How Low *SHOULD* We Go?

Musings on Remediation, Risks and Realities

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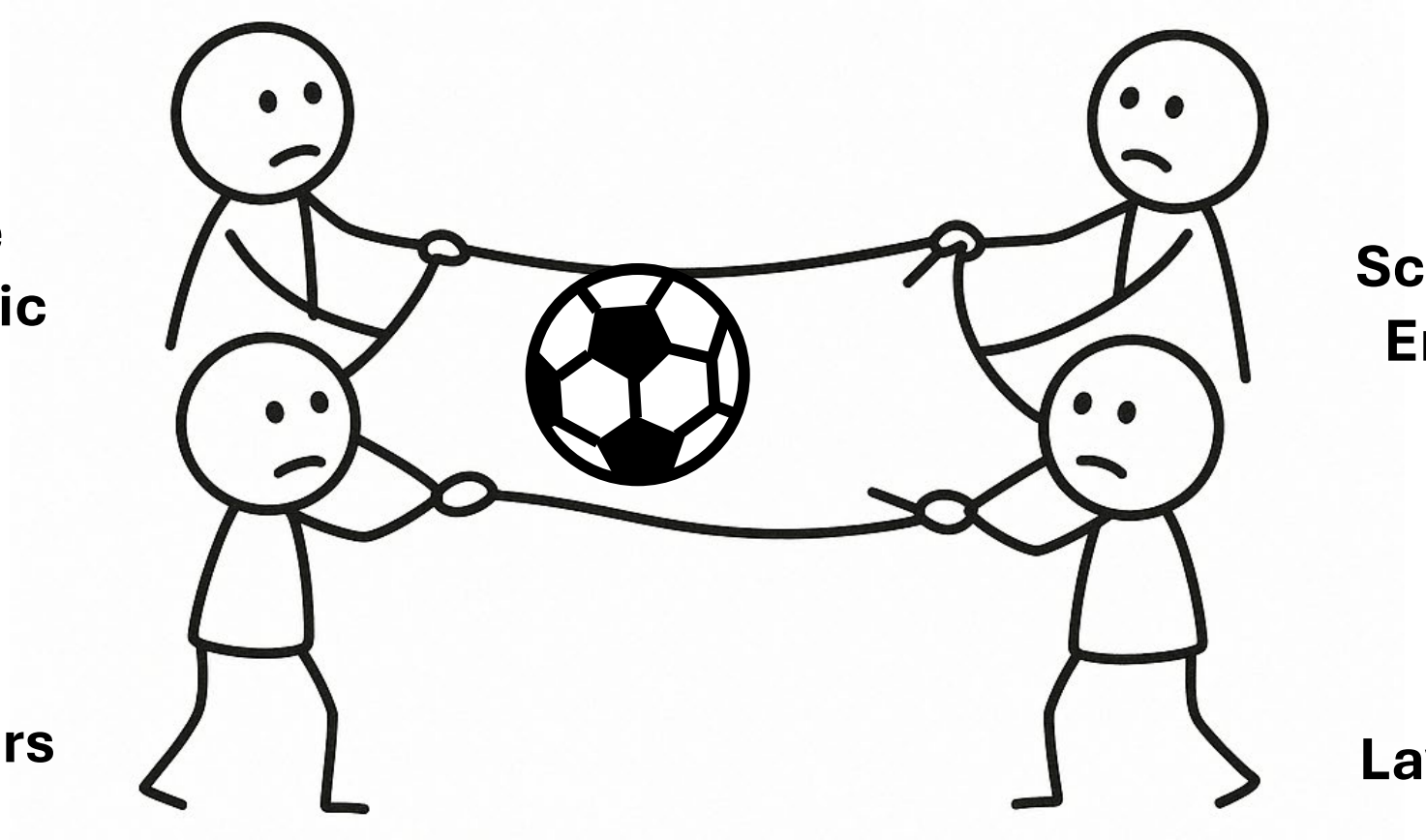
And I will mix metaphors for free

