



*Threat & Error Management Strategies
for
Key Operational Risk Area Mitigation
Capt Andrew Elbert*



Netting the Quadriga

- Key Operational Risk Areas (KORA)
- Proactive Safety
- Threat & Error Management (TEM)
- BLUF – KORA Mitigation
 - Synergetic Safety Management System
 - RCA & Bowtie “Reason-ing”
 - Education & Motivation
 - *Drink the Water (WTW, TTT)*



KORA

Overview

- **326 B738s**
- **80+ Bases**
- **31 Countries**
- **200 Destinations**
- **1800 Flights/day +**
- **500K Flts/yr (SMS)**
- **105M PAX**
- **10,000 crew**
- **380 on Order**
- **2019 = MAX**

Outlook ('24)

- **546 B738s**
- **180M PAX**
- **A-G-B!**





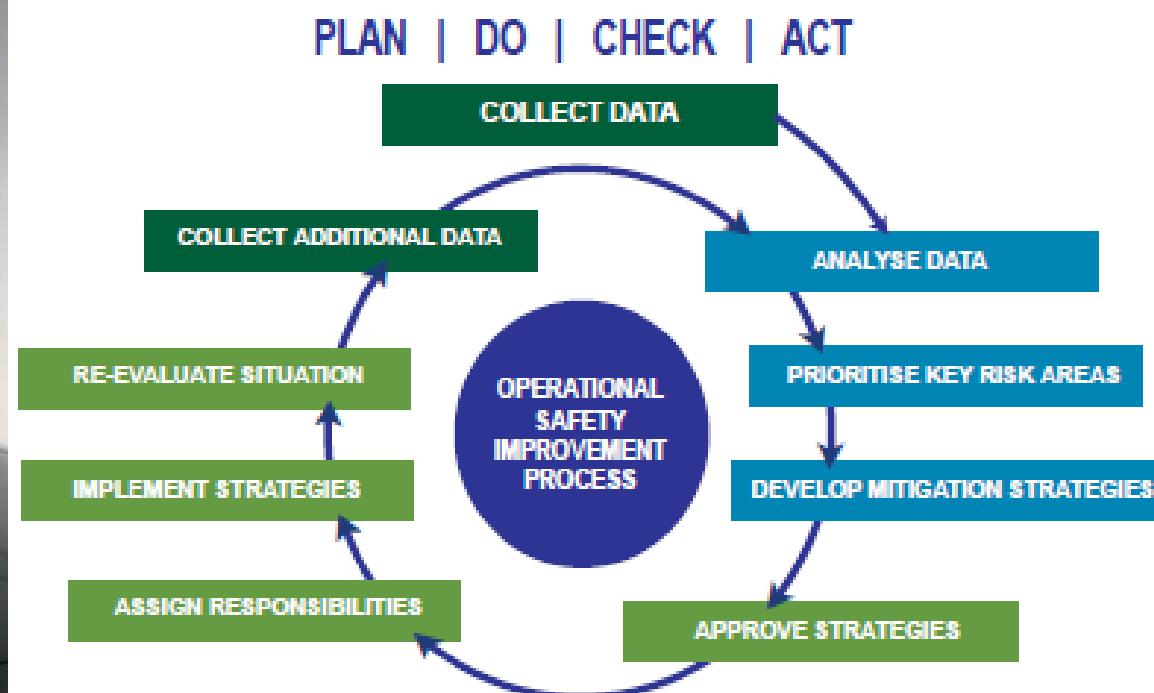
KORA

KORA	RYR	EASA	IAA	UKCAA	
Aircraft Fire*	(F-NI)	X	X	X	X
Bird Strike	(BIRD)	X		X	
<u>Controlled Flight into Terrain**</u>	(CFIT)	X	X	X	X
<u>Ground Collision**</u>	(GCOL)	X		X	
High Energy Approach	(HEA)	X			
Loss of Control In-Flight	(LOC-I)	X	X	X	X
<u>Mid Air Collision**</u>	(MAC)	X	X	X	X
<u>Runway Excursion**</u>	(RE)	X	X	X	X
Runway Incursion	(RI)	X	X	X	X
Safety of Ground Ops	(GOPS)	X		X	X
Laser Attacks	(LASER)			X	
Human Factors & Performance	(HF-Crew)			X	



