Back to the future

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IBAC
International Business Aviation Council

PARIS, FRANCE 76TH ANNUAL IASS 2023 INTERNATIONAL AVIATION SAFETY SUMMIT

FLIGHT SAFETY FOUNDATION

For another day: do we groupthink about (safety) culture?

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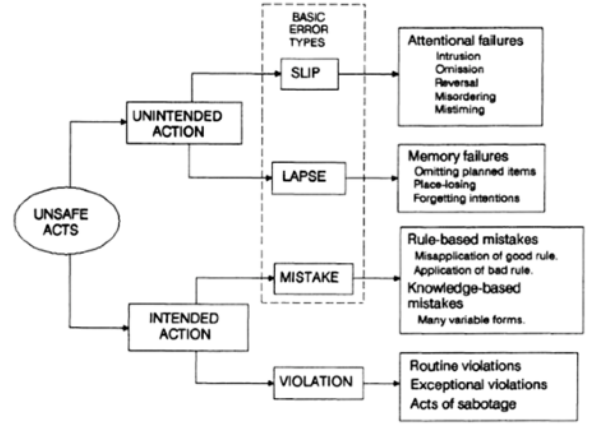
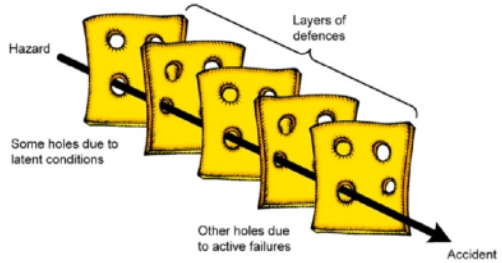
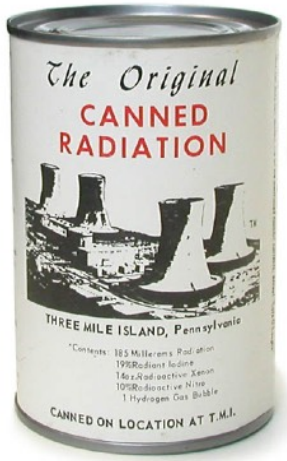
Two schools of thought





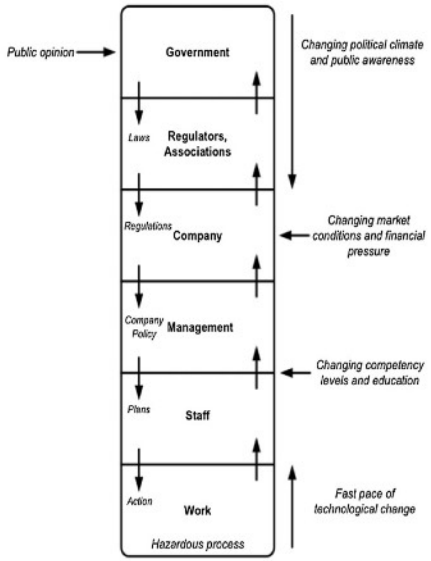
Reason & Wreathall

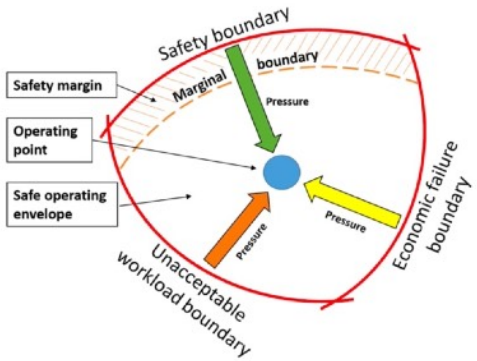


Three Mile Island
(1979)

World Bank and NATO conferences on human factors
(early 1980s)

Rasmussen, Woods, Hollnagel, etc.





Two schools of thought

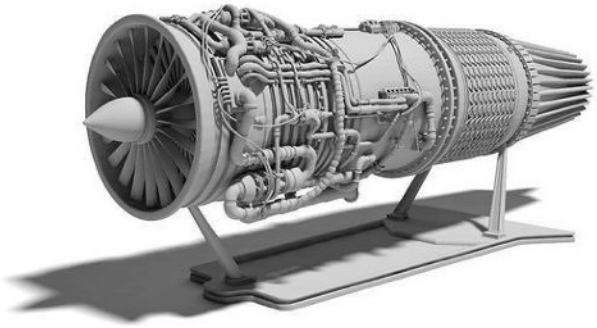
Cognitive psychological

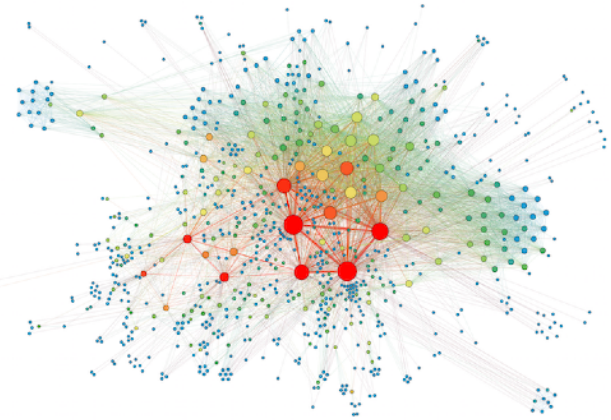
- Born through error diaries of 'normal people' in their everyday-life and from laboratory experiments
- Focuses on interventions at the level of the brain
- A human error can be the root cause of a disaster
- Bets big on barrier management and on 'defense in depth' in both physical and social systems
- At ease with simple models and linear causality
- "Poster child": James Reason
- Top hits: Swiss Cheese Model, HFACS, BowTie™
- Guilty pleasure: dreams of constraining human variability and molding staff into "The Right Stuff"-material (cf. Tom Wolfe's novel on the space race)

