

WORCTM 2026

World Overflight Risk Conference

Human Factors and Risk Acceptance in Aviation Crises.

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Exceptional Operations, Human Decisions

1. Risk as Analysis (Cognitive)

- Logical, structured, model-based
- Probabilities, data, formal risk assessments
- Slow, deliberate, “rational”

2. Risk as Feelings (Affective)

- Intuitive, emotional, experience-driven
- Fast, automatic, subconscious
- Driven by fear, dread, familiarity



Risk as Feelings (Slovic et al., 2004)

The Affective System Drives Decisions

Characteristics

Fast, automatic, intuitive

Influenced by:

- Fear & dread

- Personal experience

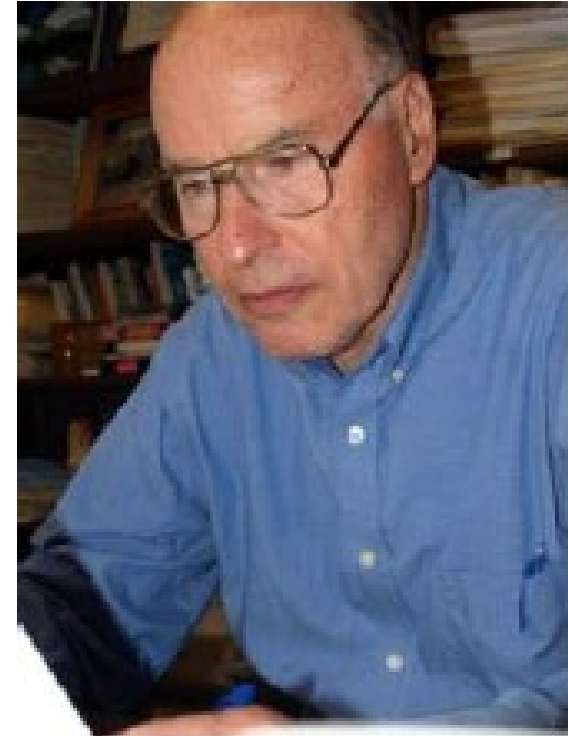
- Trust (or distrust)

Stronger under:

- Time pressure

- Uncertainty

- Stressful environments



Paul Slovic

Feelings are not noise — they are part of the risk system

In Conflict Zone Operations Hypervigilance & anxiety shape perception

“Something feels wrong” can override procedures

Slovic, P., et al (2004). Risk as Analysis and Risk as Feelings: Some Thoughts about Affect, Reason, Risk, and Rationality. *Risk Analysis*, 24(2), 311–322.

Risk as Cognitive Processes (Prospect Theory)

Decisions Are Systematically Biased

Key Mechanisms

Loss aversion → losses weigh more than gains

Framing effects → same risk, different decisions

Probability distortion:

Overweight small probabilities

Underweight large probabilities

✈ In Aviation Context

Rare catastrophic events → overweighted

Repeated safe operations → risk underestimated

Operational framing (delay vs safety) influences decisions



Daniel Kahneman
and Amos Tversky

Even “rational” decisions are **predictably biased**

“Pilots and decision-makers are not choosing between emotion and logic—they are navigating a system where both are always active, and sometimes in conflict.”

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2), 263–291. <https://doi.org/10.2307/1914185>

Target Risk Theory (Risk Homeostasis)

Why safety improvements don't always reduce risk

Core Idea (Gerald Wilde)

