Results of the IGSC Safety Case Communication Group

15th NAWG Workshop

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U. Noseck (GRS), L. Bailey (RWM), G. Kwong (NEA)

IGSC: Integration Group for the Safety Case

- Working group of the Radioactive Waste Management Committee (RWMC)
- Establishes and documents the technical and scientific basis for developing and reviewing safety case
- Annual plenary meetings with in-depth discussions on emerging issues
- technical workshops to explore key topics in detail
- studies, joint projects, …
- https://www.oecd-nea.org/rwm/igsc/

IGSC
Integration Group for the Safety Case

Countries that rely on nuclear energy and materials have an ethical obligation to manage radioactive waste in a safe and environmentally responsible manner. For society to support the sustainable solutions envisaged, disposal concepts must be technologically sound and the safety of these concepts must be convincingly demonstrated.

Geological disposal and the safety case

Radioactive waste is produced in all phases of the nuclear fuel cycle, from the use of radioactive materials in industry, medicine, defence and research. The most hazardous and long-lived radioactive wastes, such as spent nuclear fuel and high-level waste from fuel reprocessing, must be isolated and contained for hundreds of thousands of years. Disposing of waste in engineered facilities or repositories located deep underground in suitable geological formations is being pursued worldwide as the preferred disposal option. The concept of a **geological disposal facility takes advantage of both the capabilities of local geology and those of engineered materials** to isolate and contain radioactive materials for ther required timescales.

For society to agree to such deep geological disposal facilities, they must be shown to protect humans and the environment both in the short and long term. **The safety of a disposal facility is evaluated and documented in a "safety case"** that supports decision making at each stage of facility development. It presents the underlying evidence and methods that allow for increased confidence in the quality of scientific and institutional processes, as well as in the results of analyses.

The IGSC mission

The Nuclear Energy Agency's Integration Group for the Safety Case (IGSC) establishes and documents the technical and scientific basis for developing and reviewing safety cases as a platform for dialogue among technical experts and as a tool for decision making. The IGSC addresses various strategic and policy aspects of radioactive waste management as the technical advisory body to the NEA Radioactive Waste Management Committee (RWMC) for all issues related to repository development.

For more than two decades, the IGSC and its predecessor technical groups have promoted the **exchange of national experience** in evaluating and implementing geological repositories. IGSC activities foster **consensus on best practices** and encourage the **development of innovative, advanced approaches** covering the technical aspects at all stages of repository implementation, including:

- strategies to characterise and evaluate potential disposal sites;
- methods to design and test engineered barrier systems;
- priorities for research and development programmes to improve the understanding of important processes and interactions;
- tools for safety assessments;
- techniques for the effective presentation and communication of the results of safety cases and other factors that provide the basis for increased confidence in the safety of geological disposal facilities.

The IGSC has been instrumental in further developing the "modern safety case", a concept that originally emerged from NEA work in the 1990s. Co-operation with the International Atomic Energy Agency (IAEA) and the European Commission (EC) has led to the worldwide adoption of this safety case concept.

IGSC membership and operation

The IGSC comprises **senior technical specialists and managers** from national waste management programmes, regulatory agencies, and research and technical support institutions.

