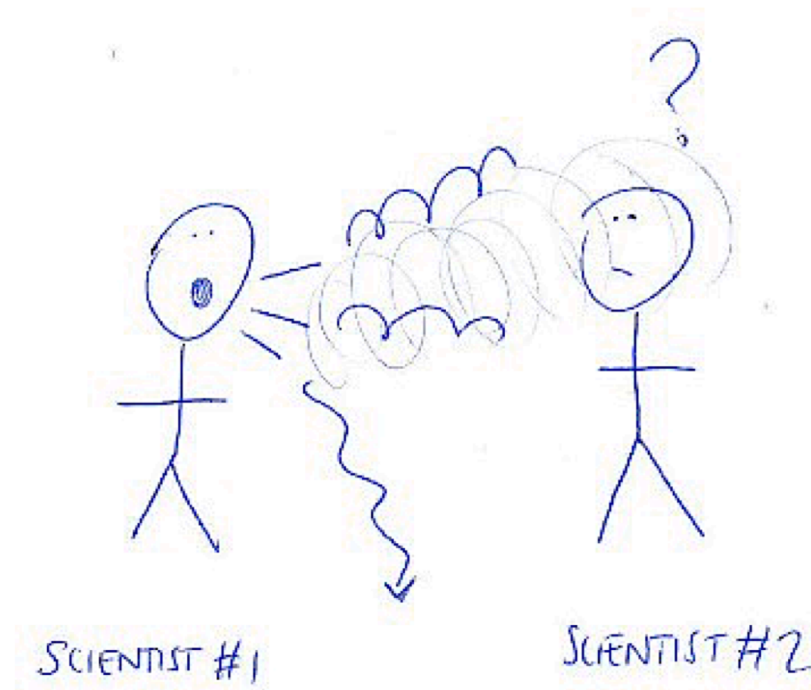
Anastasia G. Ilgen ^a, Jason E. Heath ^b, I. Yucel Akkutlu ^c, L. Taras Bryndzia ^d, David R. Cole ^e, Yousif K. Kharaka ^f, Timothy J. Kneafsey ^g, Kitty L. Milliken ^h, Laura J. Pyrak-Nolte ⁱ, Roberto Suarez-Rivera ^j

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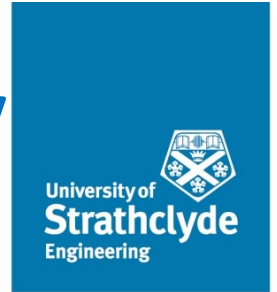
“Barriers of lexicon among geoscientists and engineers impede the development and use of conceptual models for the coupled thermal-hydraulic-mechanical-chemical-biological (THMCB) processes in mudrock formations”.



Jargon ==> also a problem for scientists.

Challenges to communication: (2) Terminology

(b) Topic specific – light jargon



Fracking: You are stimulating a well, ramping up the fluid pressures to crack the rock kilometres deep. It causes an earthquake. What happens?

→ the language matters

Q: Do you associate earthquakes with shale gas extraction?

Earthquakes?

Tremors?

Microseismic? Micro-tremors?

Felt? Unfelt?



vs.