People maintain a **"target level of risk"** they are willing to accept

Behaviour adjusts to keep risk at that level

⚙️ How It Works

TARGET RISK

→ Chosen level of acceptable risk to maximise benefit

HOMEOSTASIS

→ Self-regulation to maintain a stable state

RISK HOMEOSTASIS

→ If systems become safer → people may take **more risks**

→ If systems become riskier → people may act more cautiously

✈️ In Aviation / Conflict Zones

Advanced systems → **increased confidence**

GNSS disruption → **automation mistrust or overcompensation**

Repeated safe outcomes → **risk normalisation**

→ Behaviour adapts, not just the system

Key Implication

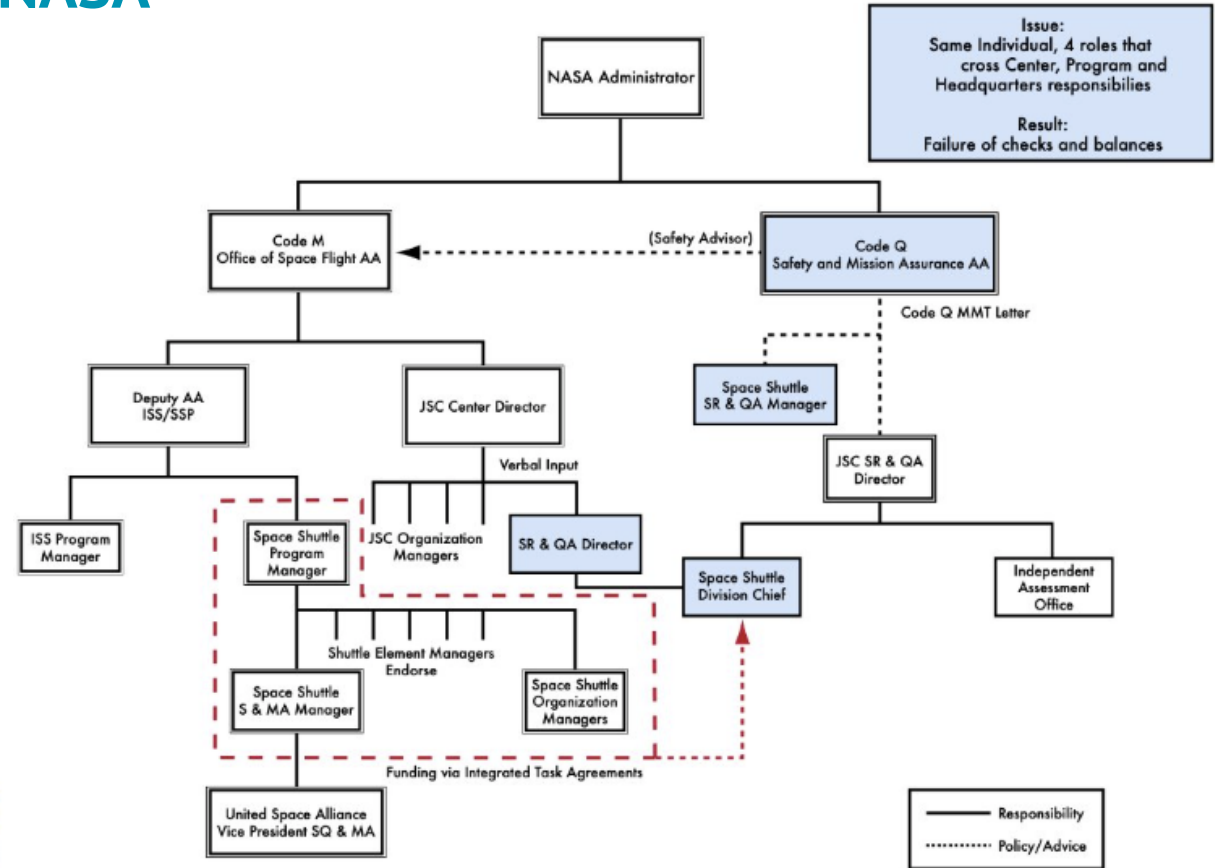
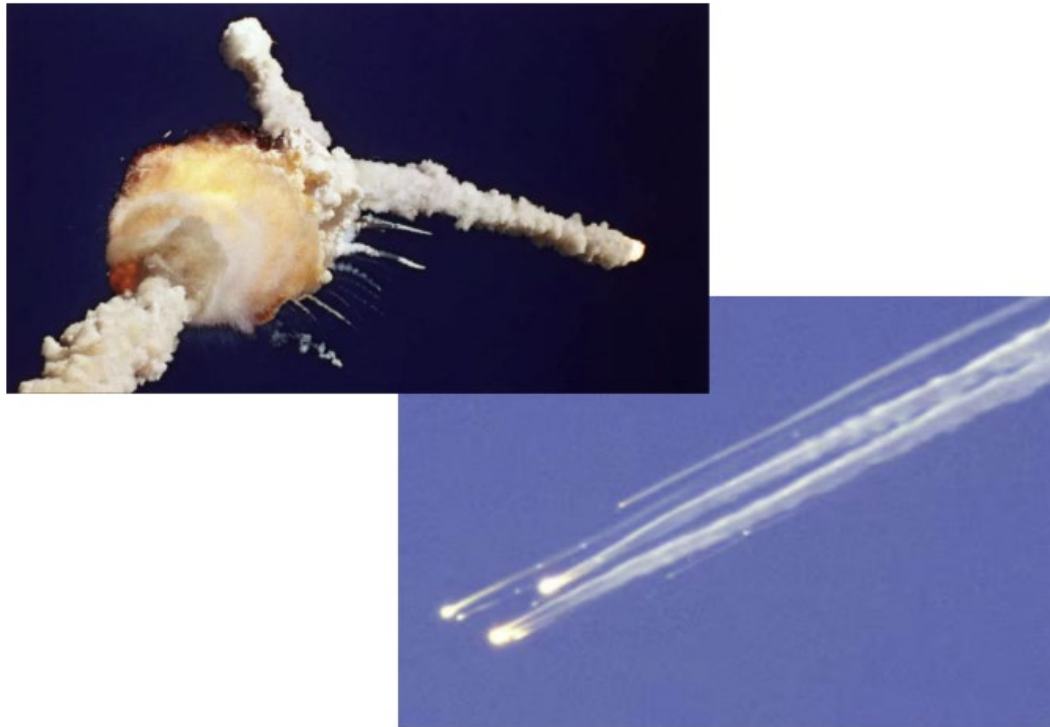
Improving safety technology **does not guarantee safer outcomes** unless it also changes the **target level of risk**

Wilde, G.J.S. (1982), The Theory of Risk Homeostasis: Implications for Safety and Health. Risk Analysis, 2: 209-225.

Examples of Safety Culture Flaws - NASA

✈ Challenger disaster

✈ Columbia disaster



Examples of Safety Culture Flaws - Boeing

Examples of Safety Culture Flaws - Boeing

- ✈ 737 MAX Crashes (2018, 2019)
- ✈ 737 MAX 9 Door Plug Issues (2024)



Human Performance in Conflict Zone Aviation

“Exceptional operations require exceptional safeguards”

The Reality

- ✈ Conflict zones create persistent, non-routine operations
- ✈ Risks include: airspace instability, GNSS interference, rerouting, uncertainty
- ✈ Normalization of risk → repeated “safe” flights ≠ reduced danger

Human Performance Under Strain

- ✈ Cognitive overload & hypervigilance
- ✈ Fatigue with reduced recovery
- ✈ Automation mistrust
- ✈ Degraded decision-making & situational awareness

Human Factors and Risk Acceptance in Aviation Crises

Panel Discussion

Long-duration conflict ≠ normal operations

Time does not reduce risk — it hides it

Are we reducing risk... or just redistributing
it through human behaviour?

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