KORA

→ KORA Mitigation via PDCA





Proactive Safety

→ **Active Safety**

- Managing *known* Hazards

→ **Proactive Safety**

- Quest for Precursors, Prediction
- Close the Gap via System/Science (*WAI v WAD*)
- Merge Technology & Human Ingenuity
- Key – SMS Synchronization/Synergy



Proactive Safety

→ KORA Mitigation via DELTA

- D - Data
- E - Enterprise
- L - *Leadership*
- T - Target
- A - Analysis



Proactive Safety

→ Data

- ✓ FOQA (OFDM)
- ✓ Line Reports
- ✓ LOSA



☛ *Internal*
☛ *External*



Proactive Safety

→ Enterprise

- NEXTGEN Lessons Learned (FAA)
 - ✓ *Shared Information*
 - ✓ *Situational Awareness*
 - ✓ *Access to decision making tools*
 - ✓ *Result -- Increased Safety*
- SMS – Synchronize for Synergy
 - ☛ “*Fringe Benefits: S & E*”



Proactive Safety

→ Synergy via Leadership

- NASA ASRS – *Happy 40th Anniversary*
“safety depends on lessons learned”
.....*at all levels of the industry*

- Managing the Pandora Factor
 - “*Murphy’s Law*”
 - “*The Naked Pilot*”



Proactive Safety

→ Synergy via Leadership

- Human Factors:
 - ✓ 95% ('31) to 73% ('11)
- The Balance:
 - ✓ *Regulation - Education - Experience*
 - ✓ *WAI versus WAD*
- The Keys:
 - ✓ *Leadership, Education & Motivation*



Proactive Safety

Regulation:

“Rule books are paper - they will not cushion a sudden meeting of stone and metal”

Ernest K. Gann, *Fate is the Hunter*



Proactive Safety



Education:

*“You can lead a horse to water,
...but you can’t make him drink”*



Cowboy Proverb
or ... *Old English Homilies, 1175*



Proactive Safety

Education:

By far the greater number of aeroplane accidents are due to precisely the same circumstances that have caused previous accidents...

a distressing feature of these accidents is the evidence they afford of the unwillingness, or the inability, of people to profit from the experiences and mistakes of others.



*Gustav Hamel & Charles C. Turner
Flying: Some Practical Experiences
Published posthumously in 1914*



 **RYANAIR**
LOW FARES. MADE SIMPLE.



Proactive Safety

Experience:

*“Experience is something you don’t get
...until after you need it”*

Murphy's Maxim





DELTA's Target



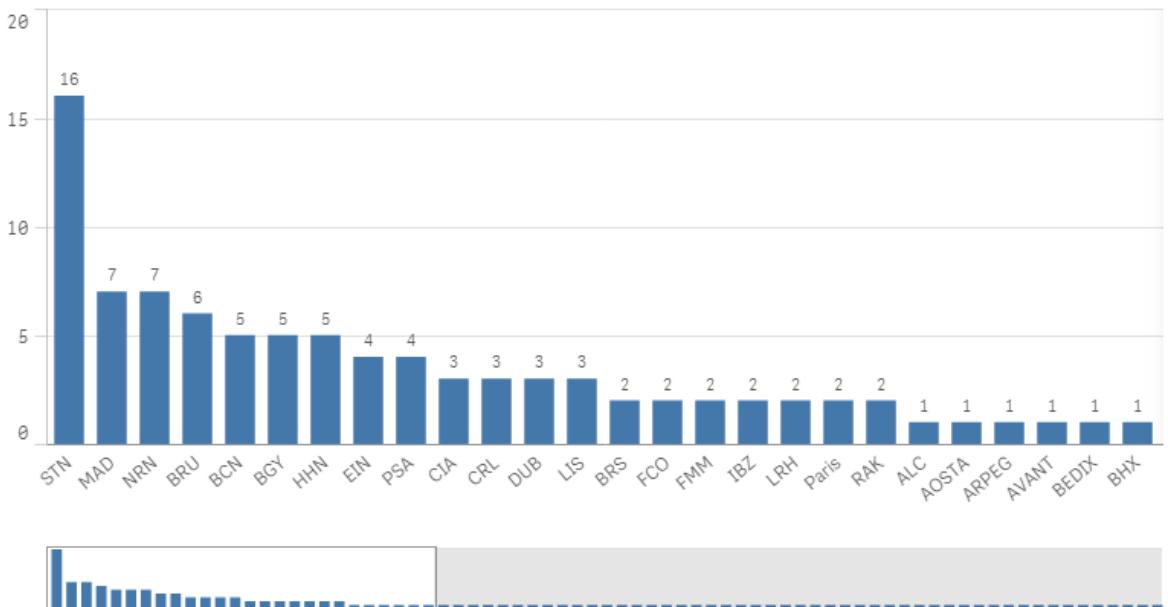
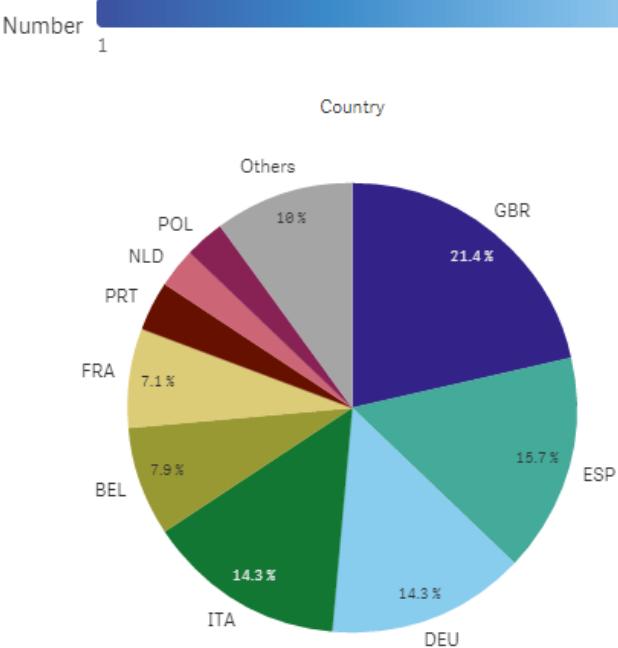
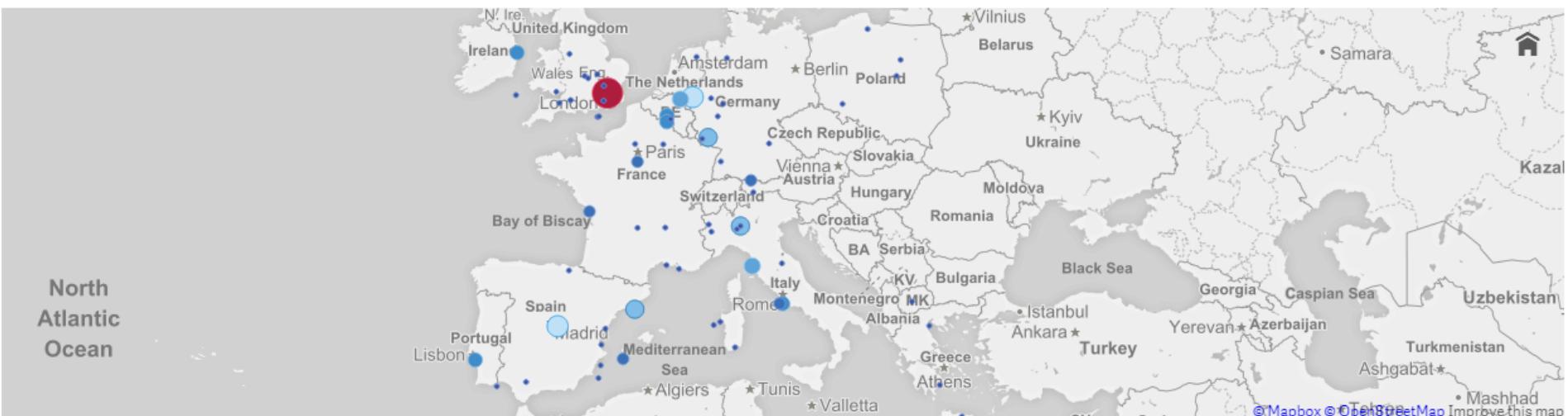
RYANAIR SAFETY ROADSHOW 2015
'ONE MISSION'