Joint cognitive systems

- Emerged by researching catastrophic failures and successes in high-risk industries
- 'Human error' is a symptom of deeper trouble within the system (and sometimes the brain too)
- Sees 'defense in depth' as inadequate, insufficient
- Embraces complexity... because it's inescapable
- "Poster children": Jens Rasmussen, David Woods, Erik Hollnagel, Richard Cook, Nancy Leveson, Sidney Dekker, et al.
- Top hits: the socio-technical view, AcciMap, ETTO Principle, Safety-II, STAMP, FRAM, etc.
- Guilty pleasure: dreams of designing a cartoon as appealing and memorable as the Swiss Cheese

Types of systems





Simple

Complicated

Complex

Regardless of their number (which contrasts simple vs. complicated systems), the elements in such systems perform well-defined functions. They're governed by laws that are understandable, clear, or even relatively easy to predict. Linear causality is the rule.

many elements

autonomous elements

high interconnectivity

high interdependency

Complex systems

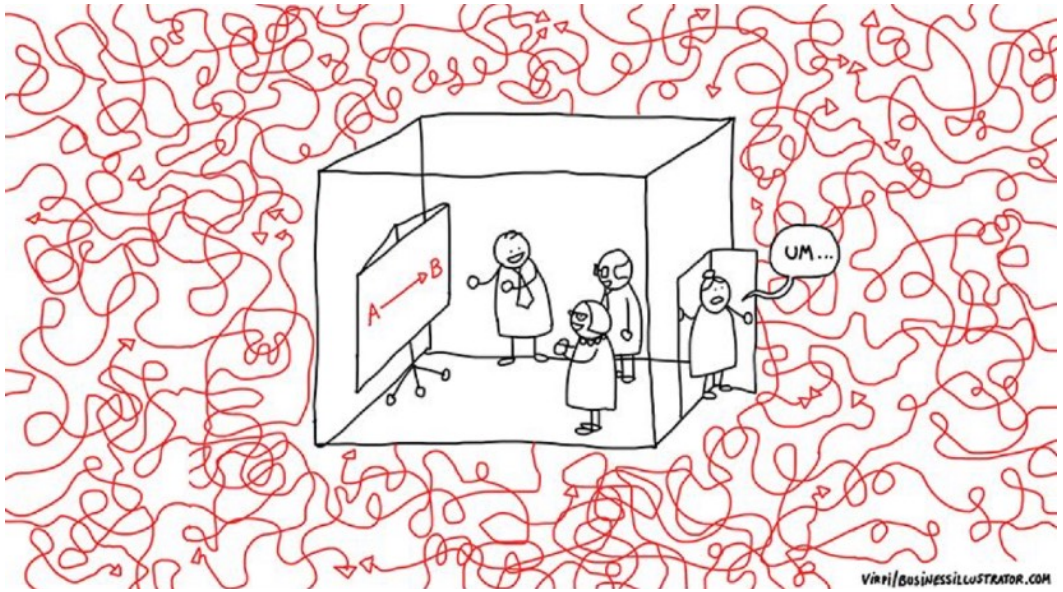
(non-)linear causality

emergent behaviours

adaptation, evolution

self-organisation

"All models are wrong, some are useful" (George Box)



Several risk management methodologies and models are available, each with its own pros and cons. Since there's no such thing as a silver bullet, organisations should test them, compare the richness of their outputs, and assess their robustness and pertinence relative to the complexity of the system that is analyzed.

Put differently, there is no universally right or wrong model. The trick is to have the right tool for a given situation, and therefore to gather both the knowledge and the toolbox allowing to deal with complexity, variability, and uncertainty.

Look for ICAO Doc 9859 Edition 5 (late 2024) for further information...

Resilience… and the nuances that sometimes get lost

- Organisational and personal resilience are interconnected, but each requires specific care.
- Betting everything on personal resilience will probably backfire in a big, big way...
- **Personal resilience** is not about how you endure more and more. It's about **how you recharge**.
- **Resilience engineering is about building organisational capacities to adapt** to partly unpredictable changes that can (and will) push the system outside of its safe operating enveloppe.
- Traps about resilience:
    - Dumping disproportionate organisational responsibility on staff and on individuals in general (e.g., *"Folks, a brittle and degraded system is your new normal, so you better be resilient!"*).
    - Avoiding investments in organisational resilience because staff proved resilient on a personal level.

Treasure hunt (have fun exploring and learning!)

Find in the literature:

- ❑ decoupling
- ❑ drift (into failure)
- ❑ safety clutter
- ❑ local rationality
- ❑ work-as-imagined/done
- ❑ graceful extensibility
- ❑ pre-accident investigation
- ❑ network failure accident

Where to look, who to read...

Richard Cook
Steven Shorrock
Scott Snook
Erik Hollnagel
Nancy Leveson
Jean-Christophe Le Coze
Todd Conklin
Sidney Dekker
Amy Edmondson
David Woods
James Reason
Jens Rasmussen
Carsten Busch
Corinne Bieder
David Provan
René Amalberti
Diane Vaughan
Charles Bosk
Charles Perrow
Barry Turner
Robert Wears
Kathleen Sutcliffe
Virginia Sharpe
etc.