Washington D.C., 29 January 2025



Warning signs existed

Repeated close encounters in safety data



Did the warning reach a decision?

INTERNATIONAL FLIGHT SAFETY SEMINAR-2026

Building a Future-Ready Safety Mindset

Integrating Digital Innovation, Human Performance and Collaborative Culture

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CORE THEME

The INTEGRATION of Digital Innovation, Human Performance and Collaborative Culture can build a future-ready safety mindset



Three strong capabilities. One integrated safety system

OUTLINE

01

Current Safety Picture

Progress · new hazards

02

Evolving Safety Thinking

Reactive → Predictive

03

Integration Challenge

Model · case evidence

04

From Model to Action

Pathway ·

Current Situation — Evolution — Integration — Action

Reduced Accident Rate : But Are We Truly Safer?

2025

Fewer accidents. 85, down from 95

Far fewer fatal accidents. 4, down from 10

More lives lost. 387, up from 296

Better aircraft. Better training. More safety data than ever.

So why do accidents still surprise us?

Long-Term Progress — Short-Term Volatility

LONG-TERM TREND · IATA

One accident for every…

456,000 flights

2011–2015 five-year average

↓

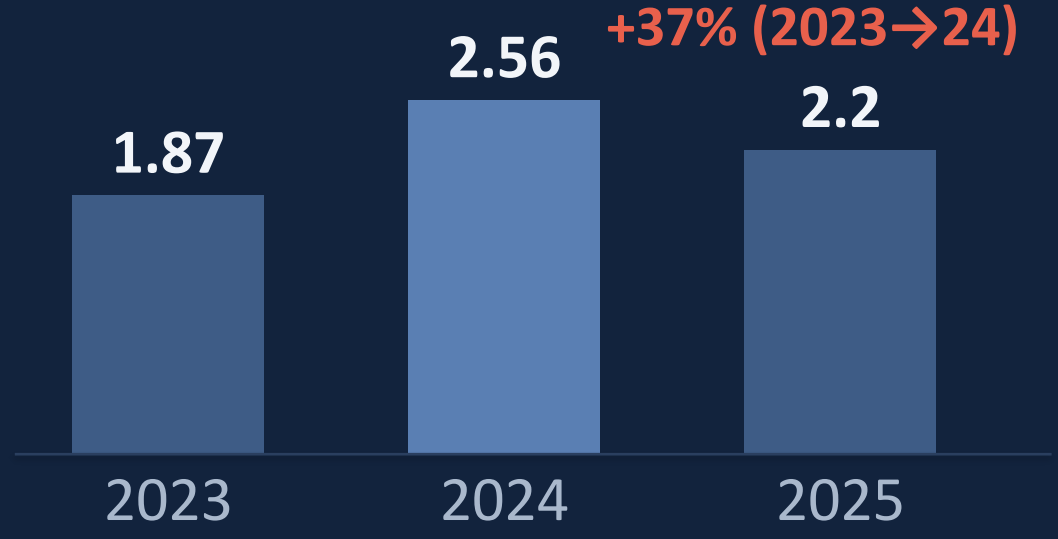