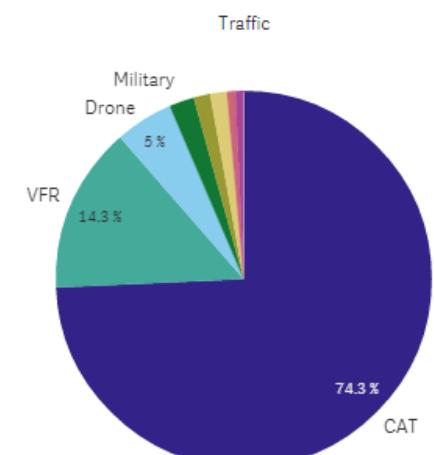
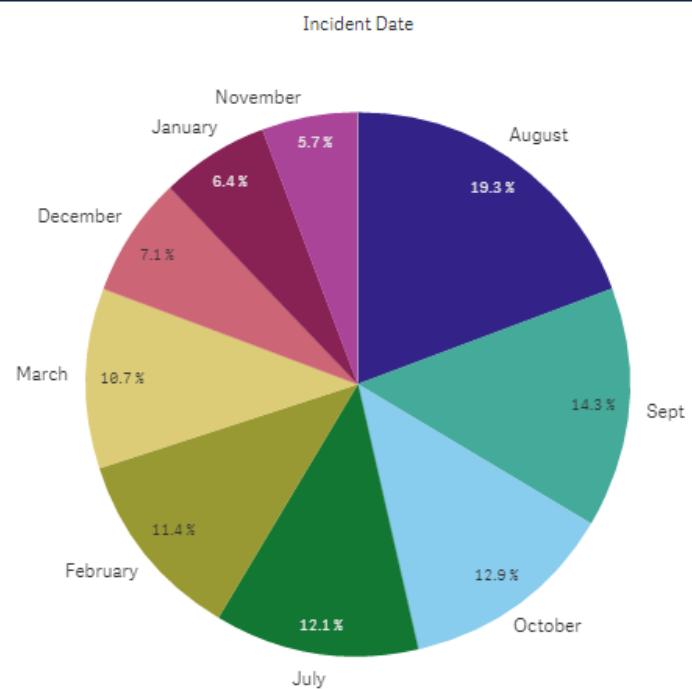