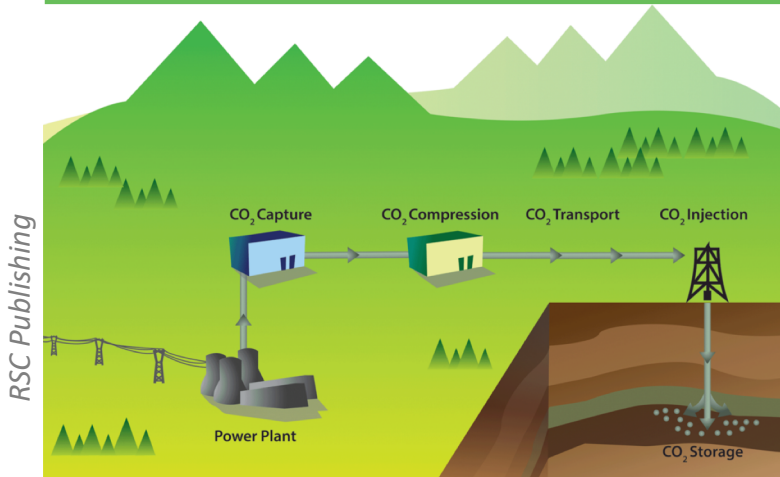
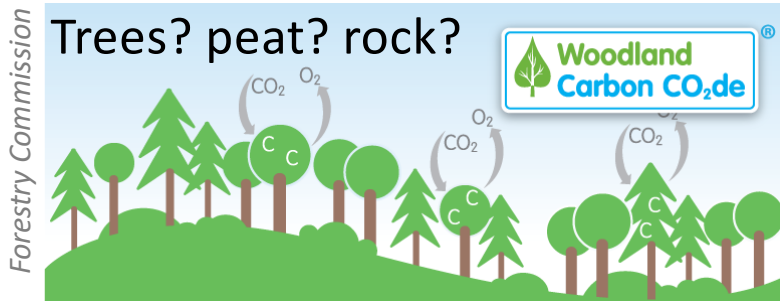
www.imoji.com

Challenges to communication: (2) Terminology

(c) Synonyms + Homonyms + Change



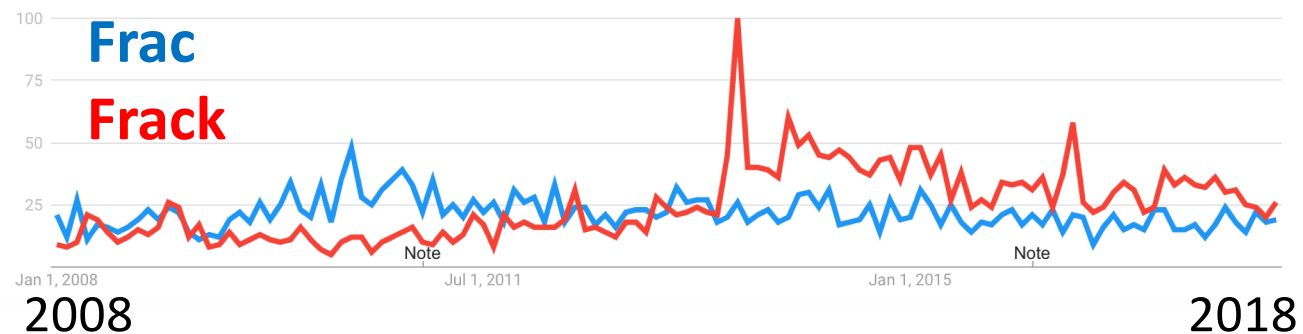
Carbon storage



CCS? CC(U)S? CCUS?

What about CCCTUS-MMV (+ BECCS + NETS)

Google Trends: UK Searches



Challenges to communication: (3) Uncertainty



Now, what I want is facts.

Thomas Hardy, Hard Times



Source: Priemco

Challenges to communication: (3) Uncertainty



What I do **NOT** want is
conflicting facts.

(Not Thomas Hardy)