810,000 flights

2020–2024 five-year average

Safety performance has improved substantially

SHORT-TERM REALITY · ICAO

Accidents per million departures



Accident rates still fluctuate year to year

Progress is real, but it is not irreversible

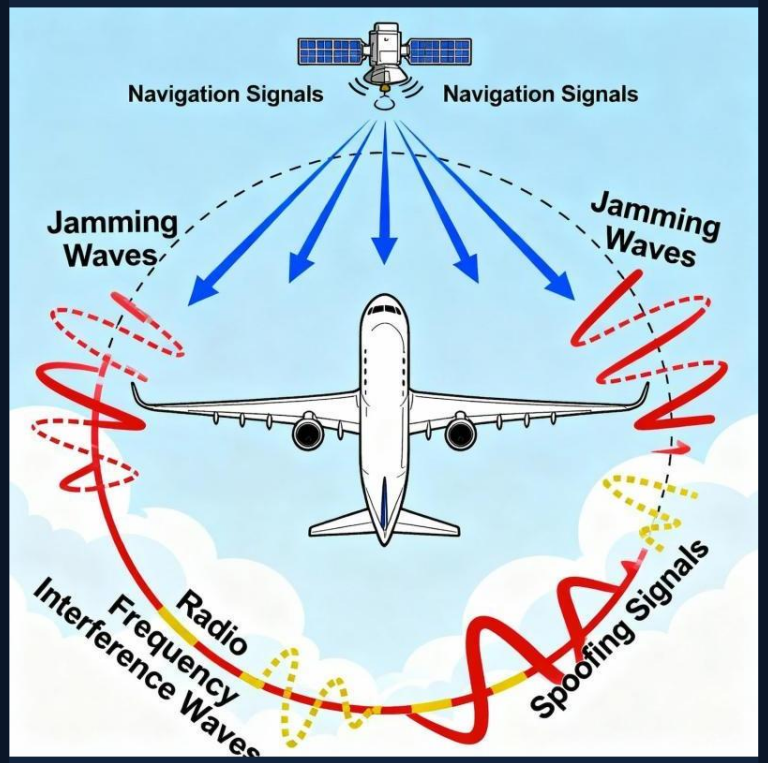
The Hazard Picture Is Changing

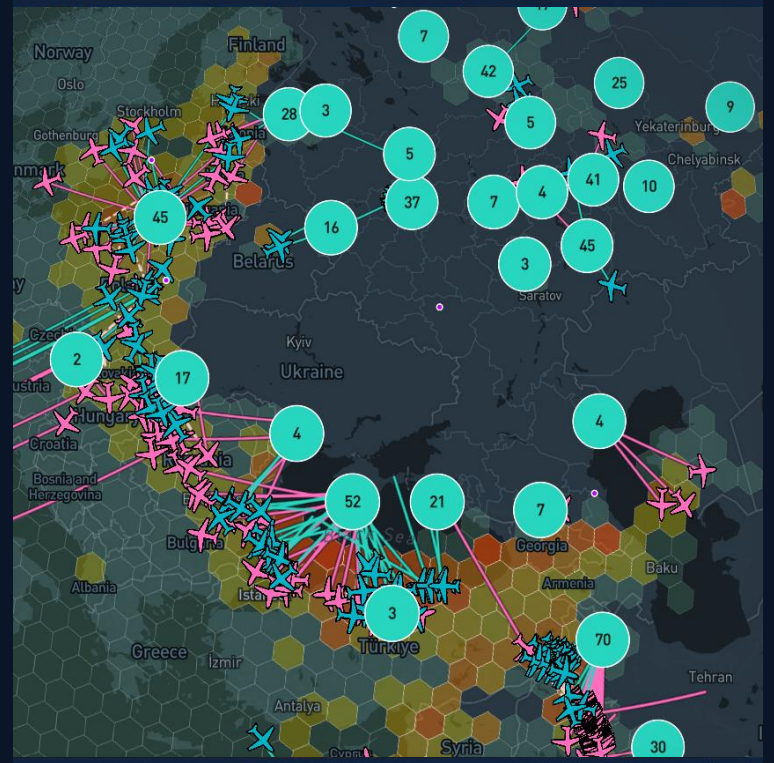
01

Contested airspace

+500%

GPS spoofing reports:
2024 vs 2023

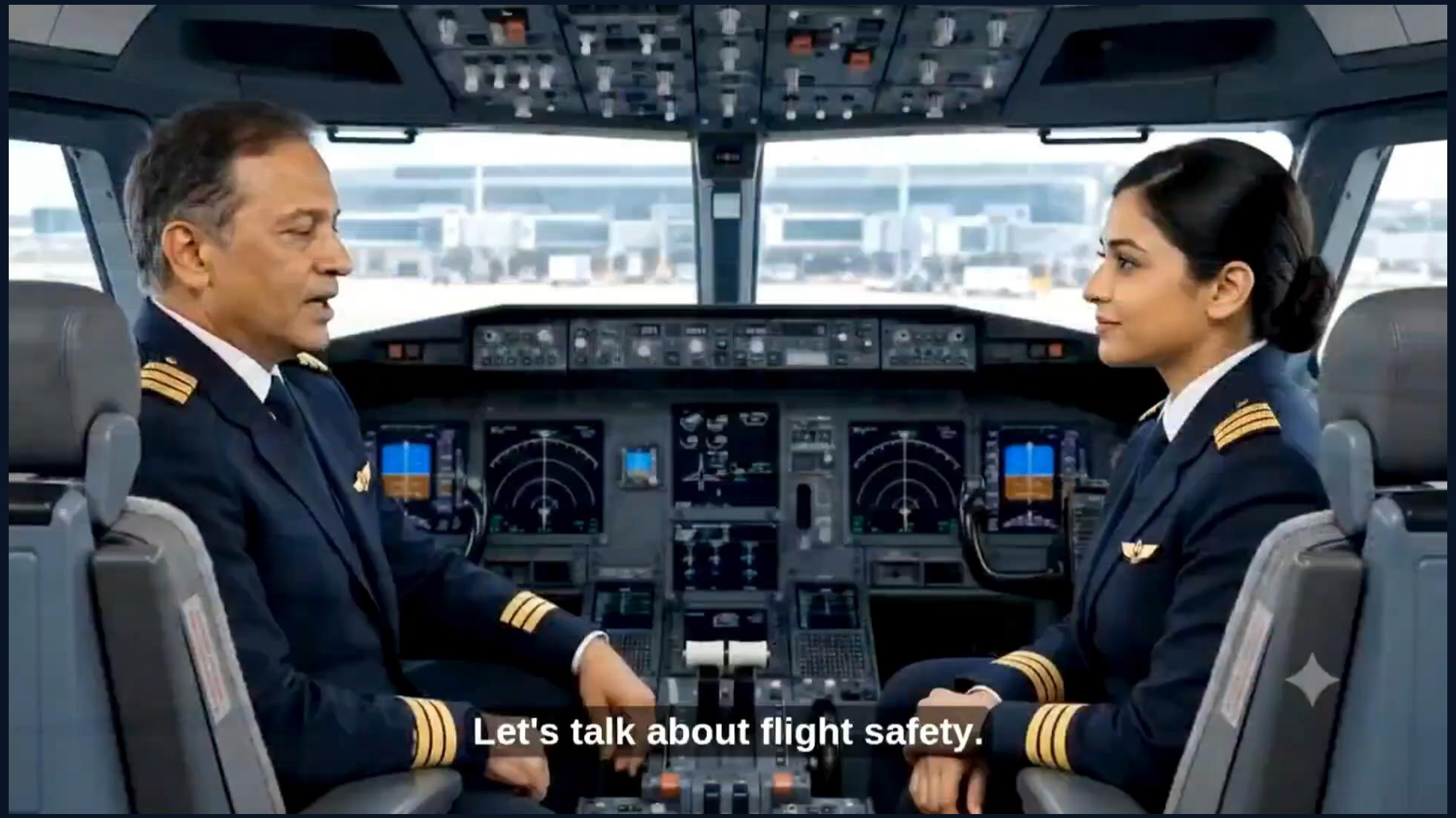




Source: SKAI Data Services

Emerging hazards cross boundaries — technology, people and organisation at once

Reactive or Proactive?



