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Careful where it counts

Exploring the *efficient* and *beneficial* execution of Safety Management Studies

Nick Kastelein

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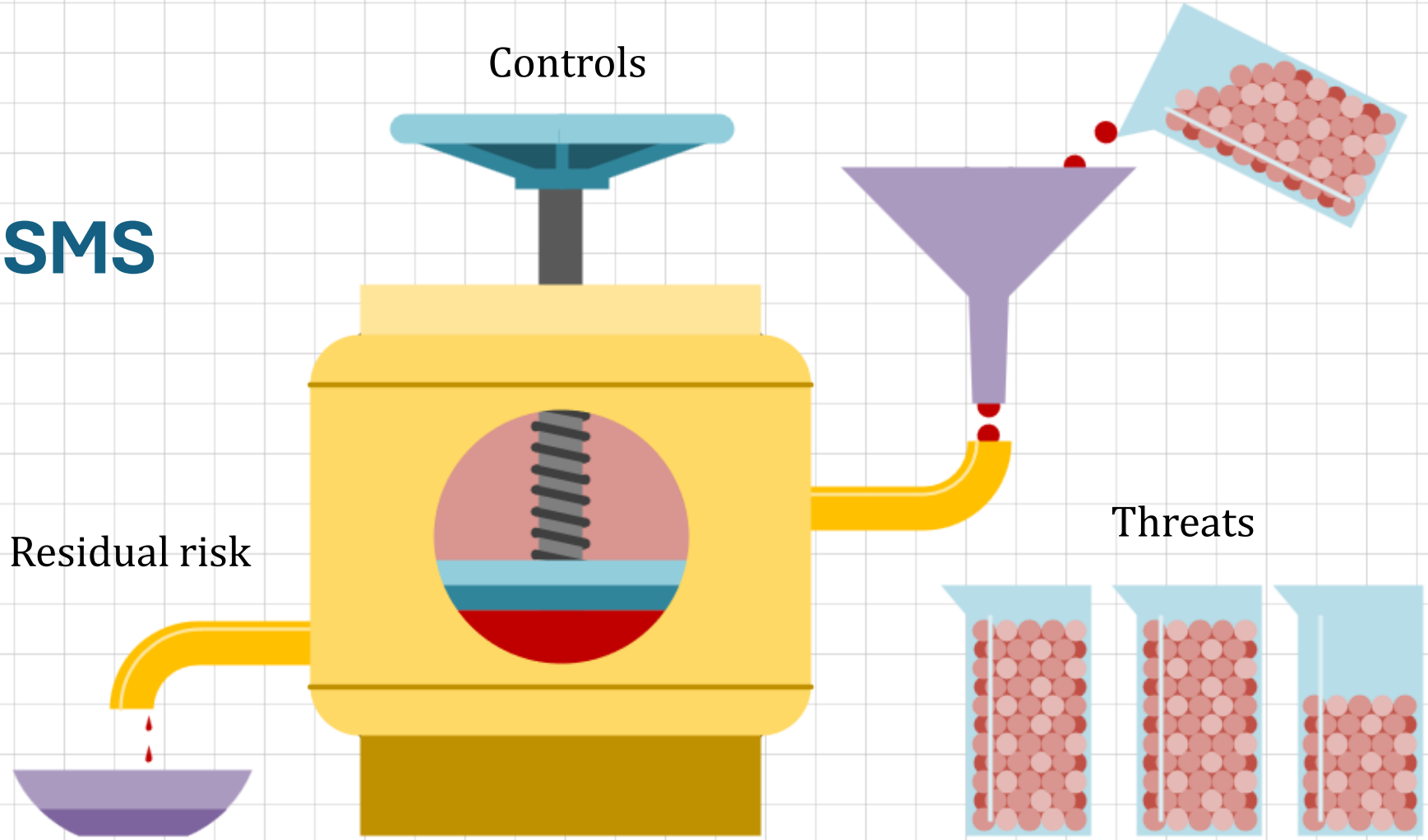
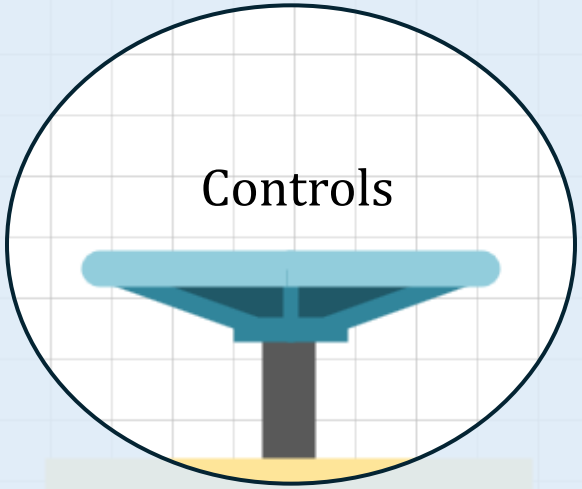
The SMS