Reality of Regulations & Policy

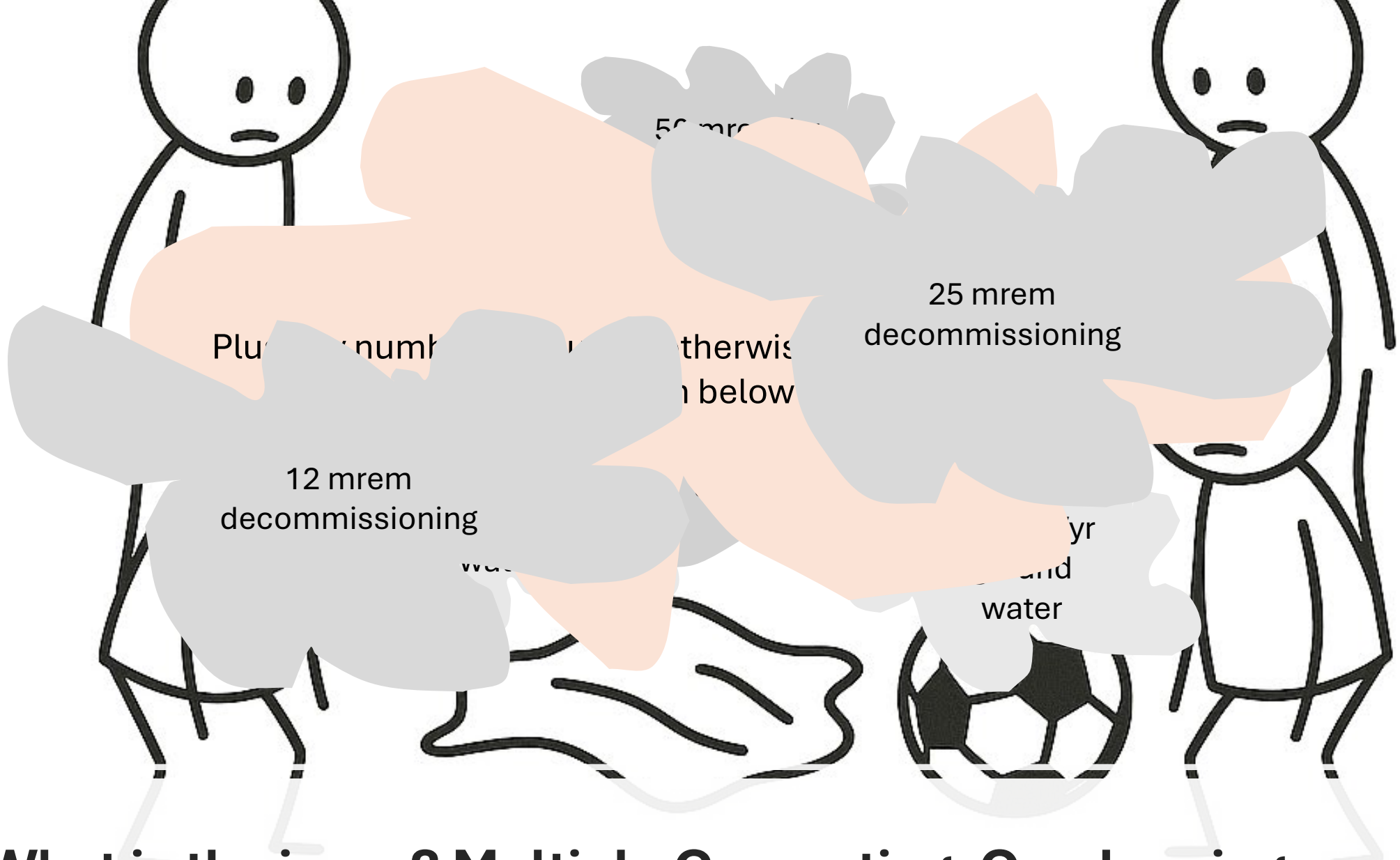
The Public

Scientists & Engineers

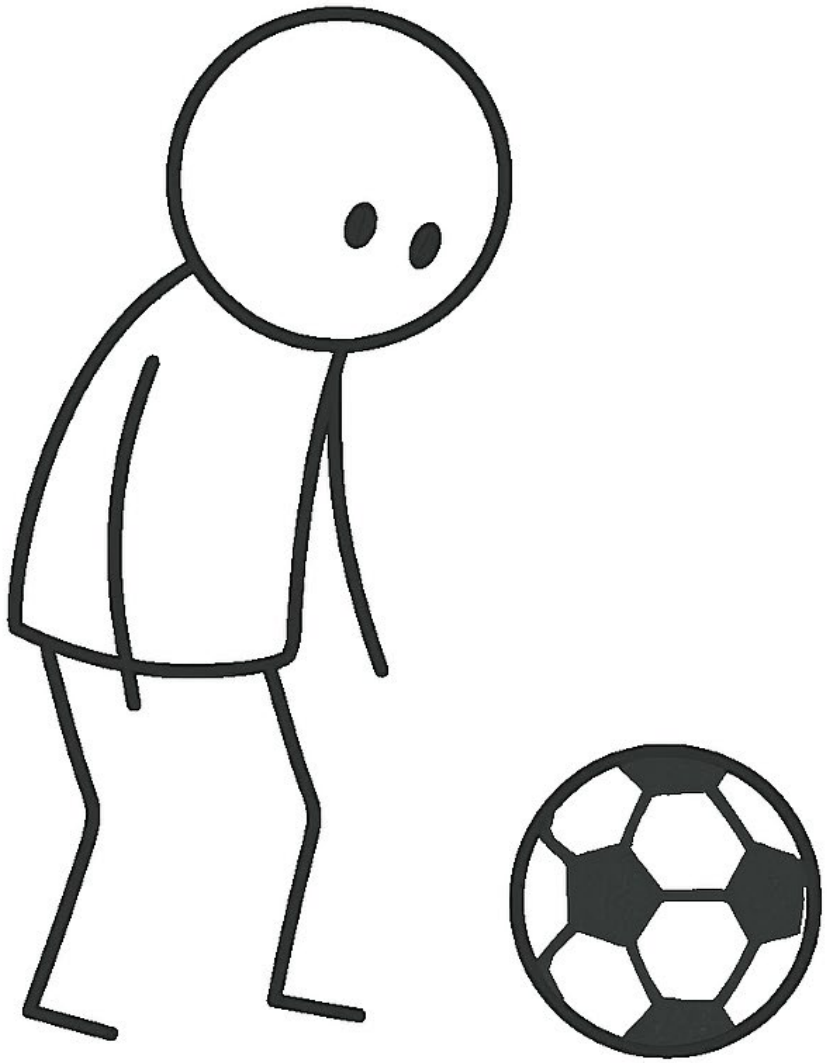


Regulators

Lawyers



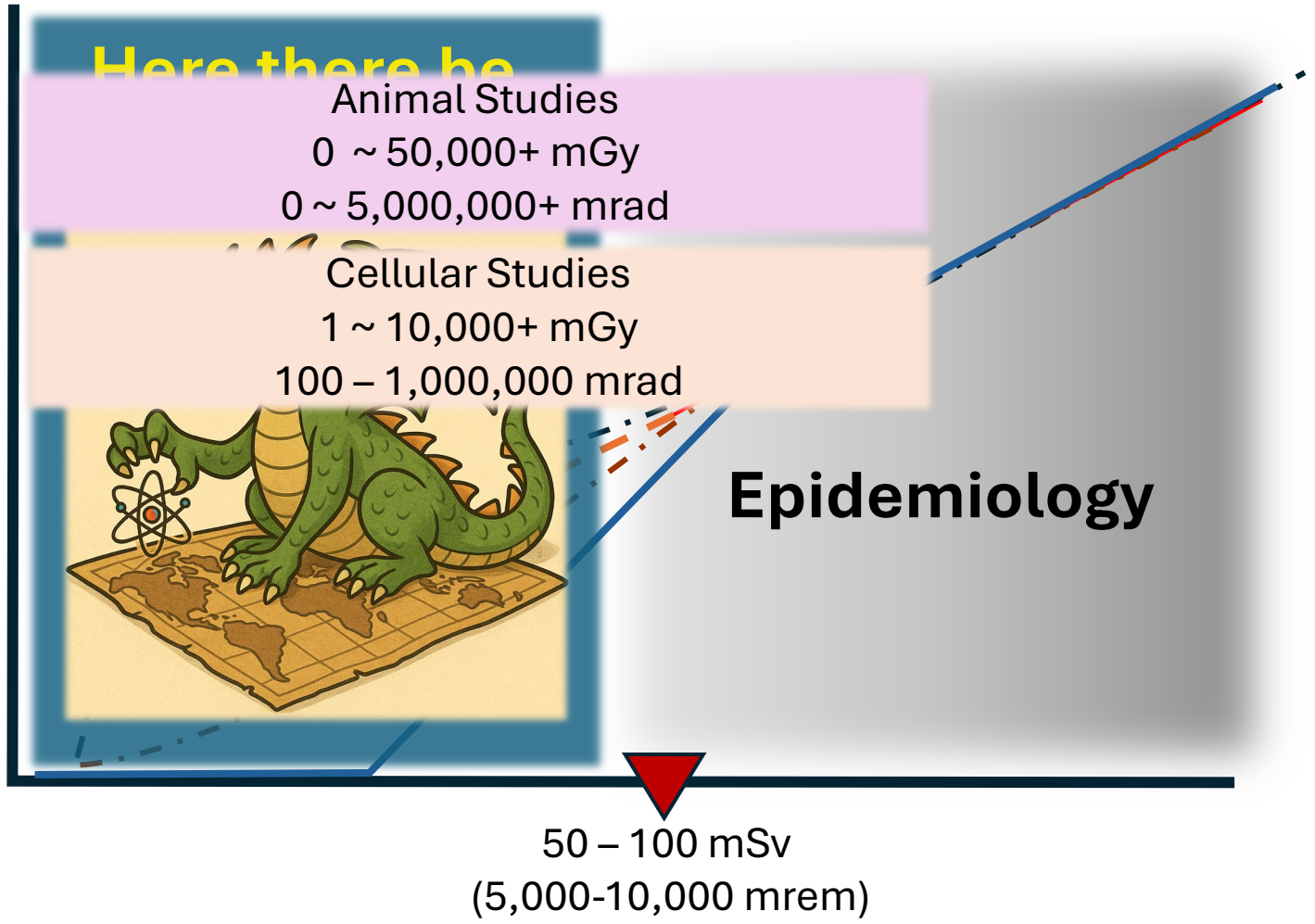
What is the issue? Multiple Competing, Overlapping or Confusing Regulations