Safety Capability Accumulates



PAST

Predominantly reactive

Something happened → investigate → correct



PRESENT

Reactive + proactive

Still investigate — and find hazards before harm



FUTURE

+ Predictive & adaptive learning

Detect weak signals · anticipate · learn · adapt

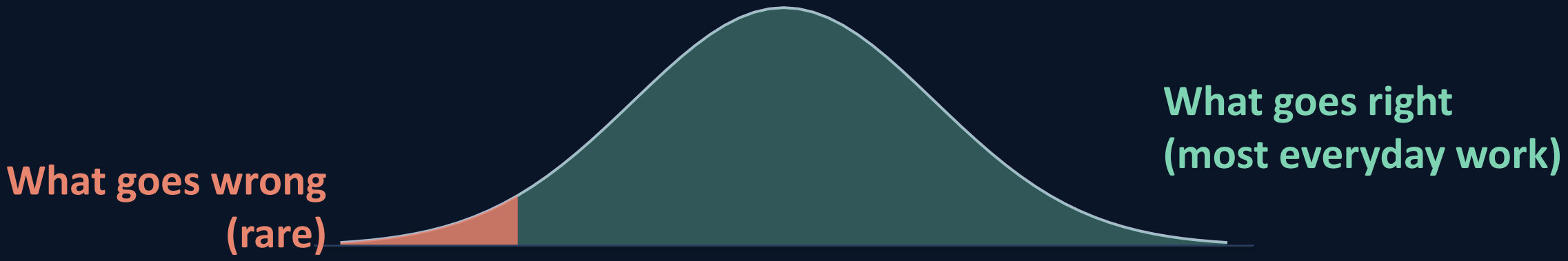
PREDICTIVE + ADAPTIVE LEARNING

PROACTIVE — PROACTIVE · remains

REACTIVE — REACTIVE · remains — REACTIVE · remains

New approaches add capability. They do not retire the old ones

Learning From Failure — and Success



SAFETY-I

Learn from what goes wrong

"As few things as possible go wrong"

- Investigate incidents and accidents
- Control known hazards
- Prevent failure recurring

SAFETY-II

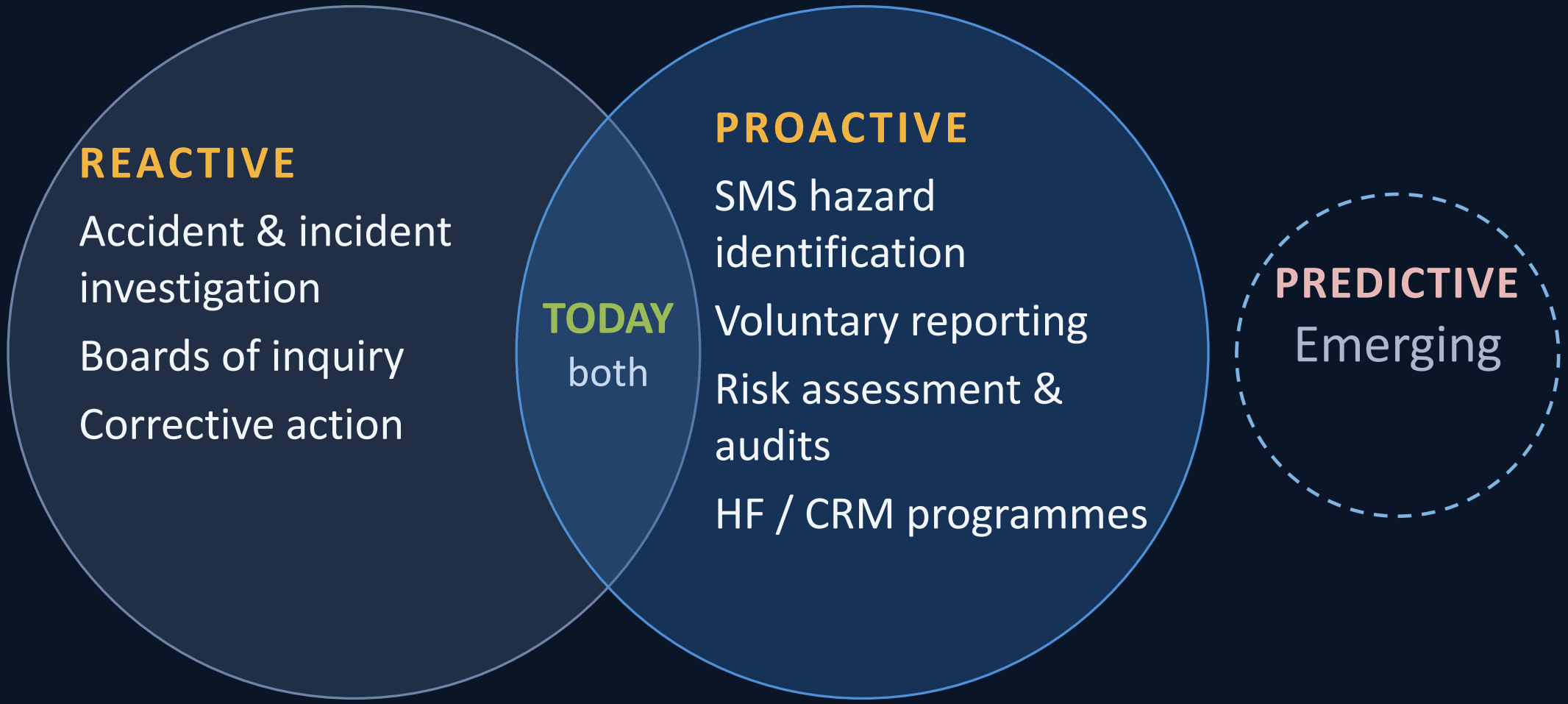
Learn why things normally go right

"As many things as possible go right"