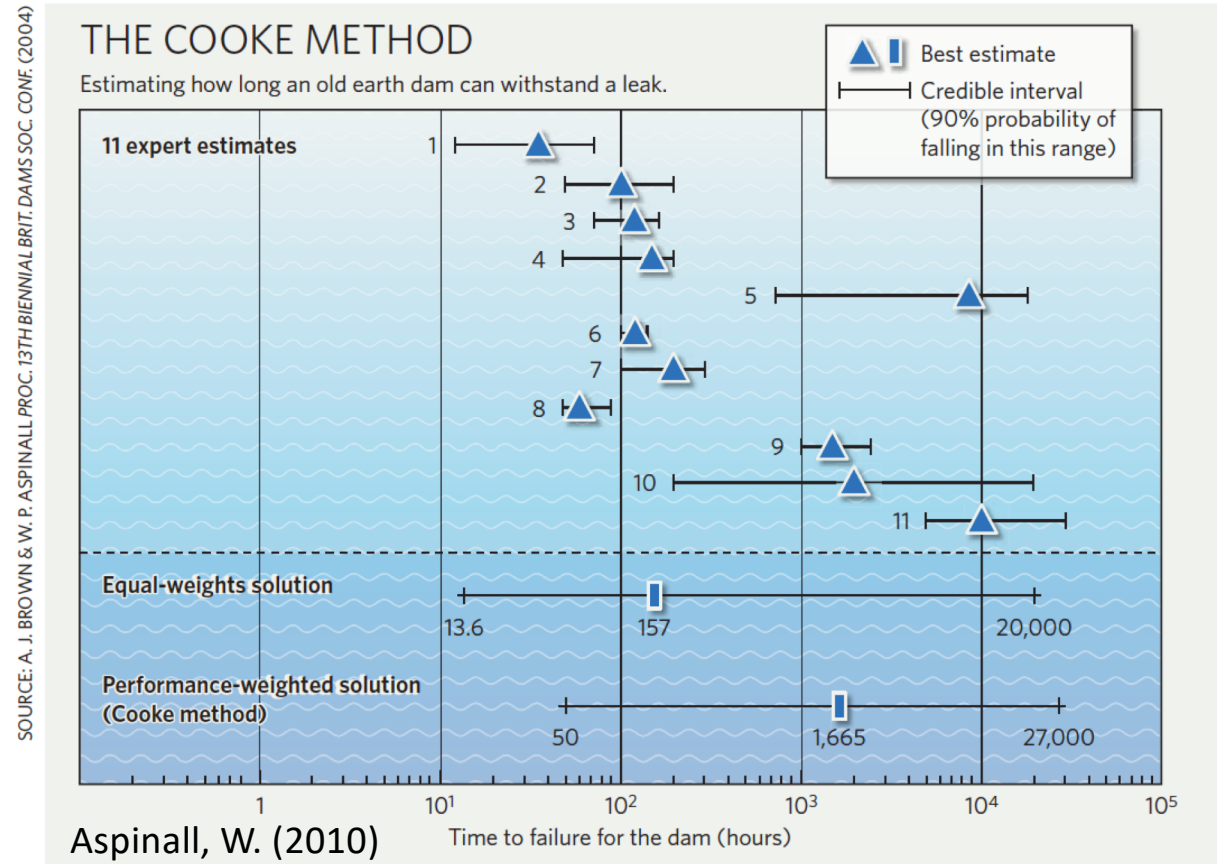


Source: Priemco

Challenges to communication: (3) Uncertainty

(a) conflict

Different experts say different things. Why?