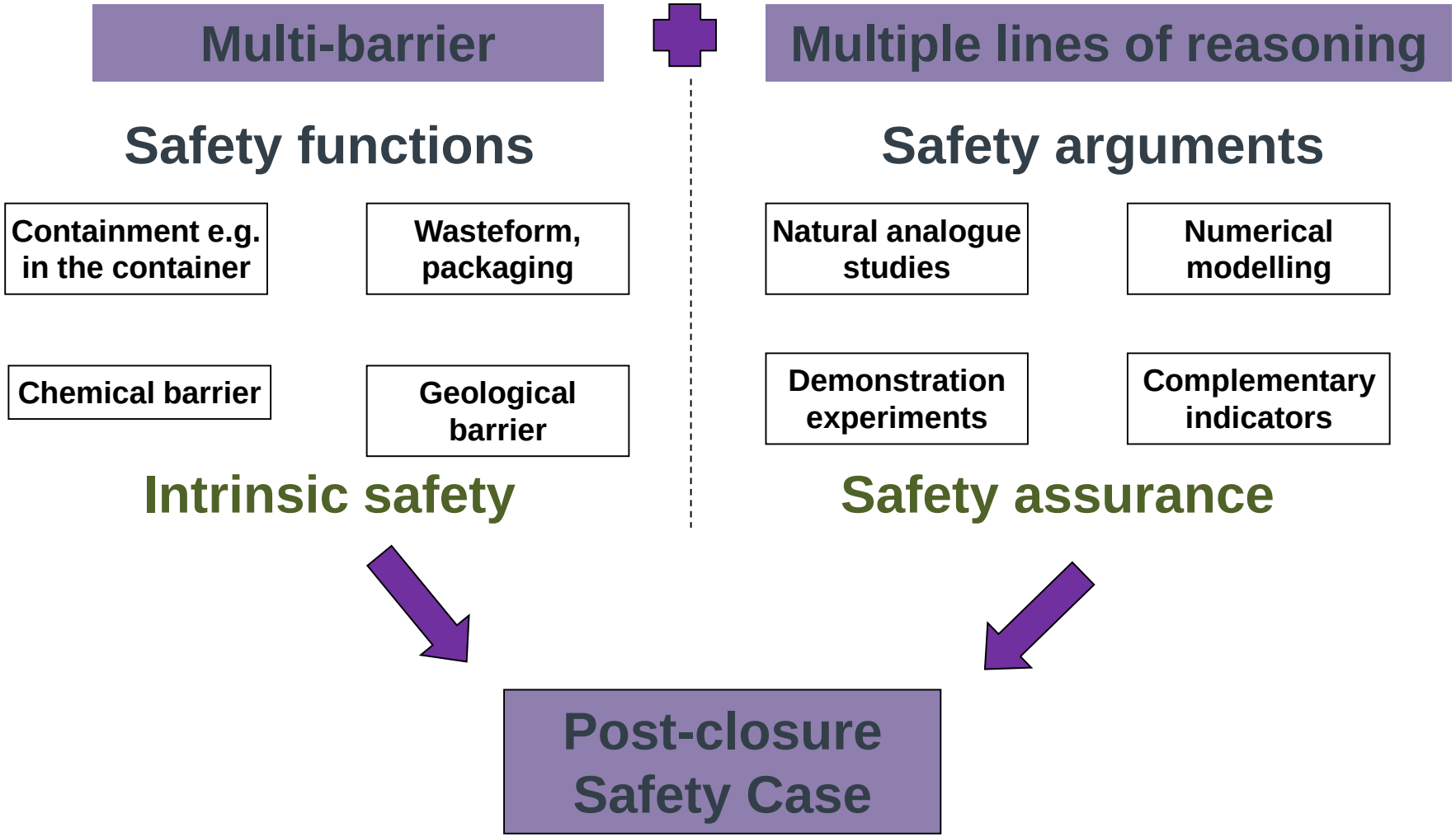
The Safety Case and its Use

- A safety case is a formal compilation of evidence, analyses and arguments that quantify and substantiate a claim that the repository will be safe;

- A safety case is presented to support a decision, to help review project status, to test safety assessment methods, or to prioritise R&D activities.

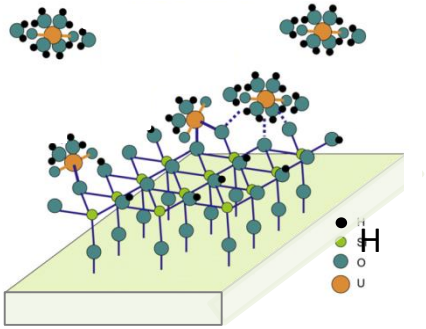
- Therefore it is important to be able to communicate the safety case to a wide range of audiences – including regulators and technical experts, but also general public, especially local community stakeholders

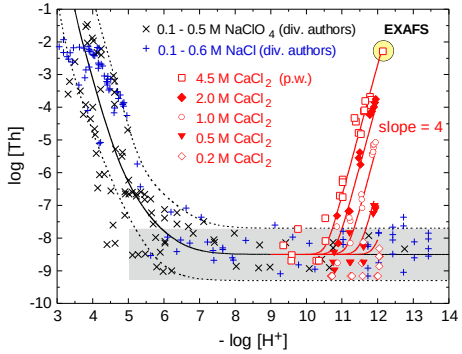
Communicating a multi factor safety case