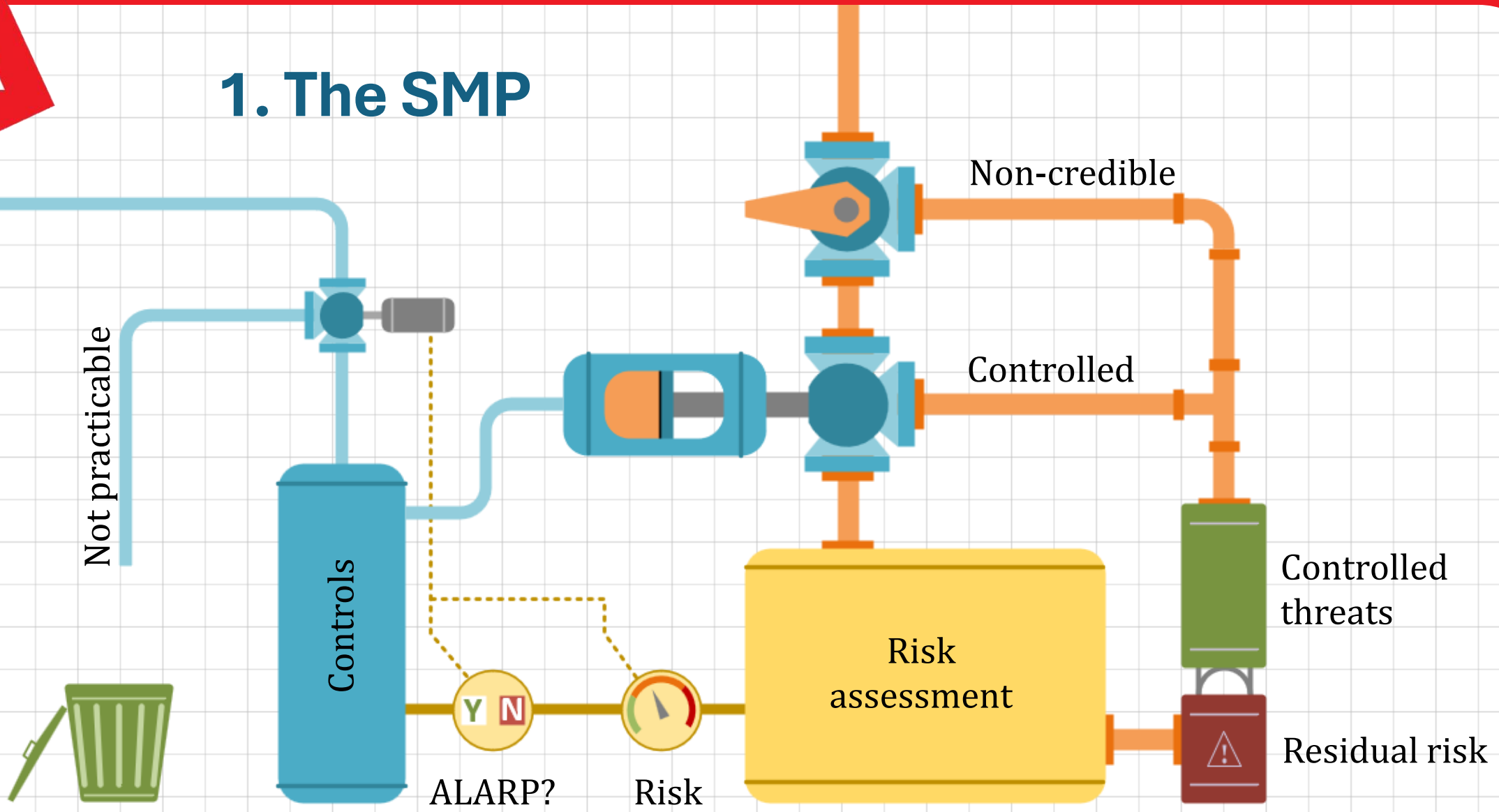


The focus is Control

When SMS not just a *documentation* exercise…

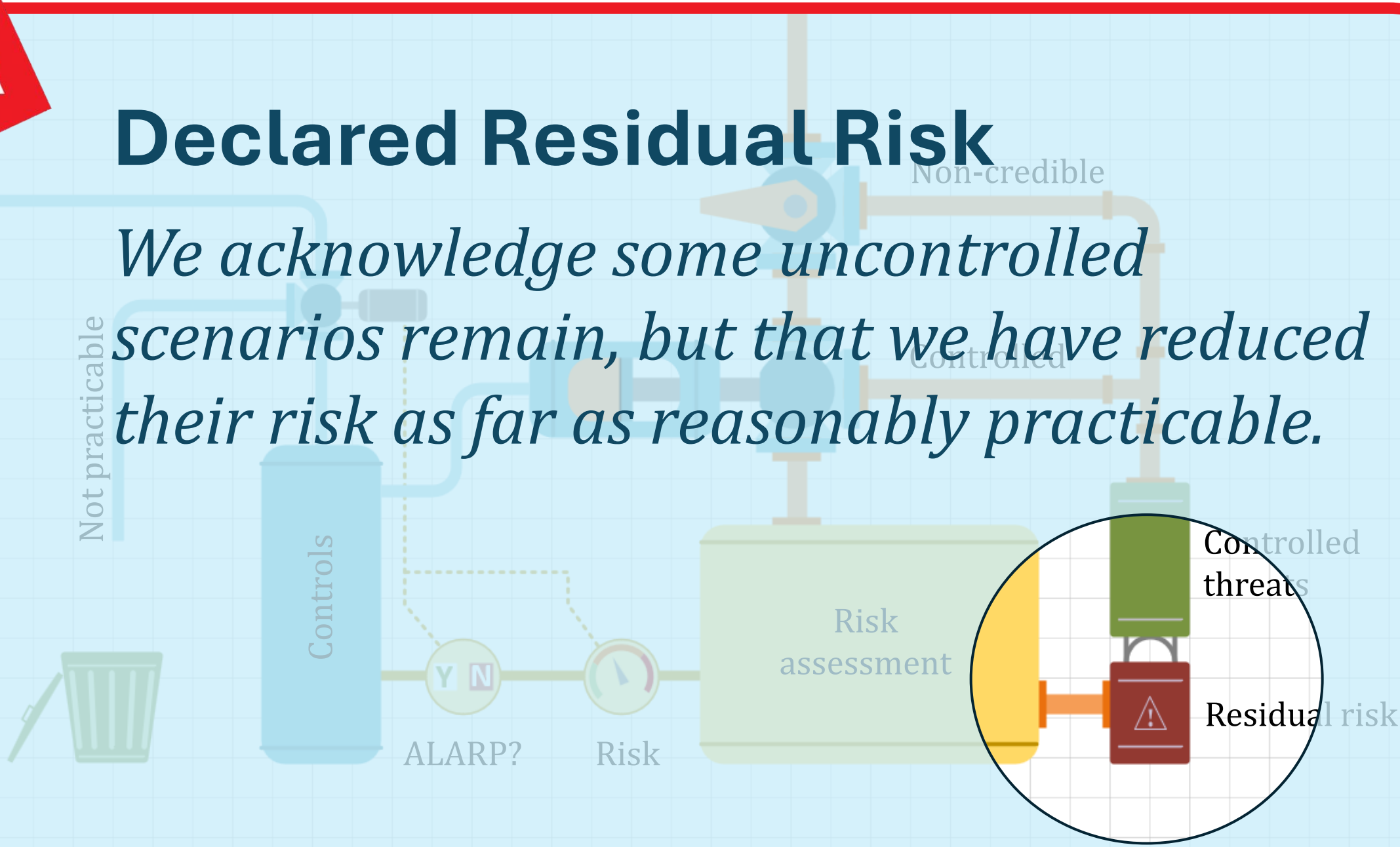
It coordinates effort to reduce risk.

