

"Hazard – risk – safe"

The need to speak clearly and chose our language carefully



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In public discourse, these words are sometimes used interchangeably; in technical fields they may have distinct and specific meanings. We need to be able to discuss these subjects freely at times and to translate between those domains consistently to reduce misunderstanding.

Hazards Forum: a place to discuss hazards, risks, trade-offs, consequences and lessons learned

Set up to enable interdisciplinary learning between professionals for the prevention and mitigation of hazards and disasters, the Hazards Forum was founded by the UK's four principal engineering institutions in 1989. It now has members from other engineering bodies, industry, and the public and charity sectors. Its vision is to be widely recognised as the independent enabler of the most needed debates and as a key source of interdisciplinary knowledge on the control of major hazards.

To bring definition to those discussions, three interest groups have been formed within Hazards Forum (see Box). These

allow members to be part of important discussions on topical issues, as well as create positive change within their own field. Members of the groups meet regularly to learn from different industries and understand how others respond to specific hazards. The aim is that members can find solutions to problems they may experience in their industry and pass on useful practices that can be implemented elsewhere.

Each interest group aims to inform and educate by sharing the latest research tools, methods, solutions and best practice. They also provide a forum in which interdisciplinary practitioners and decision-makers can connect and interact. Members hear from guest speakers, discuss topics of mutual interest, and share lessons, with the aim

of turning their deliberations into high quality events imparting information and sharing insights which are made available for the public benefit.

One such event recently was a webinar hosted by the Parliamentary and Scientific Committee in partnership with Hazards Forum in January 2025. Speakers were Richard Roff, Helen Meese and Anne Davies.

Reflections on the internal and external language of risks, tolerability and trade-offs from Hazards Forum's interest groups

An important starting point is to understand that hazard is not the same thing as risk. A definition of hazard might be something with the potential to cause harm, but this must be combined with an understanding of likelihood before we can say anything about risk and we should also understand how significant the harm could be: Risk is, therefore, a combination of our understanding of 'how bad?' and 'how often?' when a hazard can move out of control.

This understanding of risk can be challenging where we have less information about either of those questions, in situations where probability gives way to uncertainty – Helen Meese discusses uncertainty in her article elsewhere in this issue of SiP.

Risk practitioners may use shorthand language or mathematical terms in their internal discussions alongside a deep understanding of the assumptions that

BOX: HAZARDS FORUM INTEREST GROUPS

Interest Group 1: Natural Hazards

Focuses on natural hazards and disasters, such as those that would occur in nature without any human influence (e.g. flooding, earthquake, lightning etc.) as well as those influenced or induced by human activity (e.g. climate change, pandemic etc.)

Interest Group 2: Engineered System Hazards

Focuses on hazards arising from failures of engineered equipment, constructions, products and processes (or systems of these, or in the control of these), which could lead to catastrophic incidents resulting in significant injuries to people, significant damage to the environment, or large financial loss.

Interest Group 3: Emerging and Future Technology

Focuses on new technologies and risks that arise, or are inherent to these technologies, to enable a robust and resilient society (e.g. digitalisation, automation and AI, new energy, new materials and advanced manufacturing).

underpin those, but, even here, it is important to support consistency by thinking about those assumptions in advance – if we say an event or outcome is ‘probable’, then two people may have a different understanding; if we define probable, then, as something like ‘could occur during remaining lifetime of installation. Underlying causes have been seen during lifetime of the installation’, then there is likely to be convergence on what that means, and risk assessments will be more consistent across assessors and across time.

When thinking about the translation of this information to other domains, mathematical language can be unhelpful but the concern about consistent understanding remains. Use of natural language to describe probability is helpful in broad communication but people may struggle to understand the timeframe or the size of a population that a risk applies to when taking in that information. If the probability of rain is 1 in 10, does that refer to just here? Across the whole day or an hour? Indeed, how many drops are needed for it to be rain...

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Reducing risk – how far should we go?

With respect to health and safety at work and environmental laws there are requirements to reduce risks so far as is reasonably practicable. Although any test of whether that is achieved is strictly only applicable in court, the idea of reasonable practicability means that there is a point at which it is not worth (in terms of burden) doing any more to reduce risks further – there is therefore a level of harm that can be seen as tolerable to society for the benefit that society derives from a particular work activity and its output.

Here again, discussion of this outside technical domains may be challenging – a societal good may apply unevenly, a harm likewise. However, there is no such thing as zero risk and it is incumbent on

everyone communicating in this field, whether policy-maker, technical expert or professional communicator to be clear about this and help the public to recognise the assumptions and trade-offs being made. We should probably steer well clear of terms like zero and never altogether here; however much we wish it weren’t so, they make promises they cannot keep.

A place for judgement?

When making decisions about where to apply limited resources, trade-offs may need to be made. It may be necessary to compare non-equivalent risks e.g. structural strength vs. embedded carbon. Here standards are vital for engineers and technical staff, but occasionally there are limitations to their application and people must apply judgement.

Hazards Forum’s interest group on engineered systems has spent some time discussing how and when professional engineering or other technical judgement is applied, concluding that there will always be a place for this in a continuum of decision-making tools, that diverse expertise (knowledge and experience combined) is essential, that a consistent approach helps those involved and that clearly recording the process allows for subsequent audit and continuous improvement.

Complexity and resilience

Some time ago, Charles Perrow proposed the idea of ‘normal accidents’; once a system or product or process was sufficiently complex then there would eventually be a failure no matter what was done to reduce risk – failure would be ‘normal’ not exceptional. His preconditions for this were:

- The system is complex
- The system is tightly coupled (a failure in one part leads rapidly to failures in others)
- The system has catastrophic potential

Other things to consider when thinking about this are:

- Cascading or interconnected risks and the difficulty in modelling these (about which Hazards Forum is running an event on 9 October in Manchester)

- Creeping or cumulative change where small alterations in approach have each not been assessed as significant but where the total change has moved the situation, and therefore risk, some way from the original.
- Knowledge about hazards and understanding of effects may change over time so what is acceptable, the ‘goal-posts’, may also move.

Complex is an appropriate term for modern society, so this adds further weight to the avoidance of talking about zero when discussing risks. This is not an argument for neglecting the systems we have put in place to reduce the risks, but it does suggest a focus on resilience rather than on further risk reduction in some cases – the ability to recover quickly after some significant failure or unwanted event may benefit an organisation or wider society more than moving a low likelihood event to a slightly lower likelihood event. It may cost less overall too.

In communicating this in the public sphere it is possible to run into expectations of perfection. However, most people would recognise that ‘stuff happens’ and an organisation that can recover relatively smoothly while keeping its stakeholders informed will probably be seen in a better light in the long-run.

Parliament’s role in discussing risk

As important communicators in the public sphere parliamentarians have a vital role in helping discussion of risk to be fact-based, honest and transparent. Helen Meese makes a similar plea in her article, but I would ask you:

- Not to be afraid to ask for clarity and context from others; make sure you speak with similar clarity and include context.
- Not to shy away from discussing trade-offs, engage people in this and identify societal goods alongside recognised potential harms.
- To spend time engaging with expertise in technical fields to both understand the details and challenge assumptions.