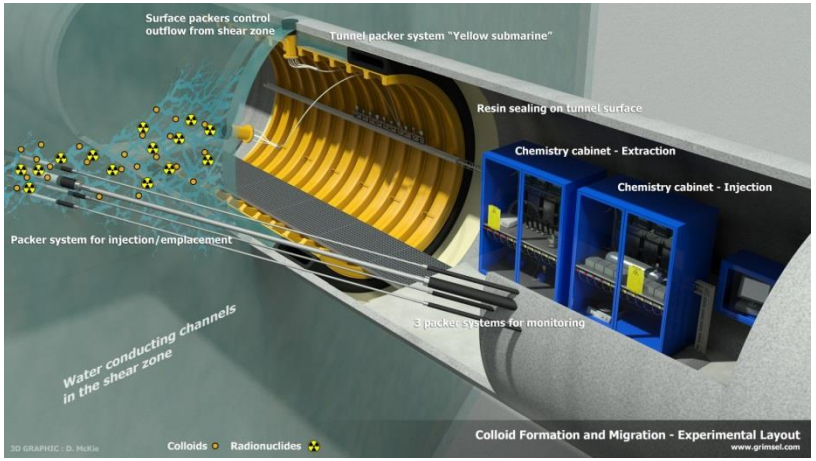


Safety Case Communication – The challenge

$$j(t) = \left(j_r \exp\left(-\frac{Q_G}{RT(t)} \right) \right) \cdot \left(1 - \frac{C_{Si}}{C_{Si,sätt}} \right) + j_\infty \exp\left(-\frac{Q_\infty}{RT(t)} \right)$$

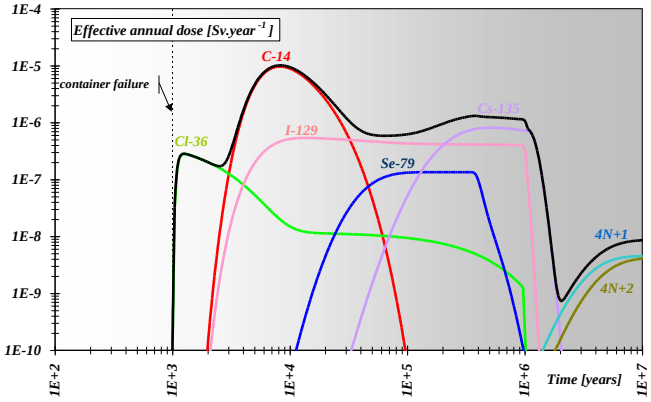


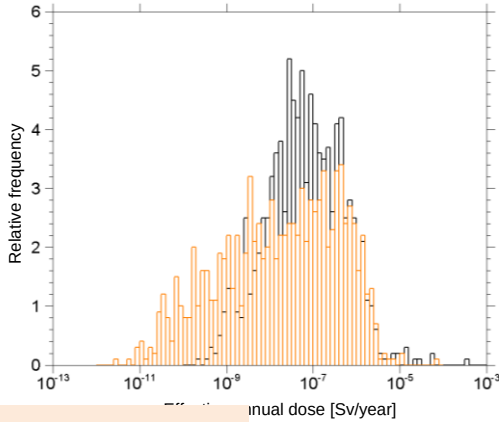




Various type of models

Complex lab and in-situ experiments





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Safety assessment results

Safety Case Communication - Background

Working group members

- Lucy Bailey, RWM
- Frederik Bernier, FANC
- Wilhelm Bollingerfehr, DBETEC
- Miguel Cunado, Enresa
- Doug Illett, EA
- Gloria Kwong, NEA
- Ulrich Noseck, GRS
- Klaus Röhlig, TUC
- Abraham van Luik, USDoE
- Jan Weber, BGR
- Eef Weetjens, SCK-CEN

1st report is available : http://www.oecd-nea.org/rwm/igsc/

Studies / events evaluated

NEA projects

- NEA status report Indicators in the safety case
- FSC topical session on natural analogues
- NEA INTESC report
- NEA IPAG report: Establishing and Communicating Confidence in the safety of deep geological disposal: Approaches and arguments, 2002
- NEA reports on Monitoring of Geological Disposal Facilities
- Reversibility and Retrievability (R&R) project
- Various NEA flyers

EC projects

- SITEX
- PAMINA report on stakeholder workshop
- Nanet – natural analogues role in pubic communication
- MoDeRn – communication deliverables
- RISCOM II project, 2003

National activities

- Het veiligheidsdossier, Level 0, Belgium
- Licence application for Yucca Mountain, US
- Compliance certification application and recertification applications of the WIPP, New Mexico, US
- Information meeting on hydrocarbons in the Gorleben salt dome, Germany
- Application f. disposal of further radioactive waste at the Low Level Waste Repository in Cumbria, UK