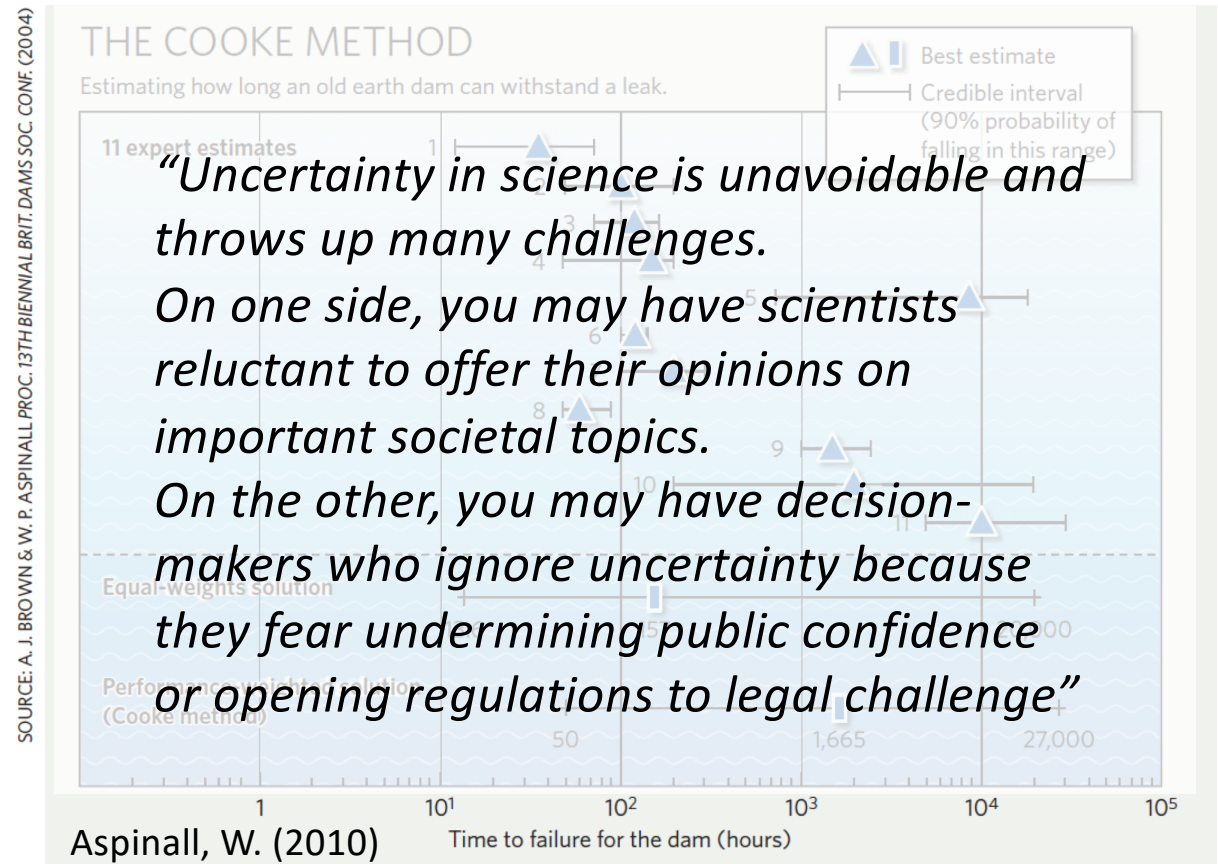


Challenges to communication: (3) Uncertainty

(a) conflict

Different experts say different things. Why?

And.... how much do the public's mind?



Challenges to communication: (3) Uncertainty

(a) conflict & change

Different experts say different things. Why?

e.g. Shale Gas Impacts:

Scope? Scale?

