

Enhanced Safe and Efficient Operations with Data Driven Insights Through CBTA

EATS 2023 - Portugal

November 2023



CAE

SIA Key Training Drivers

Training Standards and Quality



- ✓ Global standards – ICAO, IATA and Regulators
- ✓ CBTA Framework – Level 3 (TEM Metrics), mixed EBT, IEC
- ✓ Safety and Training data harmonization (IATA)

Airline Resilience



- ✓ Monitor - Integrated ecosystem framework with Airlines and partners
- ✓ Learn – Leverage on Data analysis, Machine Learning and AI
- ✓ Respond – Increase speed of response through technology
- ✓ Anticipate - Data insights framework and predictive analysis

Innovate and Transform



- ✓ Scaling up and out through collaboration to stay relevant & ahead.
- ✓ Active participation in airline communities to understand and promote innovative solutions
- ✓ Maintain effective partnership through shared vision and collaborative value creation.

SIA Key Training Drivers

Digitalisation



- ✓ Data-driven, automated process to improve workflow efficiency.
- ✓ Training anytime, anywhere using VILT
- ✓ Personalised training for individual
- ✓ Move towards enhanced EBT

Technology



- ✓ Biometrics technology – accurate data and correlation to competencies
- ✓ AR/VR Technology with AI supported scenarios to develop competencies