Stakeholder communications

- Stakeholders are “interested and affected parties” impacted by a government decision (Holm, 2011)
- Public as a stakeholder is not a homogeneous group and likely non-technical in terms of understanding repository science and engineering
- Early stakeholder involvement enables understanding of the issues from the stakeholder perspective
- Planning and strategy facilitate a successful communication

Stakeholder communications

- The following elements should be addressed in communication planning
  - Define the scope and objectives for any given communications effort
  - Derive the central messages to be communicated
  - Identify target groups and tailor the messages for understanding technical subjects
  - Select communication channels and tools to deliver the information and key messages in an effective manner
  - Design instruments and practices, including shared platforms, that allow communications effectiveness to be achieved and measured

  Fostering confidence and information exchange among stakeholders

Building technical understanding and capacity

Sustainable decision-making

Building technical understanding and capacity

- Local communities may lack of competences. Capacity building helps communities to understand complexity of RWM
- Provide platforms to promote networking of local communities – share and discuss experience / concerns, to learn from each other and form stronger linkage
- Allow enough time for stakeholders to develop dialogue, to grasp the issues at stake, but too long a process may cause "fatigue"
- Maintain periodic interface to keep up the technical capacity, assure understanding and acceptance

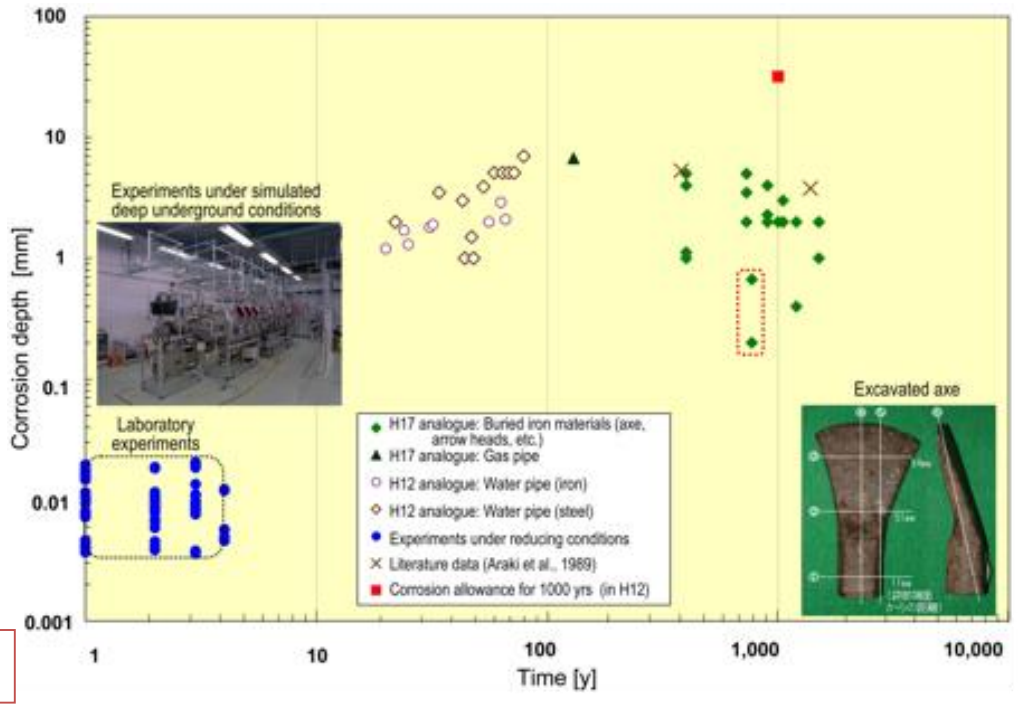
Communicating specific safety case aspects

- Purpose and context of the safety case
  - Programme context, decision-making plan and schedule
- Lessons learned
  - from previous iterations of the safety case
  - by relatable, safety cases (abroad), peer reviews, ...
- Safety requirements in the regulations and the regulator's role
- Facility's safety functions/why repository is likely to function as intended
- Explicit statement
  - what is known / unknown on a scientific basis,
  - quantify risks and describe uncertainties in context of overall safety