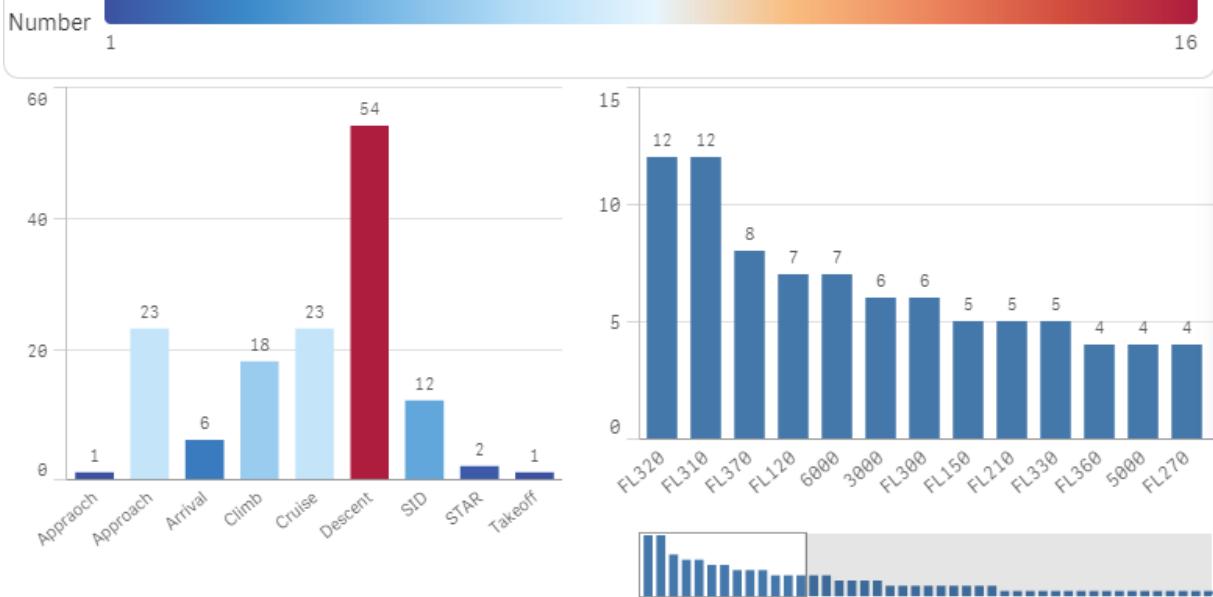
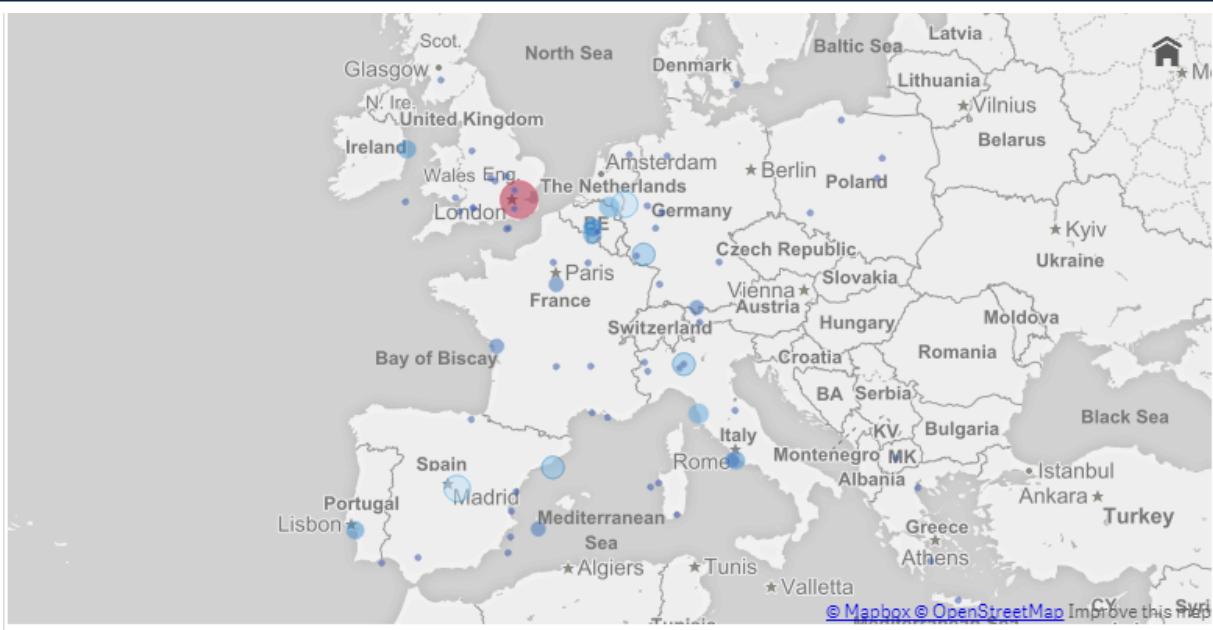
DELTA - Analysis