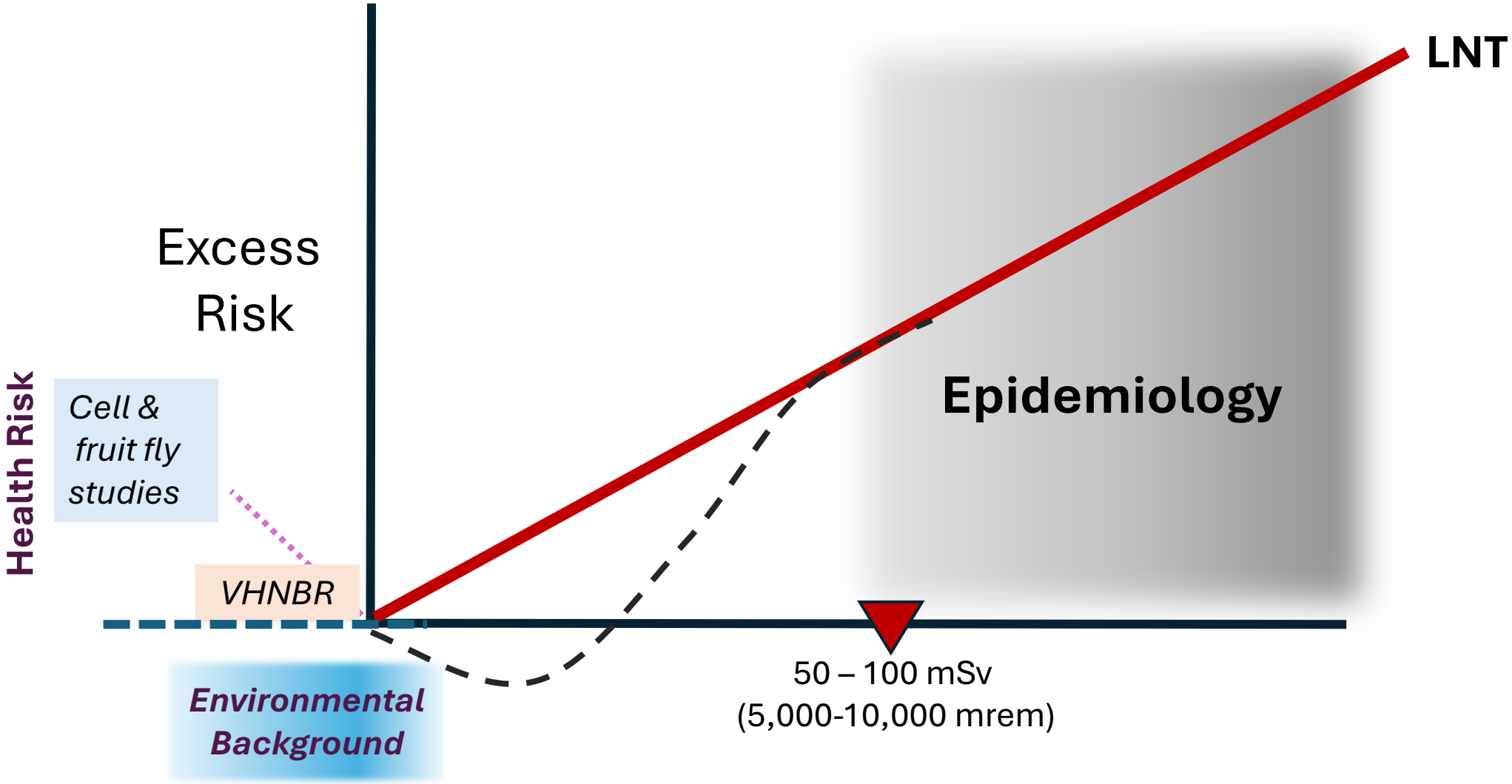
So how do we get policy and regulations back in balance?

Start with the science

What Do We Know About Radiation Risk?