Communicating specific safety case aspects

Appropriate use of **analogues** can facilitate dialogue

Important to mention limitations of an analogue



Inchtuthil nail

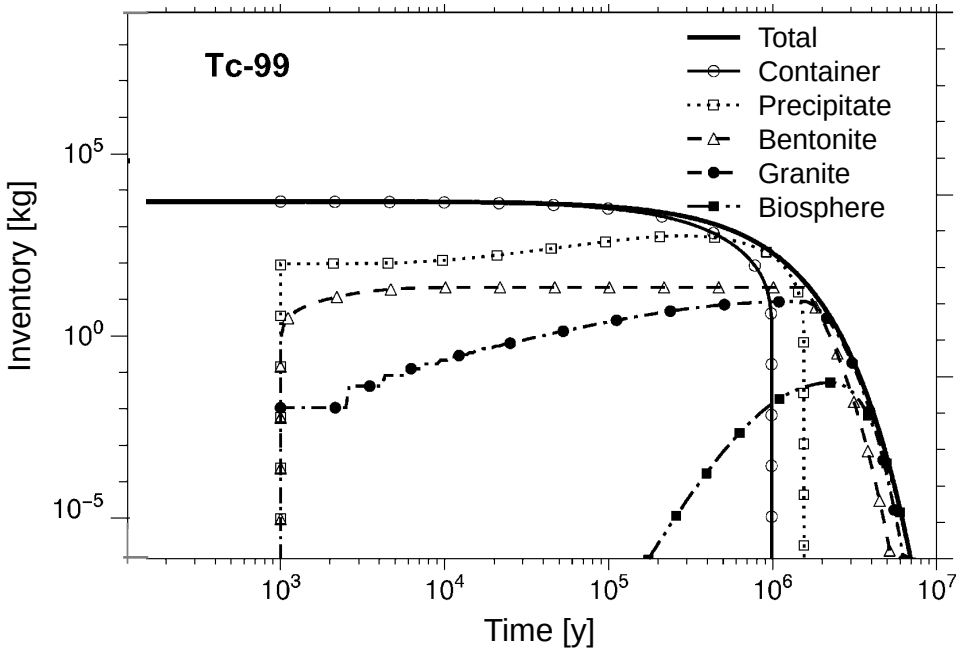
Kronan Bronze cannon

Alexander 2006

Communicating specific safety case aspects

Use of **indicators** complementary to dose and risk

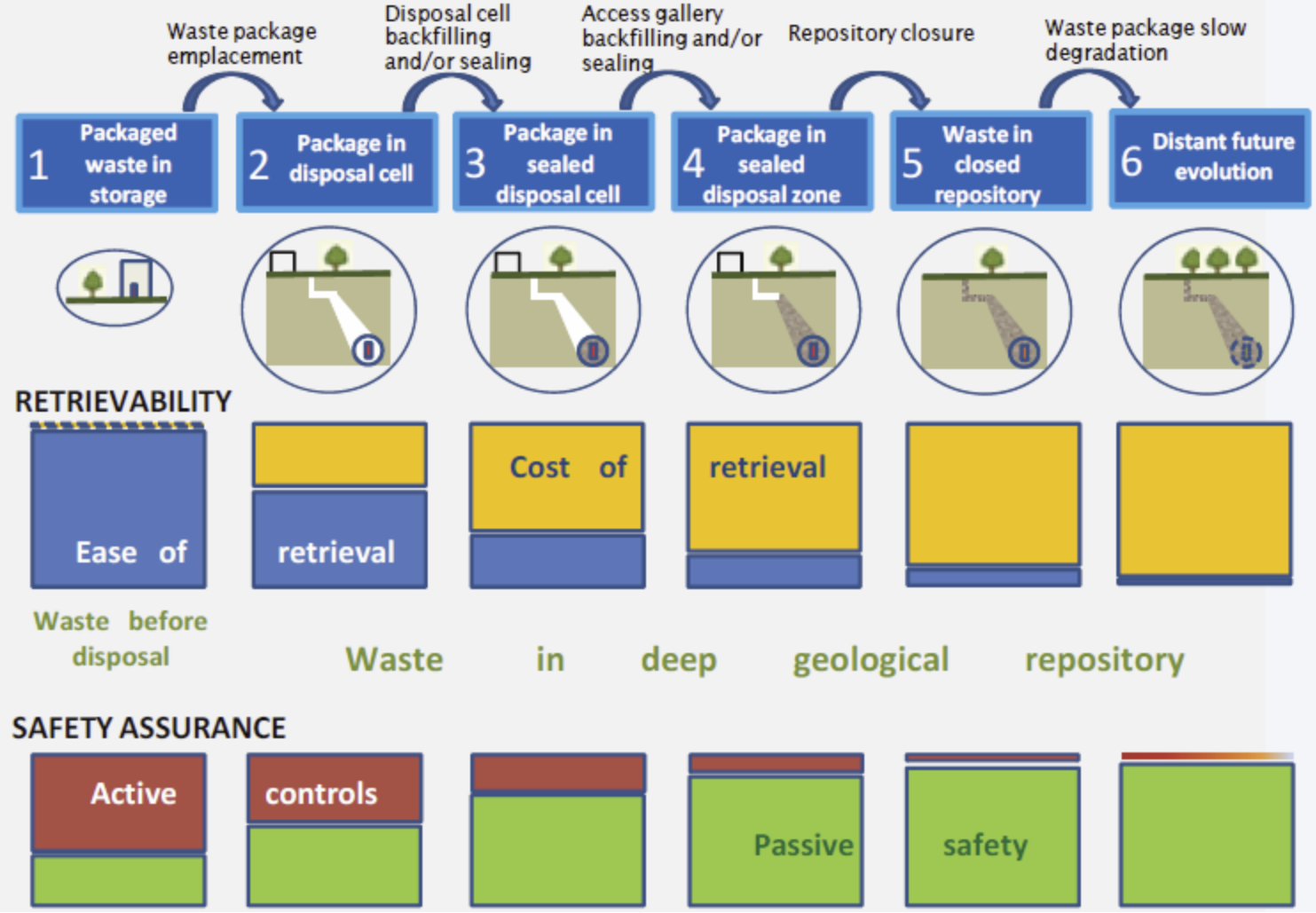
Engage stakeholders in developing use of relevant indicators