MAC Analysis





DELTA – Analysis

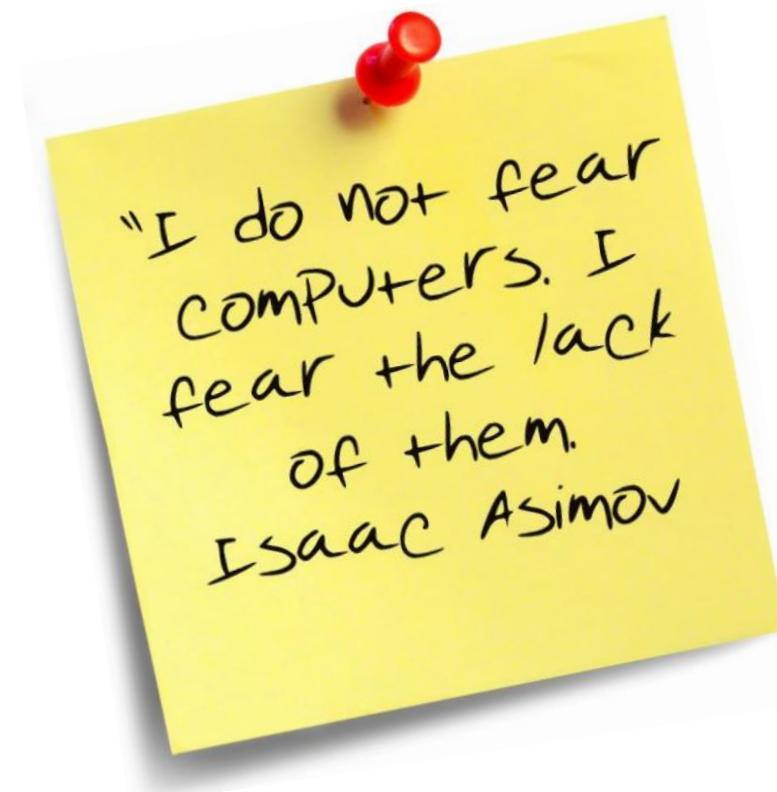




Proactive Safety & Analysis

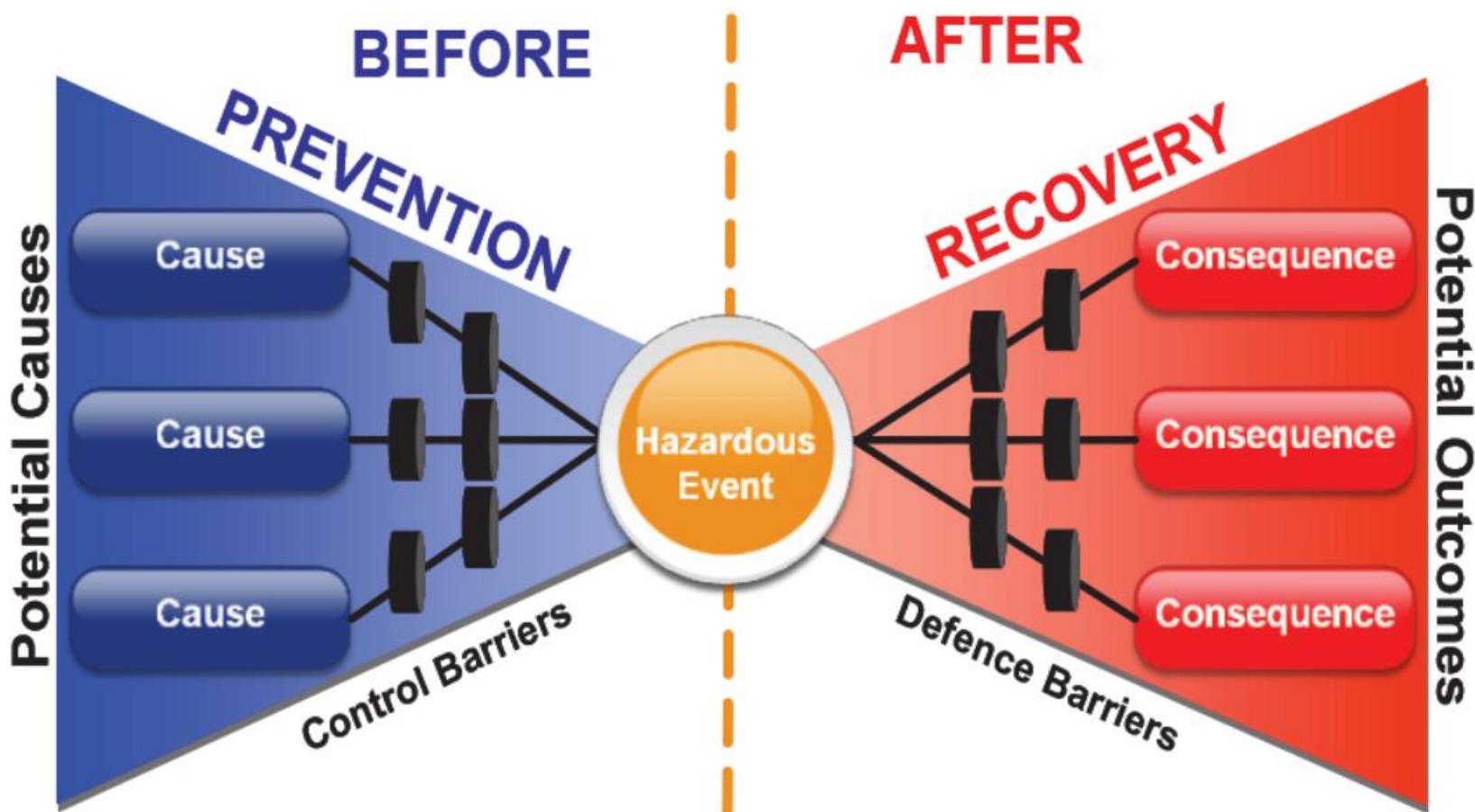
→ Reason-ing

- Organizational
- Workplace
- People
- Defences (Regulation, Tech, Training)





Proactive Safety & Analysis





Threat & Error Management

→ Anticipate – Recognize – Recover

→ TEM Awareness

- ☛ *Keep it on the Radar*
- ☛ *Educate & Motivate*
- ☛ *Talk the Talk & Walk the Walk*