- Study successful everyday work
- Understand adaptation and resilience
- Build capacity as conditions change

Future-ready safety does not replace Safety-I with Safety-II. It integrates both

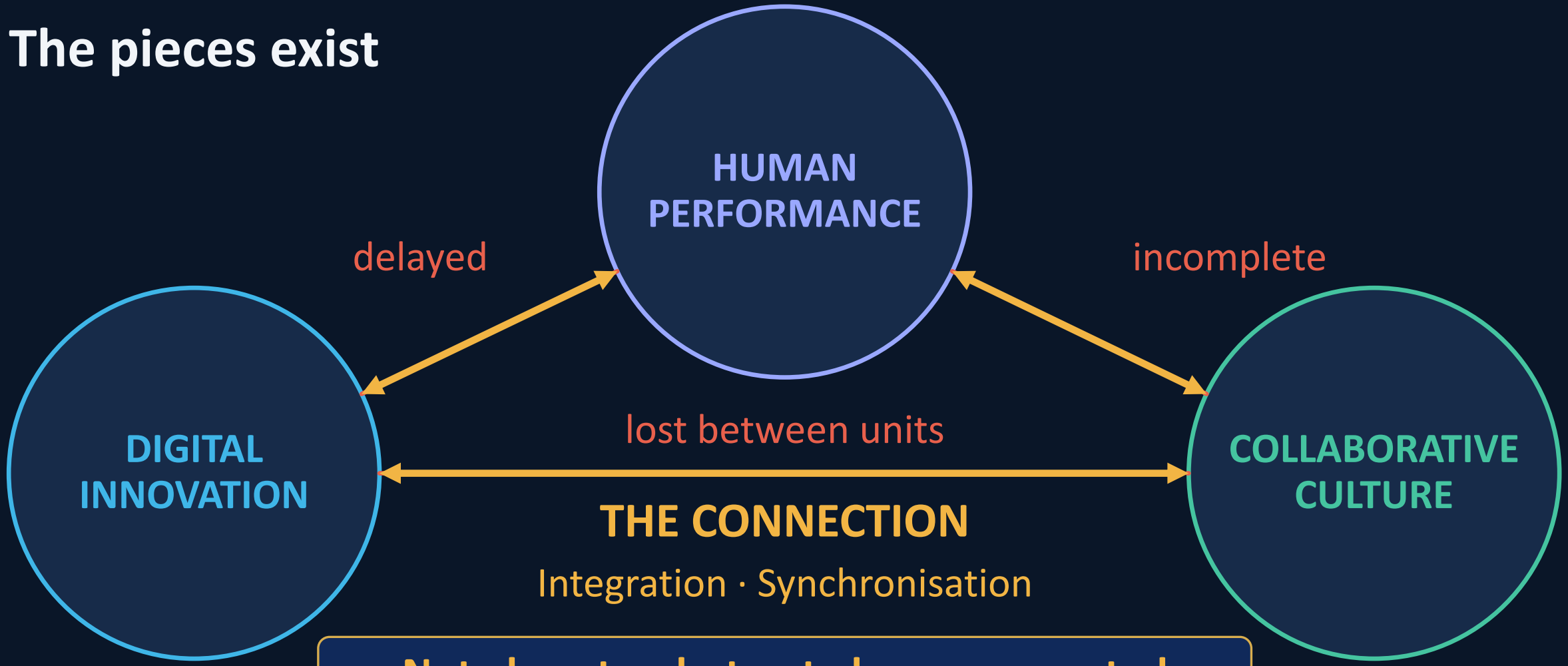
Where Safety Systems Operate Today



Illustrative : maturity varies between organisations

The Critical Link: Connection

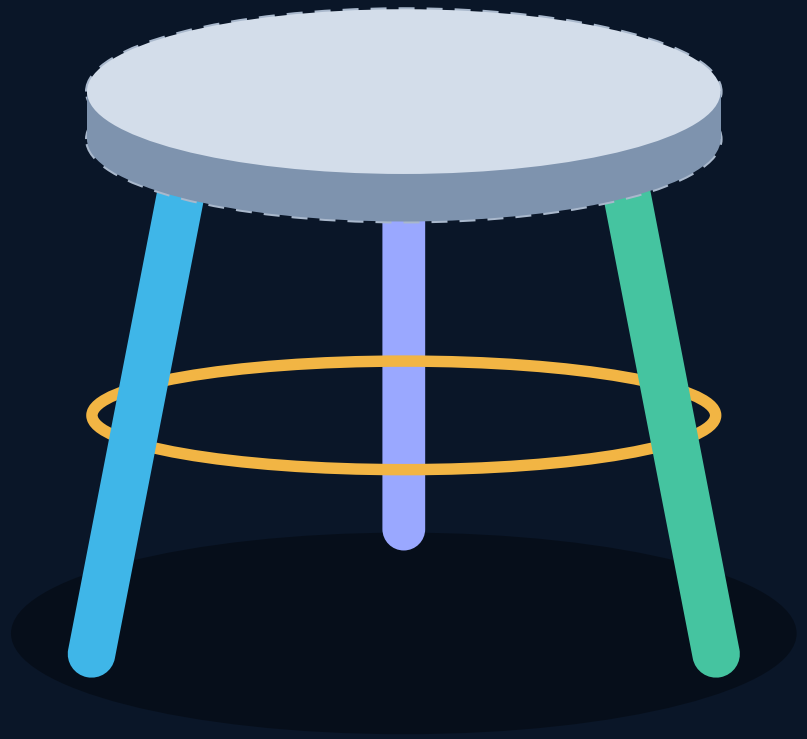
The pieces exist



Not absent — but not always connected

Three Legs: One Safety System

SAFE & MISSION-READY OPERATIONS



DIGITAL INNOVATION

HUMAN PERFORMANCE

COLLABORATIVE CULTURE

THE RUNGS

THE WHOLE STOOL

= Future-Ready Safety Mindset

Three strong legs are not enough.
They must be connected

Leg 1 : Digital Innovation

SAFE & MISSION-READY OPERATIONS



DIGITAL HUMAN CULTURE

- Trusted reports
- Connected data
- Early warning
- Human judgement

BAF Flying · Engineering · ATC · Fatigue

CIVIL Operators · Aerodromes · Air navigation

Reports + flight data → Pattern → Command decision → Review

Leg 2 : Human Performance

SAFE & MISSION-READY OPERATIONS



DIGITAL **HUMAN** CULTURE

- Competence
- Workload
- Fatigue
- Decisions under pressure

PERFORMANCE IS SHAPED BY

Task · Technology · Environment · Organisation

‘Human error’ : a starting point, not a verdict

Leg 3 : Collaborative Culture

SAFE & MISSION-READY OPERATIONS



DIGITAL HUMAN **CULTURE**

- Speak up
- Share lessons
- Close the loop
- Accountability with trust

EVERY LINK MUST CLOSE

Report → Analysis → Command → Other units

Just Culture: trust, with a clear line between acceptable and unacceptable behaviour