Question of concern	Matching indicator
Will the local river be polluted?	Maximum concentration of waste derived radionuclides in local river water and the time at which it occurs, compared to present day tap water quality
Will my great grandchildren be able to swim at the nearby beach in summer?	Amount of waste derived contamination that will accumulate on the foreshore over the next hundred years.

Communicating specific safety case aspects

- **Recovery and Retrieval**



Communicating specific safety case aspects

- **Monitoring**

- Monitoring may consist of qualitative and quantitative parameters and can be an effective means to address public concerns if set up appropriately

- **Clear rules** governing the planning and performance of monitoring as well as the **sharing of the results** will avoid a potential distrust in the information

The awareness challenge vs. the avoidance of surprises

- Awareness among the public is often low until a community becomes affected and thus concerned – might be perceived as a "negative surprise"
- After siting, more "surprises" might concern the amount of RW, transportation, the size / function of the surface facilities, etc.
- "Surprises" might be amplified by mass media
- Avoid "surprises" by communicating all salient aspects
- Early involvement of news media, e.g. seminars, focus groups, can be helpful in balancing news values and correctness of information

Divergent views amongst stakeholders and expert dissent

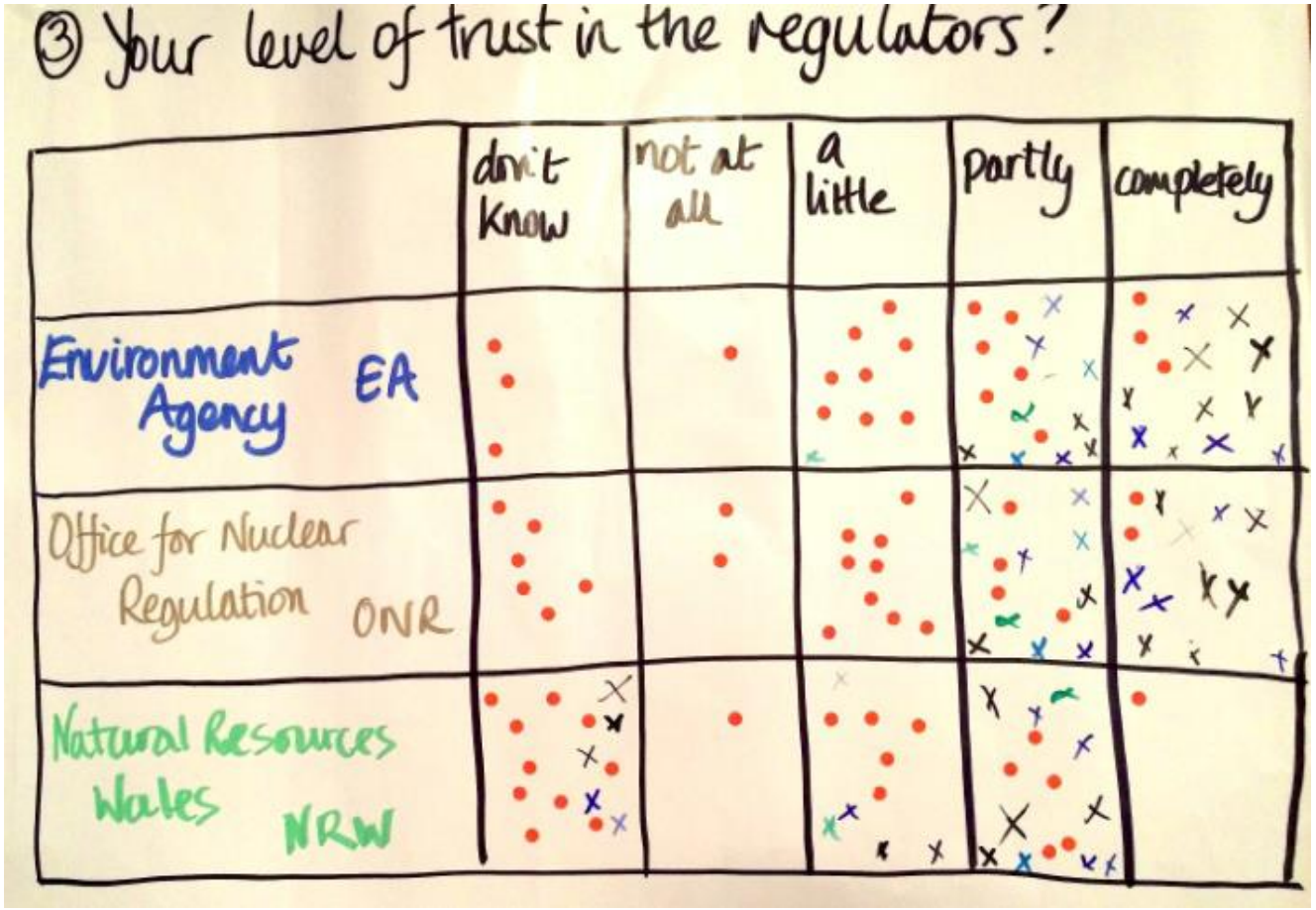
- Divergent views are unavoidable even about fundamental issues
- Downplaying divergence or claiming only experts can competently address the issues at stake may induce mistrust
- Consider addressing divergent views through two-way dialogue
- Successful communication is a team effort, requires technical experts as well as leadership – this is an important public confidence enhancing approach