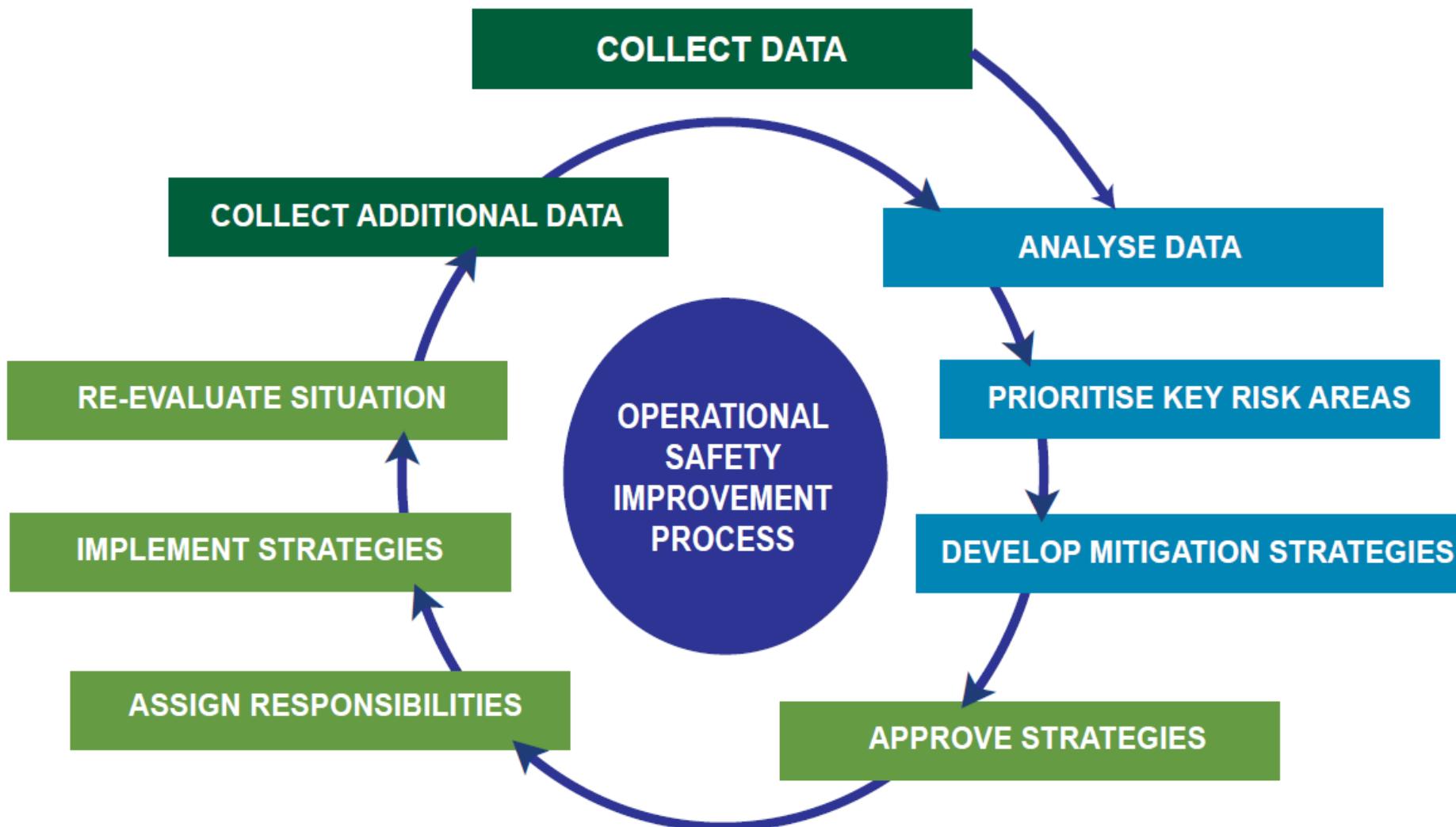
→ Incorporation into Line Operations

- Qualification & Recurrent Training
- Audits & Evaluations (simulator & aircraft)
- Briefings - *Planning, Departure, & Approach*
- PDCA



Threat & Error Management

PLAN | DO | CHECK | ACT





Proactive + Resilient Safety Nets

CSS

SMS

KORA

PDCA

TEM

Outreach



Questions?