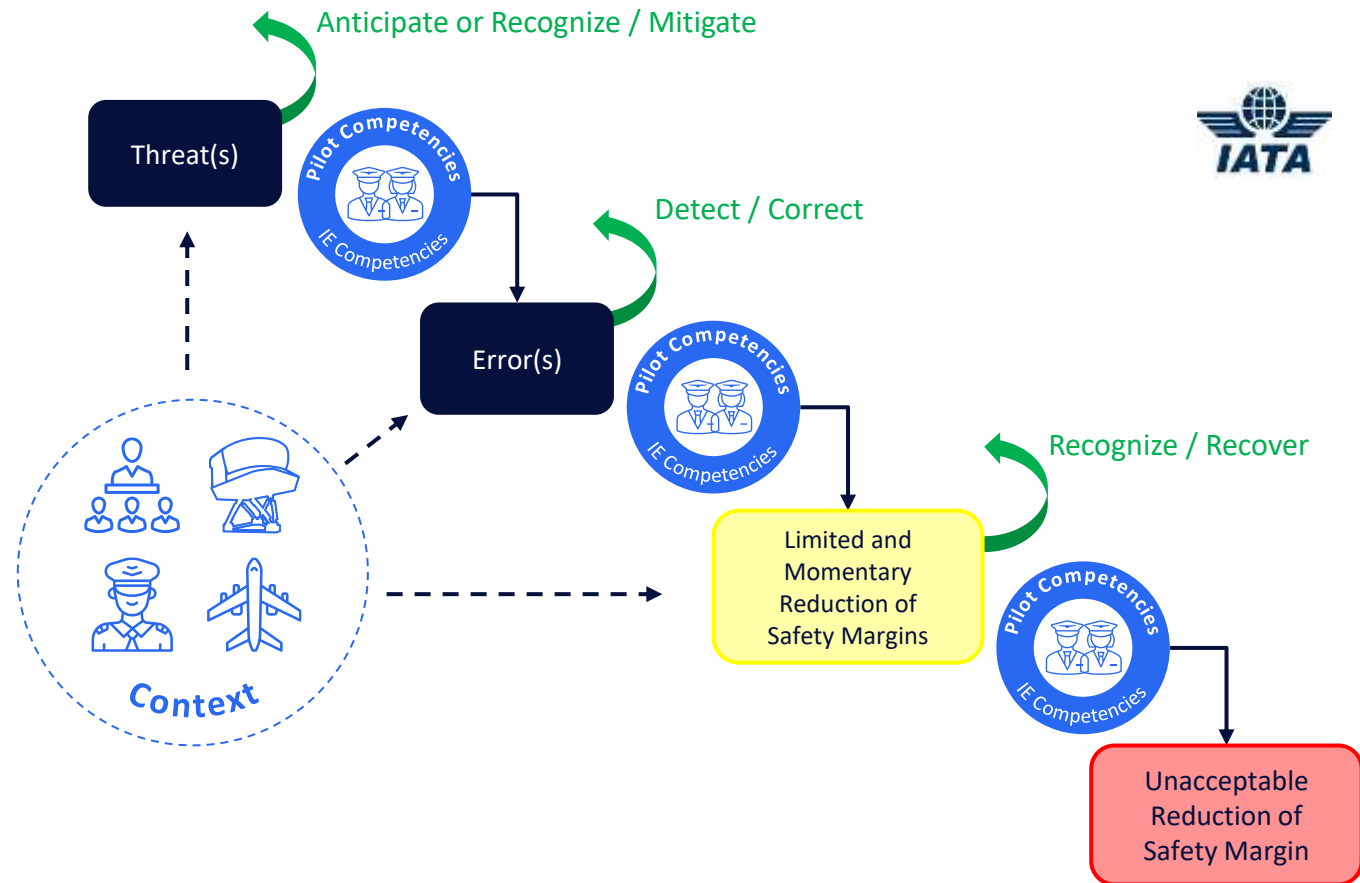
Training Analytics



- ✓ Promotion of individual behavioural change in safety attitude through CBTA.
- ✓ Improve pilots' operations and efficiency
- ✓ Enhance Instructor/Evaluator competencies

Effective threat and error management = competent pilots

Modern Safety Management Systems collect and analyze Threat, Error, Safety Margin and Crew Behaviour data for Predictive / Prescriptive Safety Management.