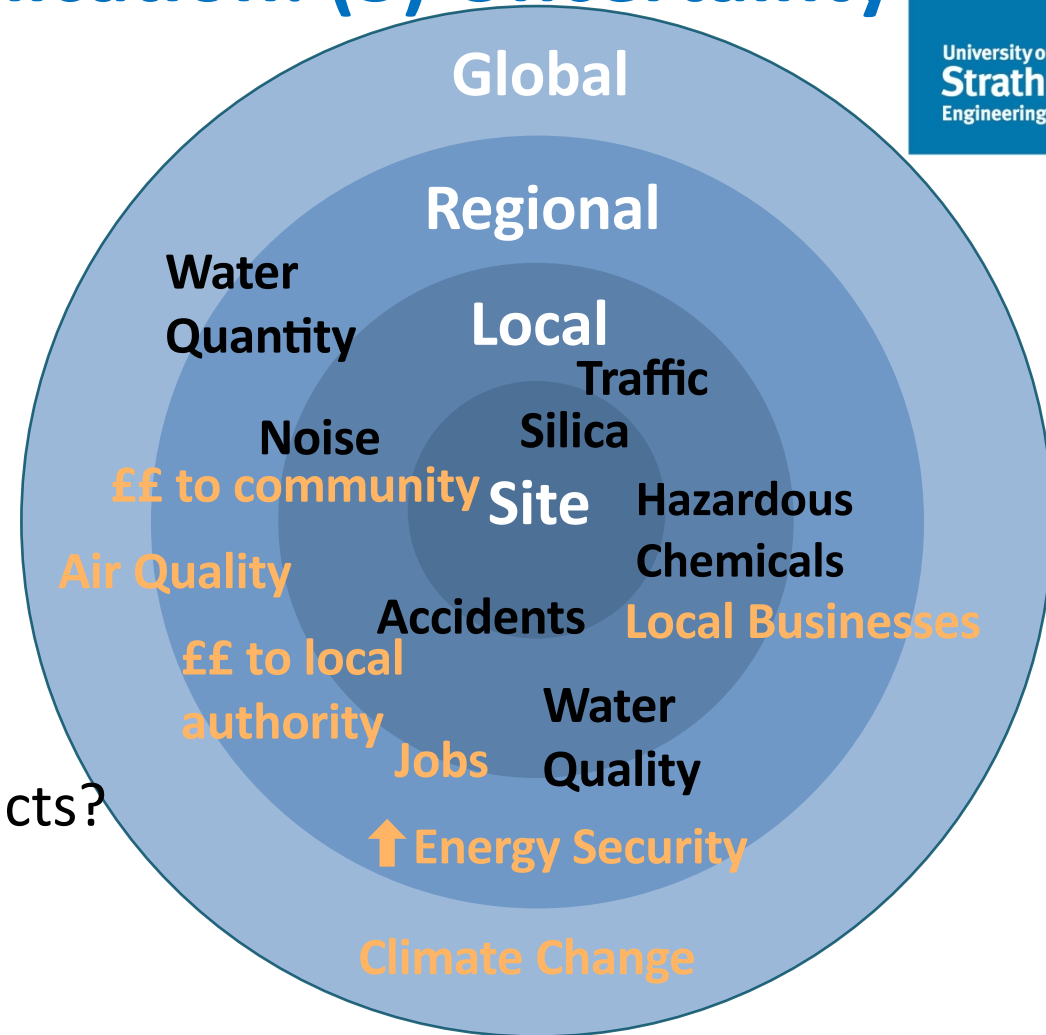
Who?

When?

In context with other risks/impacts?

Information is evolving

Adapted from Adgate et al. & North et al. (2014)



Challenges to communication: (4) Protocols

(b) Consultation → One-way?