1. The SMP


Non-credible
Controlled
Not practicable
Controls
Risk assessment
Controlled threats
Residual risk
Y
N
ALARP?
Risk

Declared Residual Risk

We acknowledge some uncontrolled scenarios remain, but that we have reduced their risk as far as reasonably practicable.



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Residual risk acceptance

Compared to benefit.

Risk threshold for a worthwhile endeavour.

Reasonably practicable

Compared to peers.

Achieving "relevant good practice" means matching the control effort of peers.

Compared to alternative options.

"Gross disproportionality": Cost difference >> Risk difference

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Risk calculation

Key challenge = Estimation of likelihood, especially for low-frequency events.

Qualitative	*Experience-based estimation possible for clear categories.* *Rapidly resolve simple cases (e.g. lightning strikes)*

Semi-quantitative	*Mathematical model representing causal sequence.* *Stacks the likelihood of each step between initiating event and consequence.* *Combine data (where available) with causal reasoning and estimation.* *Methods like Bowtie and LOPA.*

Quantitative

Need data that differentiates the controls you will apply.

Which is typically not available…

The more valuable a QRA is, the more semi-quantitative it is.

The main distinctive of QRA (as practiced) is to aggregate risk over various threats and along the pipeline.

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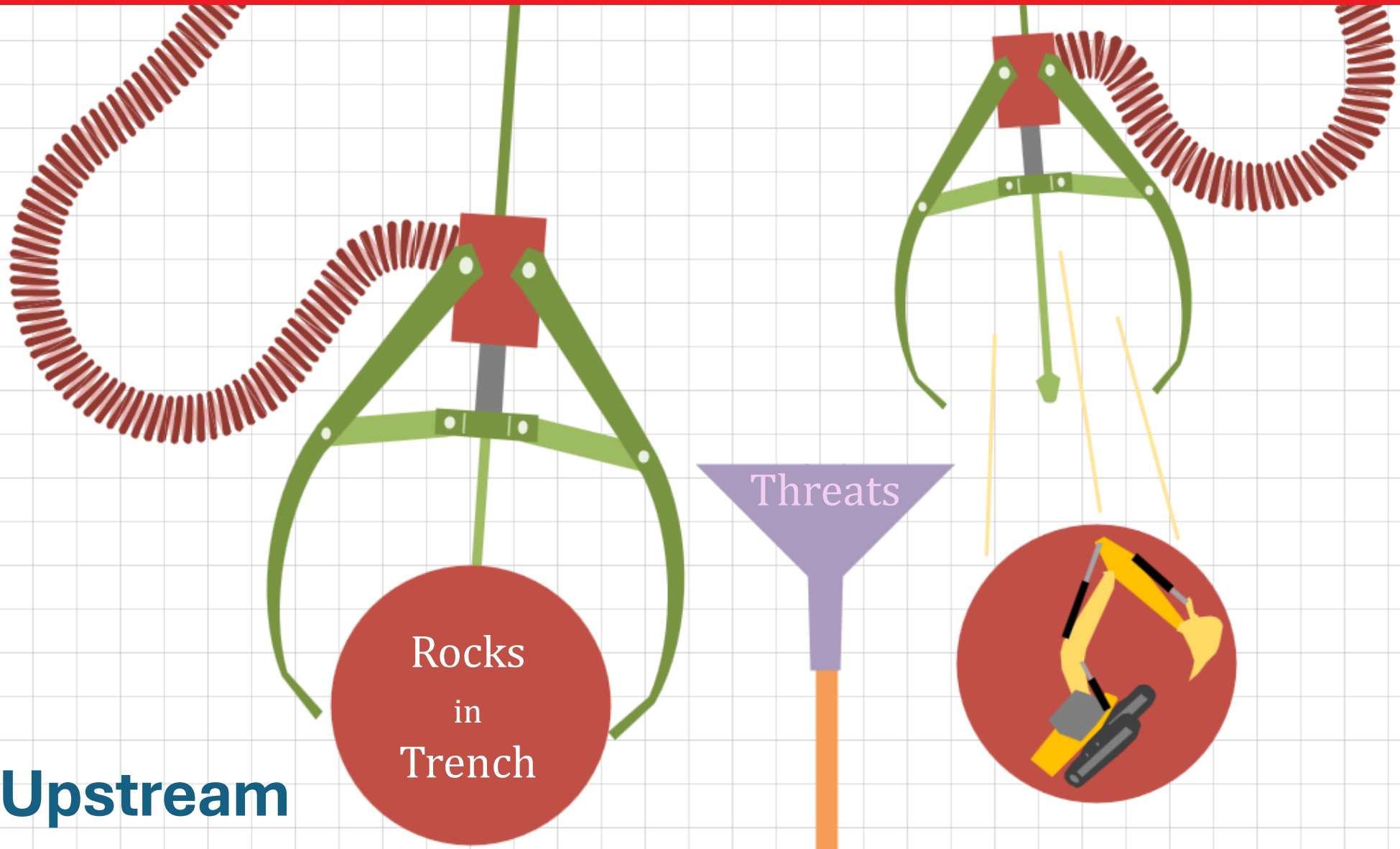
Remember the purpose