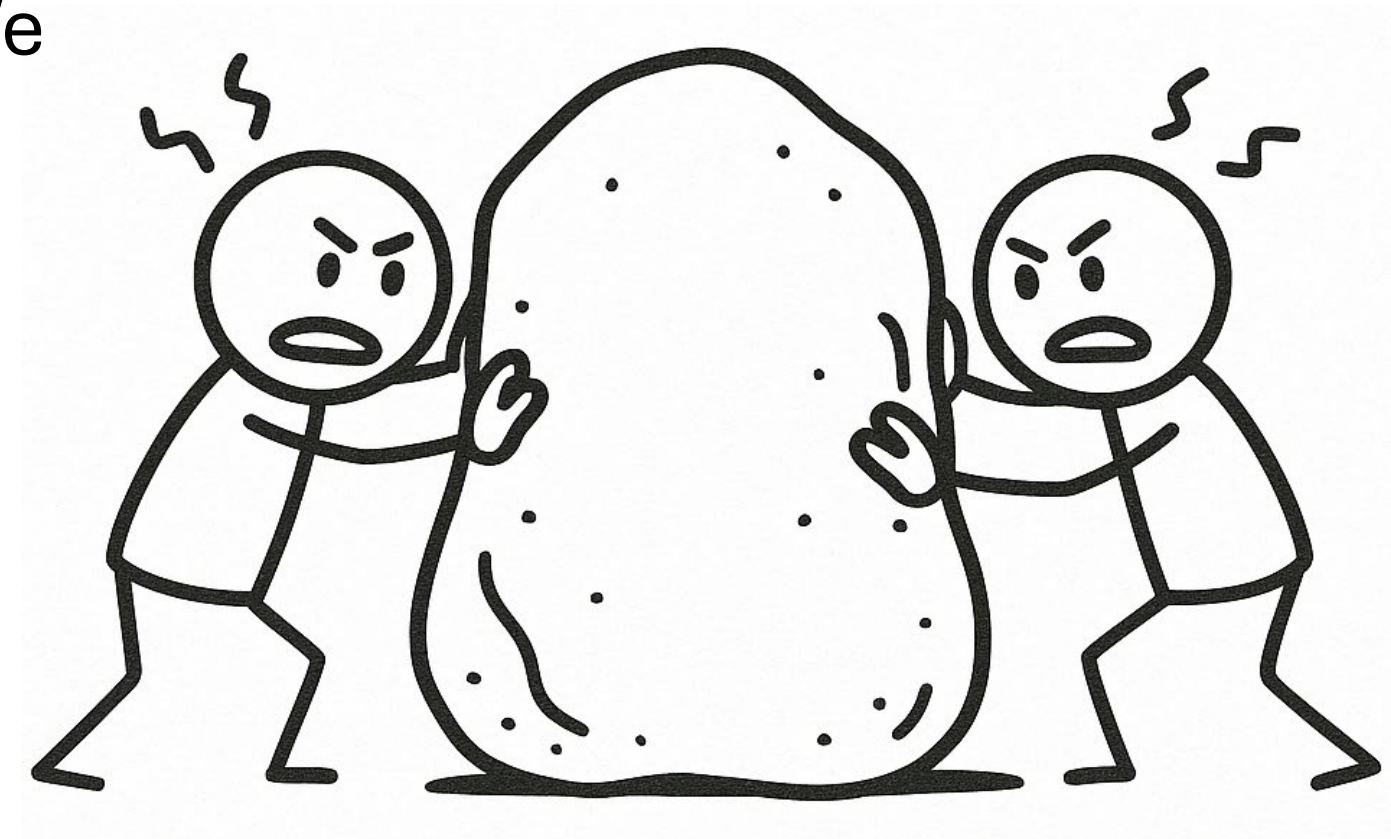


What Do We ***Do*** About Radiation Risk?



So Where Does This Leave Us with Policy?