Leg 3 : Collaborative Culture

SAFE & MISSION-READY OPERATIONS



DIGITAL HUMAN **CULTURE**

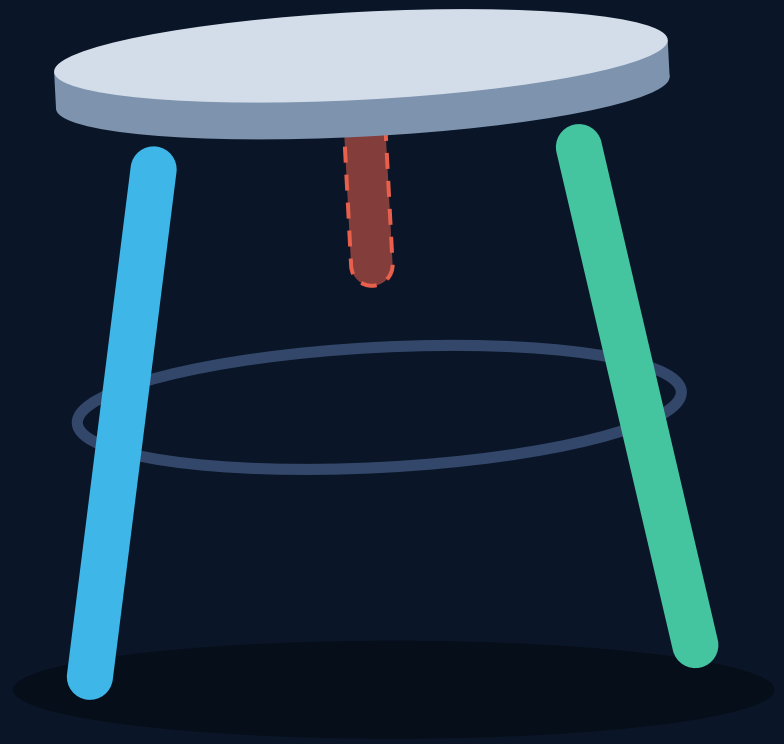
EVERY LINK MUST CLOSE

Report → Analysis → Command → Other units

Wasted Information
Wasted Intelligence
Wasted Experience

When Human Performance Is Weak

SAFE & MISSION-READY OPERATIONS



DIGITAL INNOVATION

HUMAN PERFORMANCE

COLLABORATIVE CULTURE

SCENARIO A
STRONG DIGITAL · WEAK HUMAN

Alerts arrive on time

Crew are fatigued, overloaded and not trained to interpret correctly

Technology cannot compensate indefinitely for unprepared or overloaded people

When Culture Is Weak



SCENARIO B
STRONG PEOPLE · WEAK CULTURE

Skilled people see the hazard

…but fear blame and stay silent

Competence without a learning culture cannot surface hidden risk

When the Safety System Is Weak



SCENARIO C
STRONG CULTURE · WEAK SYSTEM

People report openly

Delayed arrival at other agencies

Late identification of the pattern

Good culture can recognise problems — without usable data, it cannot anticipate them

All Three Legs — Connected



Integration strengthens the system

Synchronisation makes it responsive

THE RUNGS

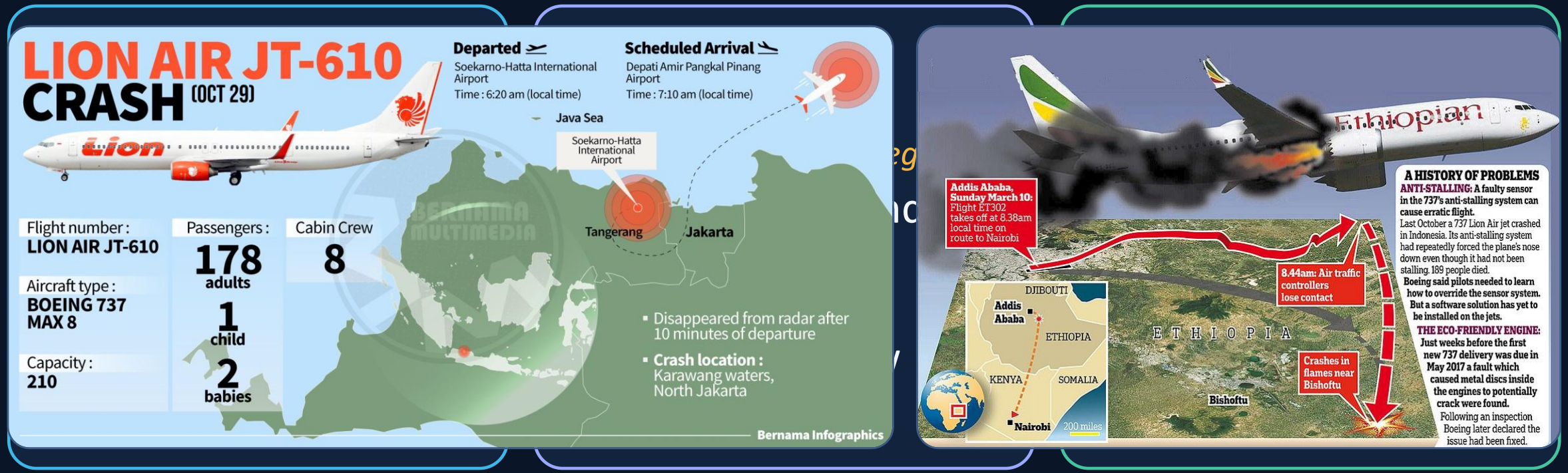
Information flow · trust · command decisions · SMS governance · feedback loops · SPIs · periodic review