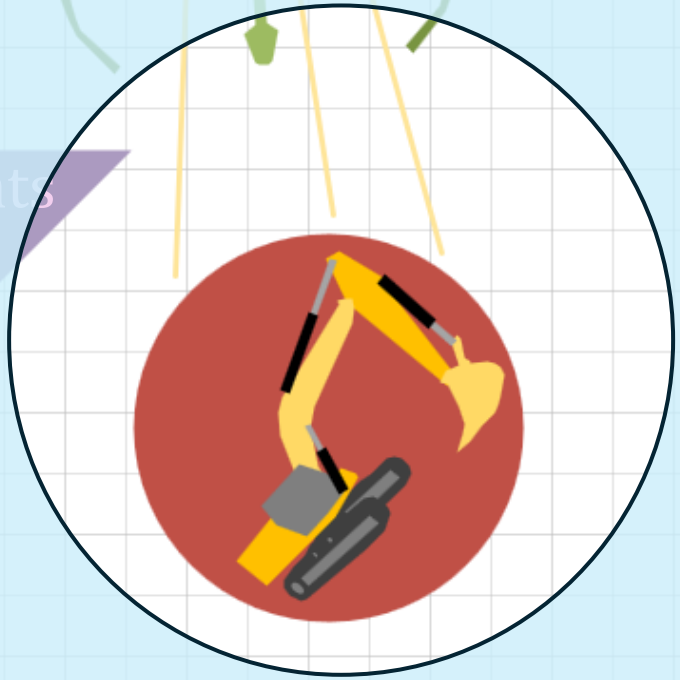
- The chosen assessment method is **scaffolding** for **careful reasoning** which informs **targeted application of controls**.
- So don't overemphasise the maths.
- **More in the paper:** The standard pre-packages a lot of risk work in location class, risk matrix, "no rupture", etc.
  … that is calibrated to the gas industry.
- Outside that application…



2. Upstream

Latent residual risk

Threats we missed or didn't adequately define are another potential source of residual risk.



Threat “order”

- **Zero** order = threat to *public* or *environment*
- **First** order = threats to the *pipeline asset*
- **Second** order = threats to control *effectiveness*
- **Third** order = threats to control *implementation*

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Identify

Search

Define

Research

Ten threat categories

Conditions

- External interference
- Natural events
- Deterioration
- Intentional damage
- Process deviations

Faults

- Design
- Materials
- Construction
- O&M
- Management

Key outcomes

- **Not all categories want the same treatment**
- Recognition of the different types of threats enables different assessment emphases.
- The SMS needs to engage with existing value-adding work being done in other pipeline deliverables…