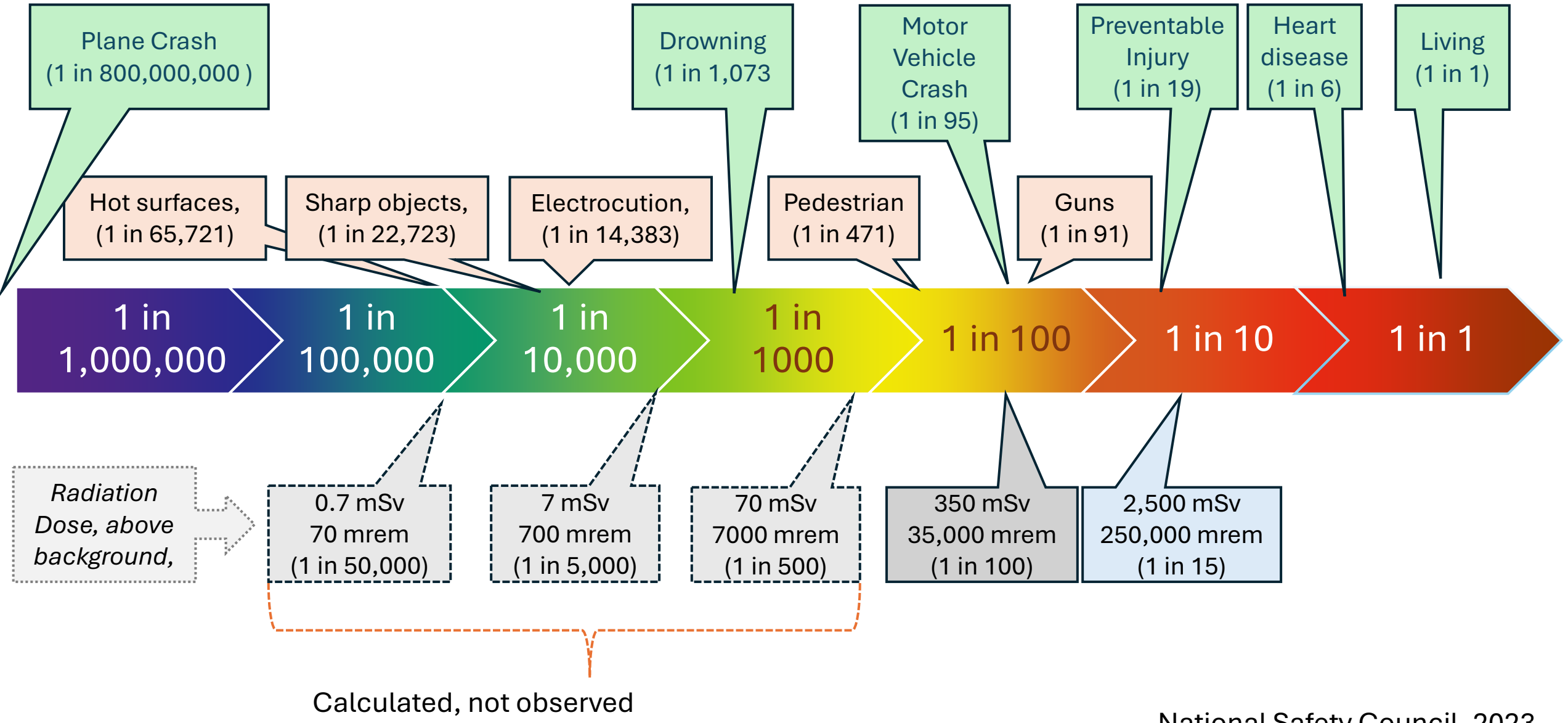
What We Don’t Know



What We Know

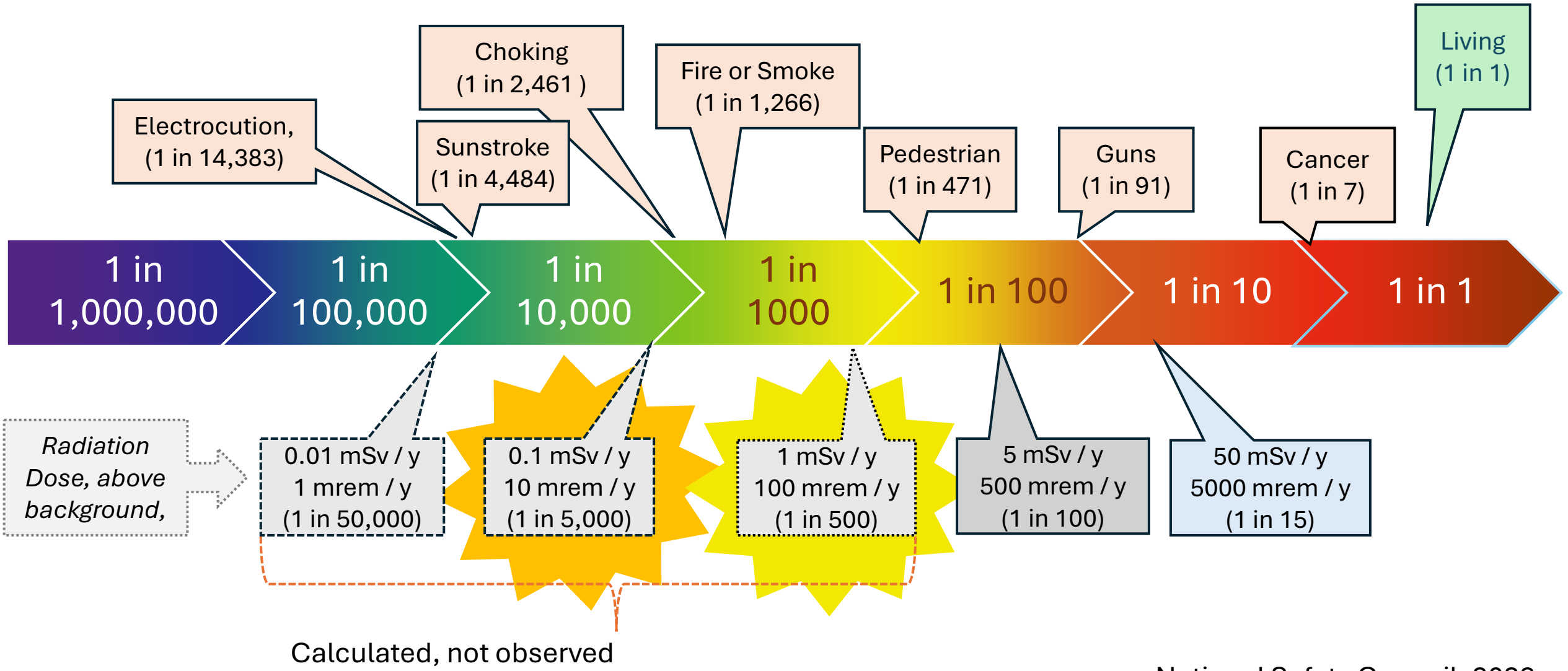
Let’s Talk About Death……

Lifetime Odds of Dying

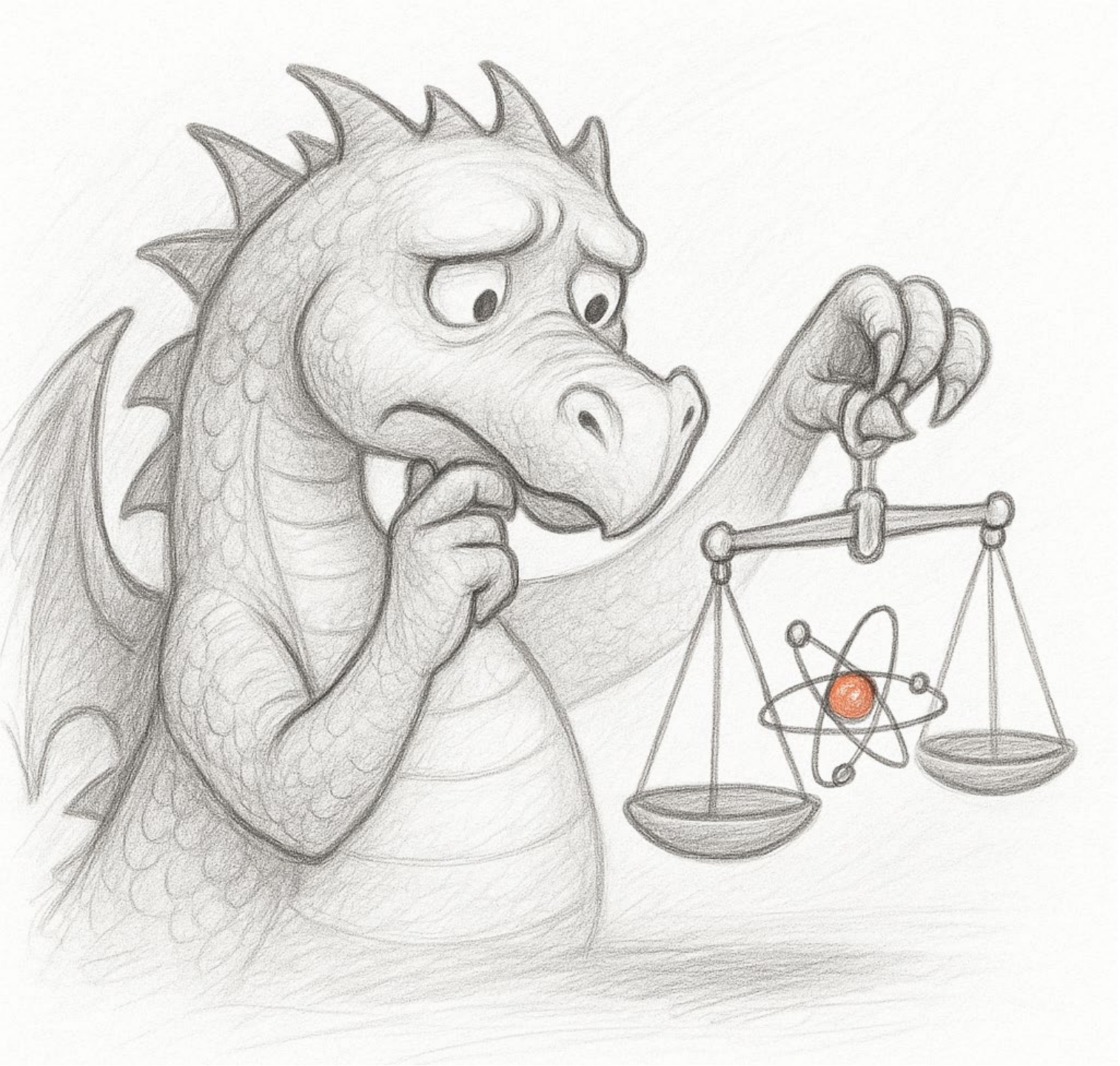


National Safety Council, 2023

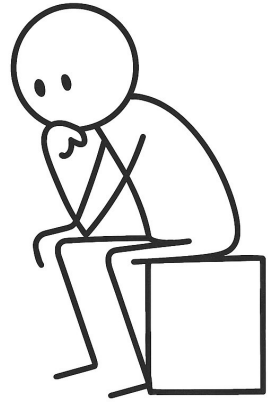
Lifetime Odds of Dying (Mostly Involuntary)



National Safety Council, 2023



Okay, so now what?

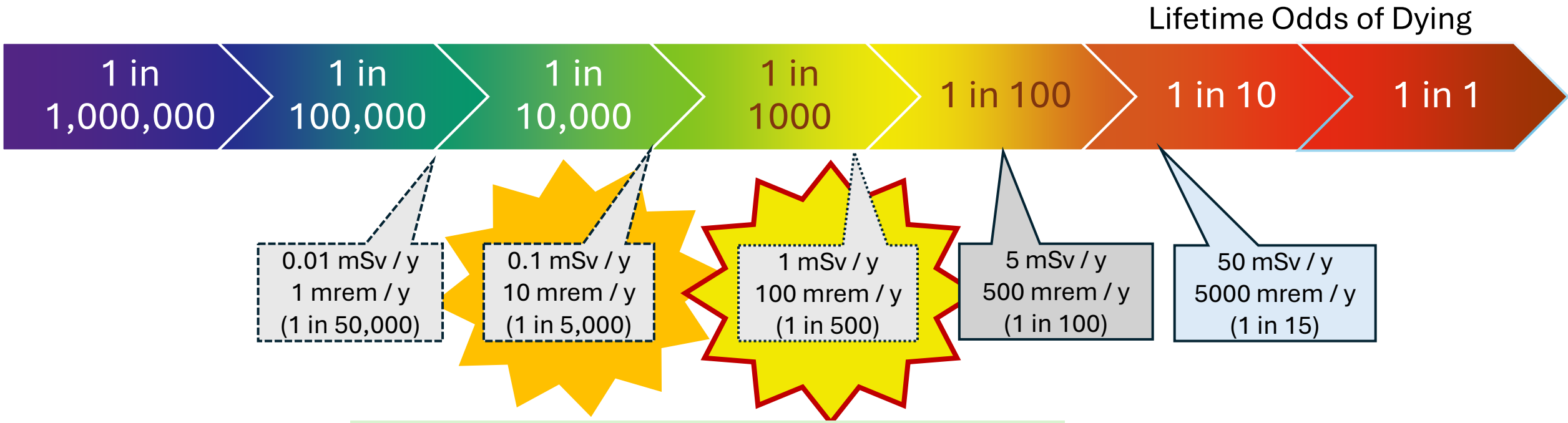


Unintended Consequences

- Extremely low dose limits
  - Not measurable
  - Use pathway modeling