SEAT safe & mission-ready operations

WHOLE STOOL future-ready safety mindset

737 MAX — A System Interaction

Lion Air 610 (2018) | Ethiopian Airlines 302 (2019) | **346 lives lost**



Different weaknesses. One interconnected system failure

The Solution Also Required Integration

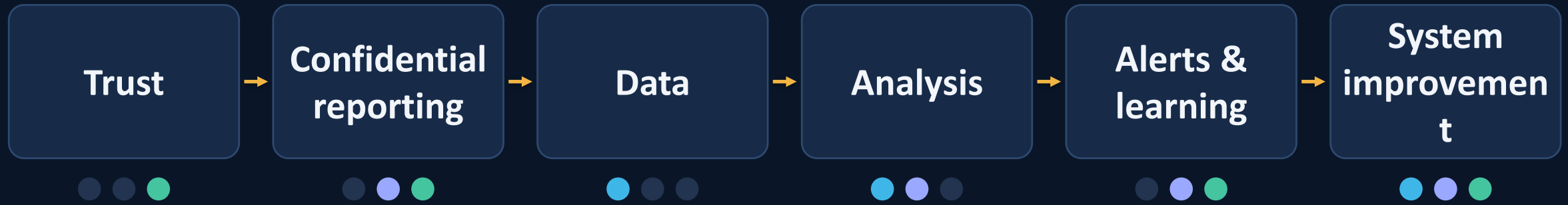
Would fixing one leg have been enough? The return to service changed all three:

Digital Innovation	MCAS now compares both AoA sensors, activates once per event, with limited authority; AOA DISAGREE alert made standard
Human Performance	Non-normal procedures revised and added; simulator-based pilot training required
Collaborative Culture	Multinational certification review (JATR); calls for integrated, human-factors-informed system safety assessment

Complex safety failures rarely respect organisational boundaries

ASRS — Integration in Practice

NASA Aviation Safety Reporting System, since 1976



2.3 million+
confidential safety reports received

8,150+
safety alert messages issued

Voluntary · confidential · non-punitive
the foundations of the programme

Integration in practice — turning reports into shared safety learning

One Continuous Safety-Learning Loop

1 Front-line report → 2 Safety data → 3 Safety intelligence → 4 Command decision

Updated practice → new reports

DIGITAL INNOVATION
Collects & connects

HUMAN PERFORMANCE
Interprets & decides

COLLABORATIVE CULTURE
Reporting, feedback & shared learning

5 **Assigned action**
Training · SOP · maintenance

6 **Reporter feedback & shared lesson**

7 **Effectiveness review**
Did the action work?

No leg works alone

A Suggestive Pathway : One System

DIGITAL INNOVATION

- (a) Digital SMS and reporting platform
- (b) Data governance and cybersecurity

HUMAN PERFORMANCE

- (c) Human Factors training across trades
- (d) Fatigue Risk Management

COLLABORATIVE CULTURE

- (e) Institutional support in safety planning
- (f) Cross-unit safety collaboration
- (g) Safety leadership and communication

(-) Formal Just Culture policy

THE RUNGS · CONNECTING ALL THREE LEGS

- (h) Safety performance indicators across all three legs
- (j) Multidisciplinary incident and accident response

A Phased Implementation Plan

Proposal — not official policy · pace set by readiness, not the calendar

PHASE 1 · CONNECT

- Data owners & access rules
- Feedback to every reporter
- Common safety indicators

PHASE 2 · INTEGRATE

- Shared reporting & analysis
- Fatigue & HF training
- Cross-unit learning

PHASE 3 · ANTICIPATE

- Use Trends & Predictive indicators
- Governed analytics / AI
- Learn from success too

Connect before you digitise. Integrate before you predict

CONCLUSION

Not a Fourth Pillar — A Connected Three



The future of aviation safety may not depend on discovering a fourth pillar —

making the three we already have carry the load together



Interactive Session

Building a Future-Ready Safety Mindset