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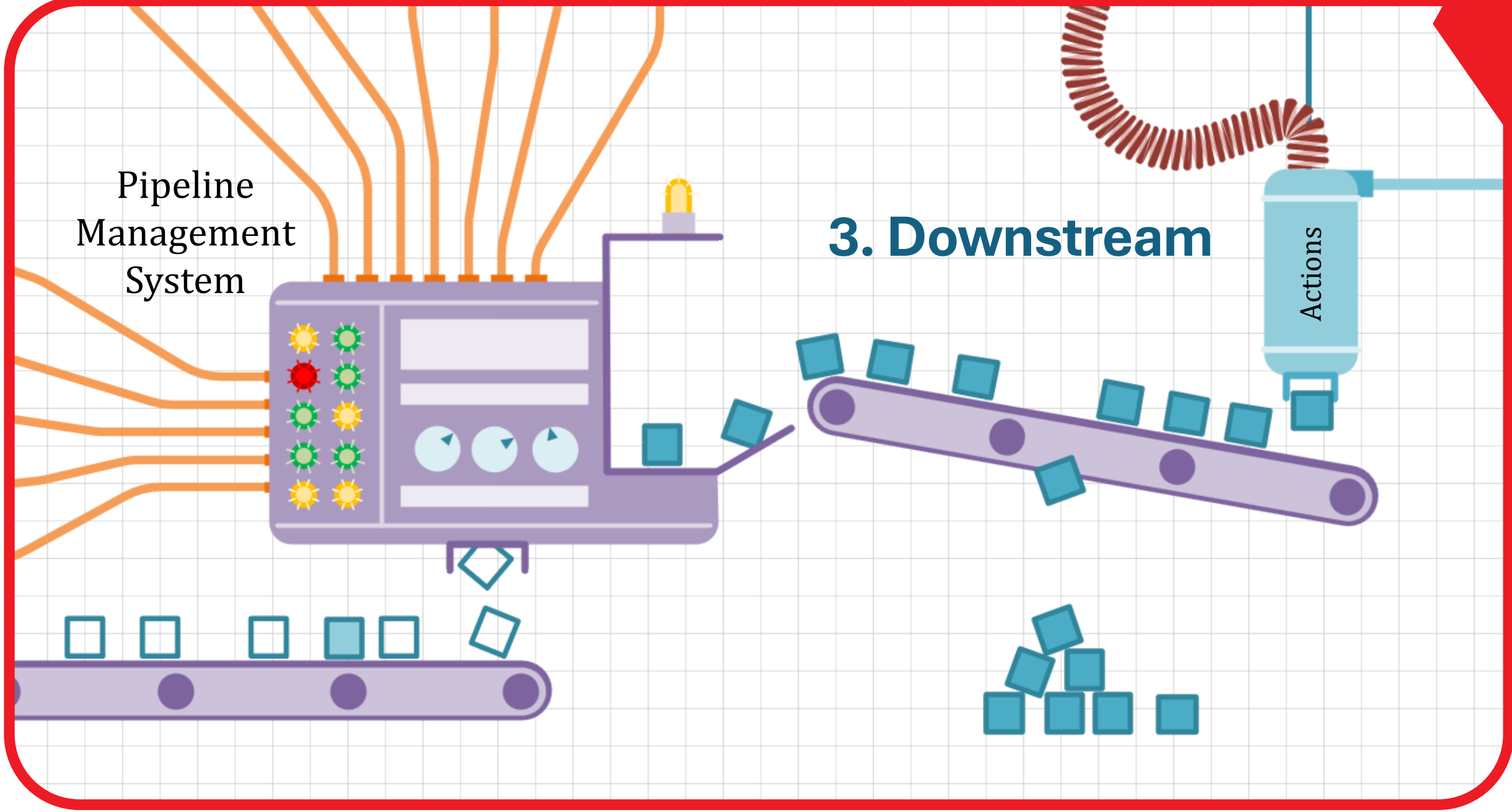
Safety management folio

Safety Management Study sits alongside
the *design*,
the *PMS*,
the *PIMP*,
etc.
providing the **risk mindset** to hold each document
accountable to *recognise and reduce*
residual risk.


Pipeline
Management
System
3. Downstream
Actions

Latent residual risk

Risk that remains because we don't fully implement our controls.

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