  - Translates into very, very low environmental concentrations
  - Challenging detection capabilities
  - Hard to explain statistics

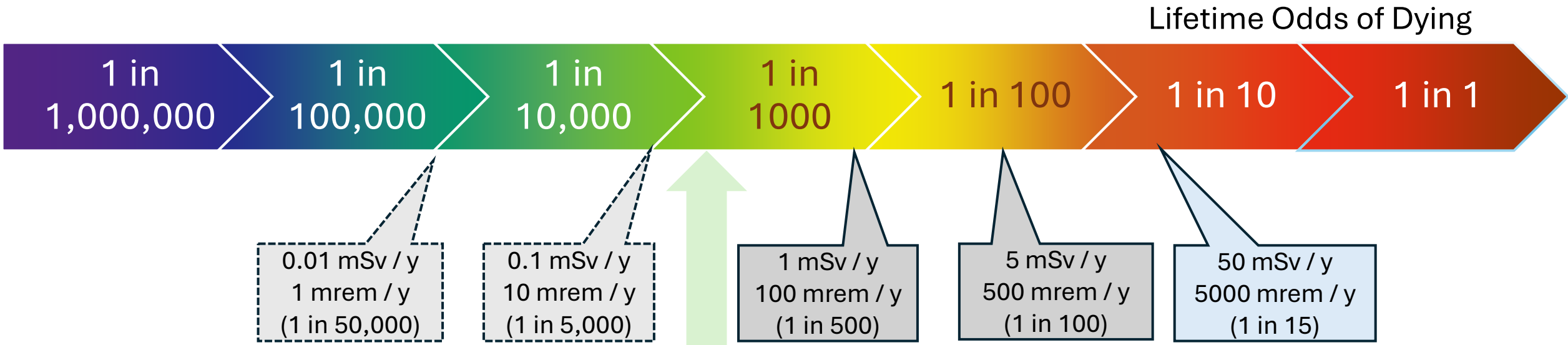
- Long remediation timelines.
- Akin to using tweezers to go after every last atom.

Where We Are Today



We have already accepted continuous population exposure at 1 mSv/y (100 mrem / y) for operating facilities

A Somewhat Considered Proposal



Why not have a cutoff for radiation regulation at ½ - 1/3 of 1 mSv/y (100 mrem/y)?