Dealing with general misgivings concerning the L-T safety of DGR

Fundamental doubts in the public about deep geological disposal
→ crucial to communicate:

- Our society cannot "guard" the waste in the very long term
- Geology offers a solution, "deep rock is more stable than society"
- Oversight for as long as achievable – even if not relied on for safety
- No intention to 'abandon' the disposal facility
- Over such long timescales, uncertainties are inevitable
  - be honest about the uncertainties
  - explain how addressed and that they will be subject to regulatory scrutiny
- Geological disposal is the most practical, practicable, and ethically acceptable way to remove risk from the "biosphere"

Improving trust and confidence in regulator decisions



● start of the workshop

x end of the workshop

Public involvement in reactor design assessments, UK, Environment Agency, 2015

Conclusions and outlook (1)

- Communication is essential in DGR development;
- Implementers and regulators ought to each be involved in stakeholder outreach and dialogue
- For effective communications among stakeholders, there are clear benefits for technical experts to hone their communication skills and communication experts to be integrated into the development process

Conclusions and outlook (2)

- Joint workshop on collaboration between IGSC and FSC (Forum of Stakeholder Confidence): “Safety Case Communication”
- Paris, 14./15. September
- Presentation of Case studies from France and Finland
  - View of the implementer
  - View of a local community
- Discussions in working groups (World Cafe, …)
  - What are the most important concerns expressed by stakeholders?
  - Experience with stakeholder interactions: Which issues related to natural sciences, engineering, and safety are most important in the discussions?
  - How to help audience to understand uncertainty & complexities?

Thank you for your attention!

- Participation of a few members from NAWG are welcome !