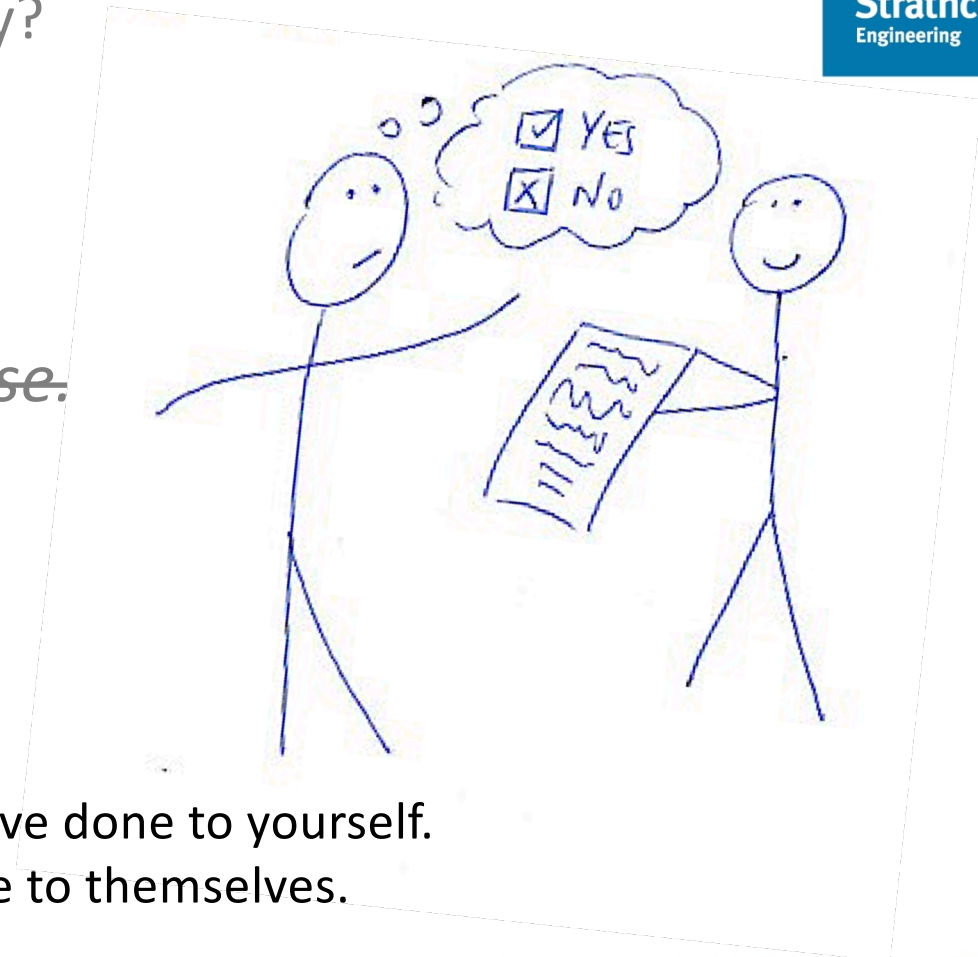
Emotionally loaded term

~~Consultation. NIMBY.~~

~~Social acceptance. Social license.~~

Scrutiny is a **Good Thing**.

Do NOT do onto others as **you** would have done to yourself.
Do onto others as **they** would have done to themselves.



Challenges to communication: (4) Protocols

(b) Consultation

One-way? → *loaded term*

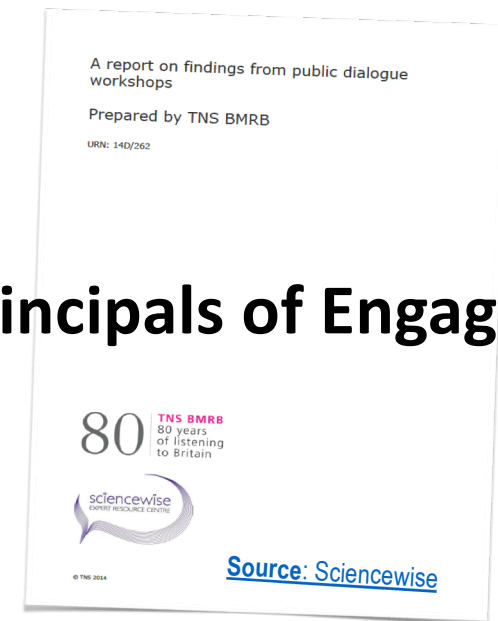
Engagement = Two way

Engage Better!



WE BELIEVE THAT PEOPLE SHOULD BE AT THE HEART OF DECISION-MAKING LEARN MORE →

Principals of Engagement



Challenges to communication: (5) The Future



“...it is difficult to engage in a serious public debate over risks or to develop an effective risk communications strategy if there is no actual project on which to present information.”

Challenges to communication: (5) The Future



Moving forward together

Getting the Science Right

Getting the Right Science

Getting the Right Participation

Getting the Participation Right

Synthesis
Reflexive i.e. listen & respond

North et al. (2014)

Challenges to communication: (5) The Future



Language challenges:

Concepts and context

Terminology

Uncertainty and change

Protocols

**Bear these in mind.
Be explicit.
We can do better.**

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