Some history on this concept

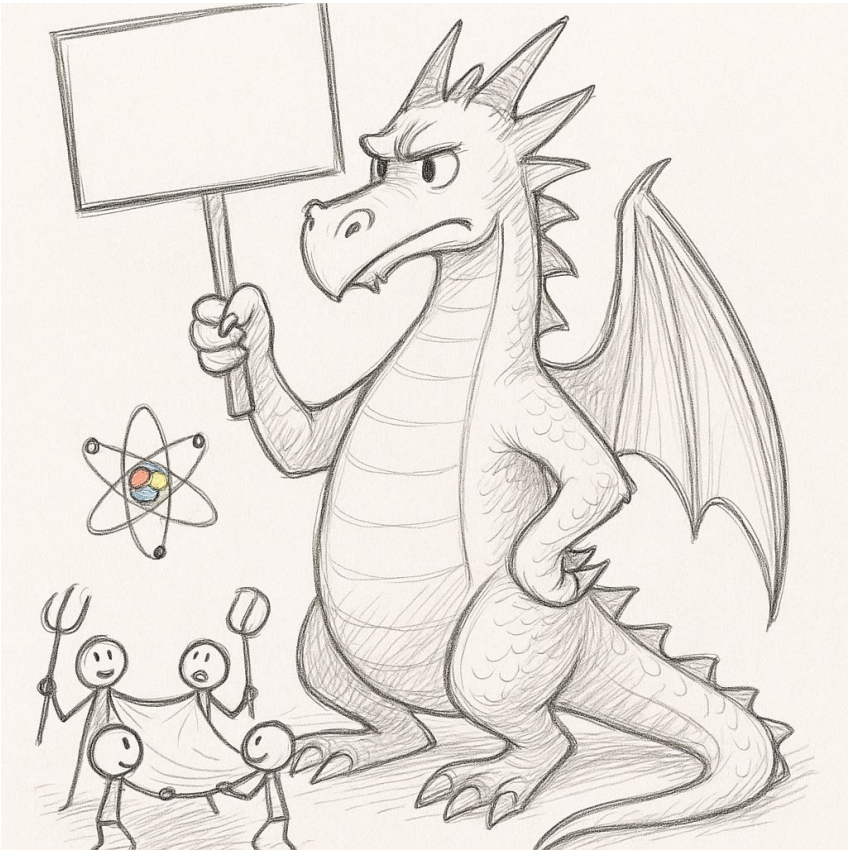
- Below regulatory concern (BRC) policy proposed by US NRC (1990)
  - 10 mrem / year for the average individual in the critical group
  - 50 mrem / year for any individual
  - Doses were above normal background and medical exposures
- Purpose:
  - Provided a framework for exempting very low-level radioactive materials and wastes from regulation,
  - Goal of conserving space in licensed low-level waste disposal facilities.

Even more history

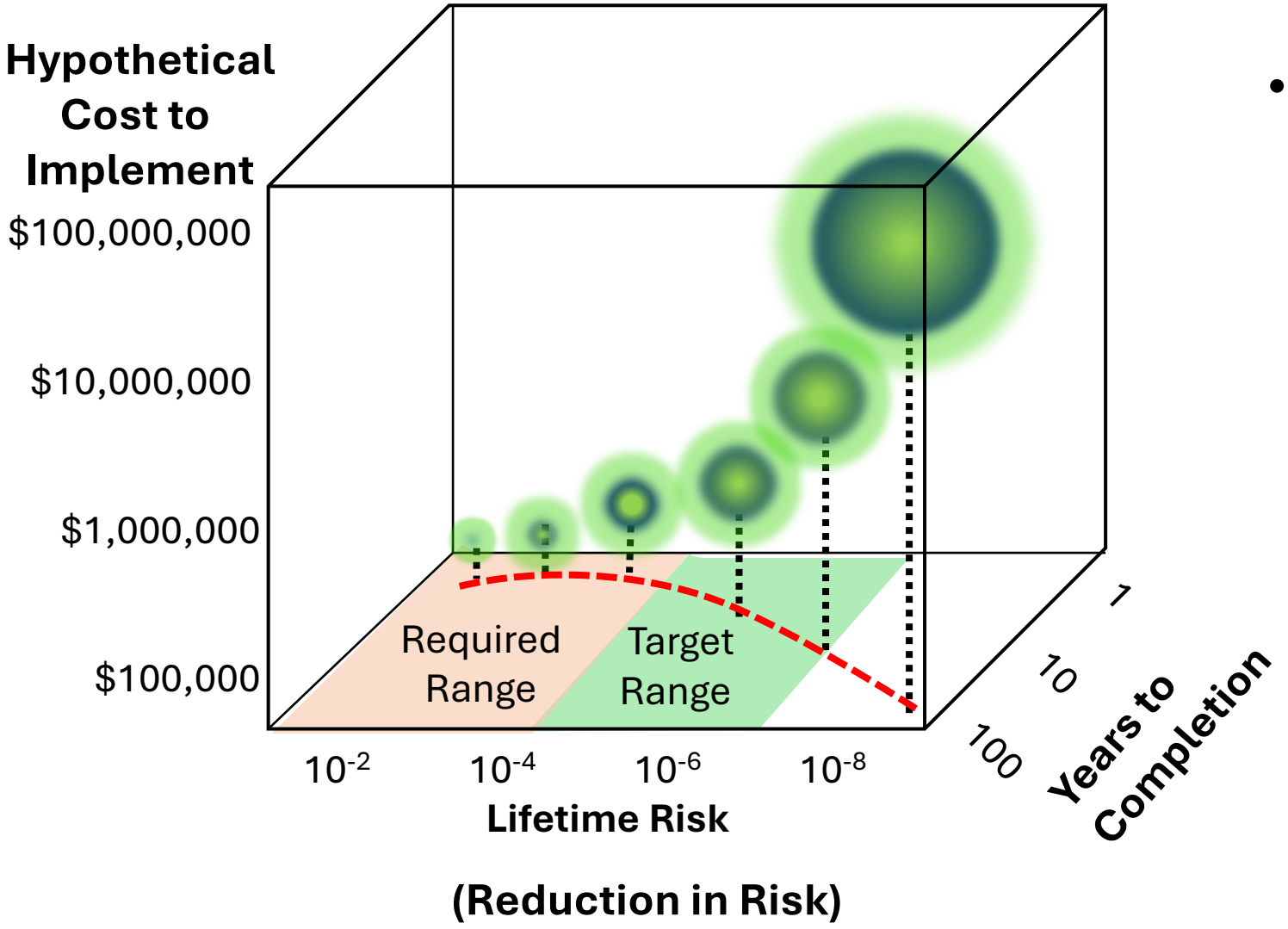
- Proposed applications:
  - Decommissioning, managing low-level waste, and recycling slightly contaminated materials.
- Public opposition and withdrawal:
  - Met with strong public opposition.
  - Critics argued that the policy would allow radioactive waste to be dumped in regular landfills and released into the environment
  - Increases the risk of cancer and other health problems.
- **NRC withdrew it in 1993**

De Minimus / Negligible Risk

- National Council on Radiation Protection and Measurements (NCRP):
  - Suggests 0.01 mSv (1 mrem) / year as a negligible risk.
- Nuclear Regulatory Commission (NRC):
  - Considered a regulatory "cutoff level" of 0.01 mSv/yr (1 mrem per year) for population dose calculations.
- IAEA
  - Discussed de minimis levels in the range of 0.01–0.05 mSv/yr (1 to 5 mrem per year).



Just to Belabor a Point



- Smaller risks generally mean
  - Longer cleanup horizons
  - Delayed access to site reuse
  - Potential waste of usable resources
  - Greater environmental disruption
  - And greater costs

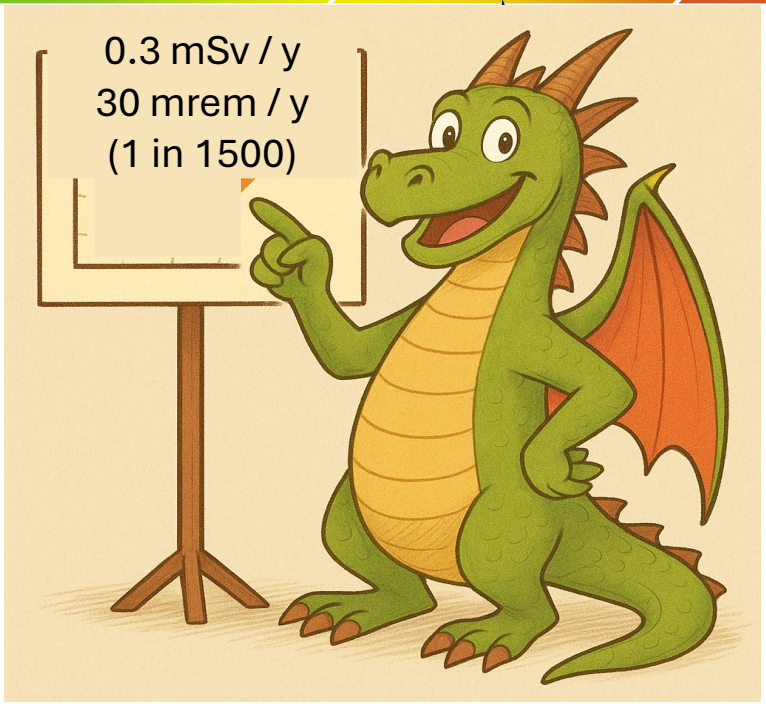
So, For Our Lunchtime Conversation

Lifetime Odds of Dying

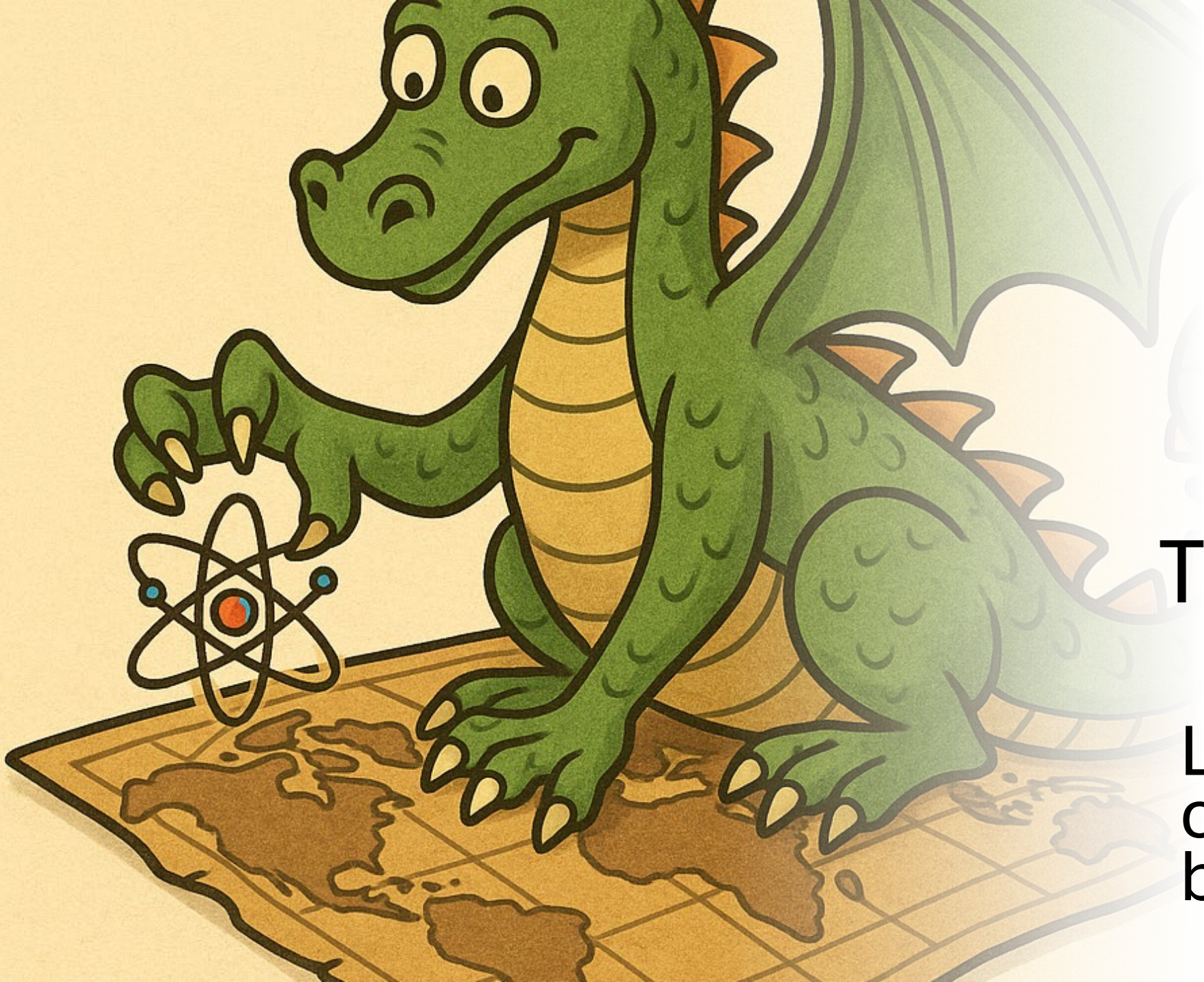
1 in 1,000,000 | 1 in 100,000 | 1 in 10,000 | 1 in 1000 | 1 in 100 | 1 in 10 | 1 in 1

0.01 mSv / y
1 mrem / y
(1 in 50,000)

0.1 mSv / y
10 mrem / y
(1 in 5,000)



50 mSv / y
5000 mrem / y
(1 in 15)



Thank You

Let the comments begin