Accurate grading data is required to drive accurate insights



GM2 ORO.FC.231(d)(2) Evidence-based training

ED Decision 2021/002/R

VERIFICATION OF THE ACCURACY OF THE GRADING SYSTEM — FEEDBACK PROCESS

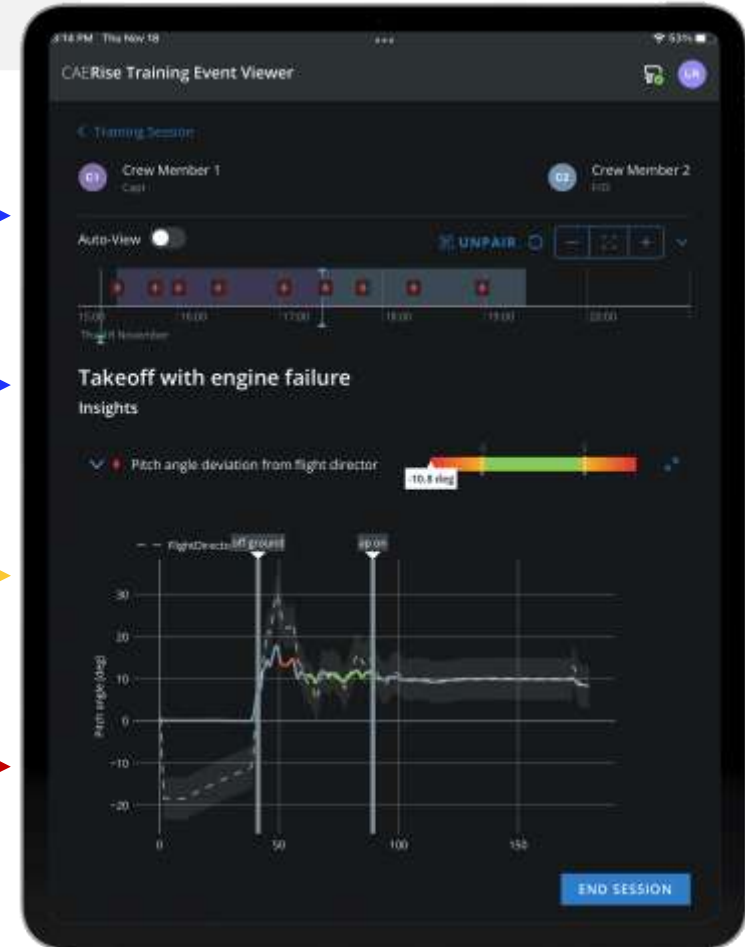
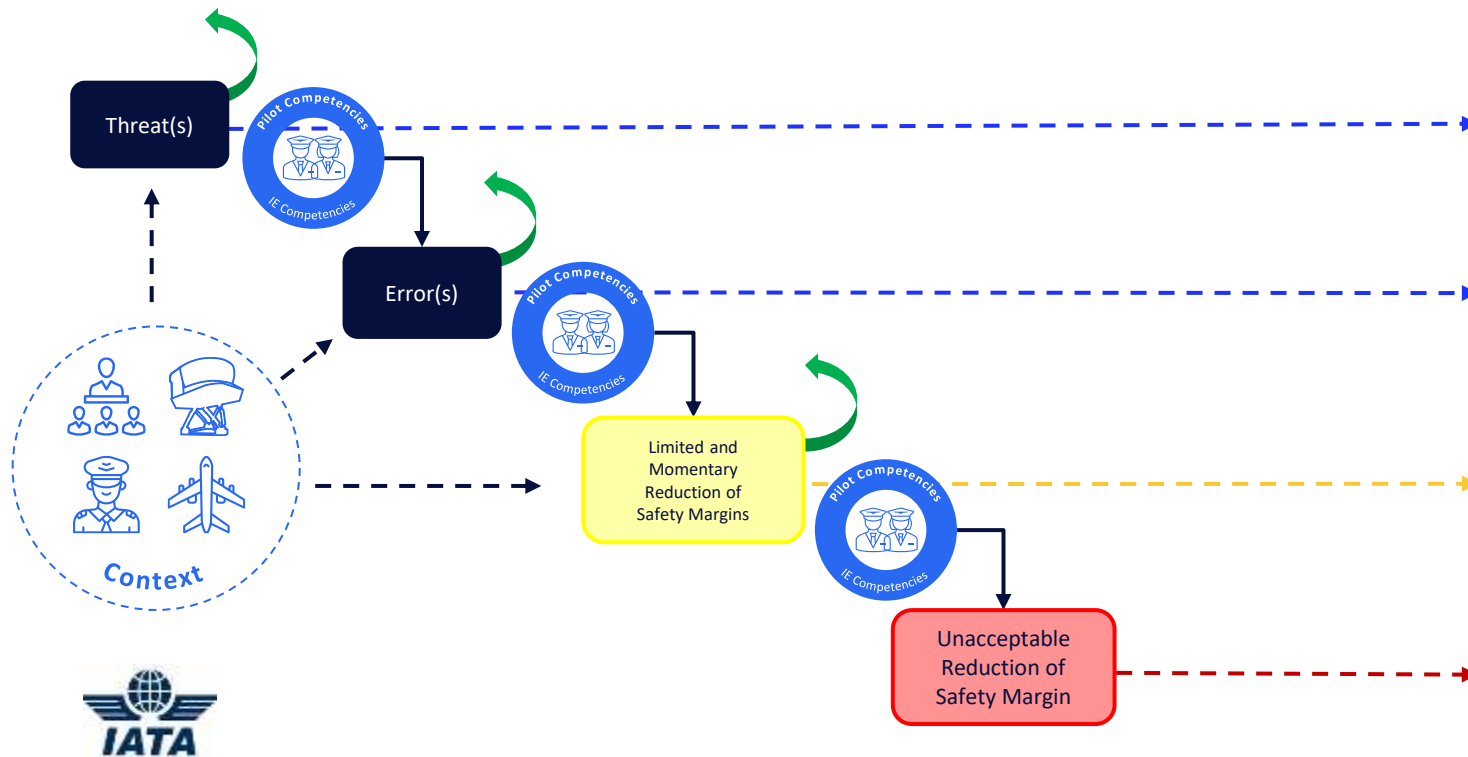
Concordance agreement between instructors may be high; **however, the whole community of instructors may be grading too low or too high (accuracy).**

The statistical result of the verification against Appendix 9 criteria can provide the operator with a criterion-referenced system to adjust the accuracy of the grading system.

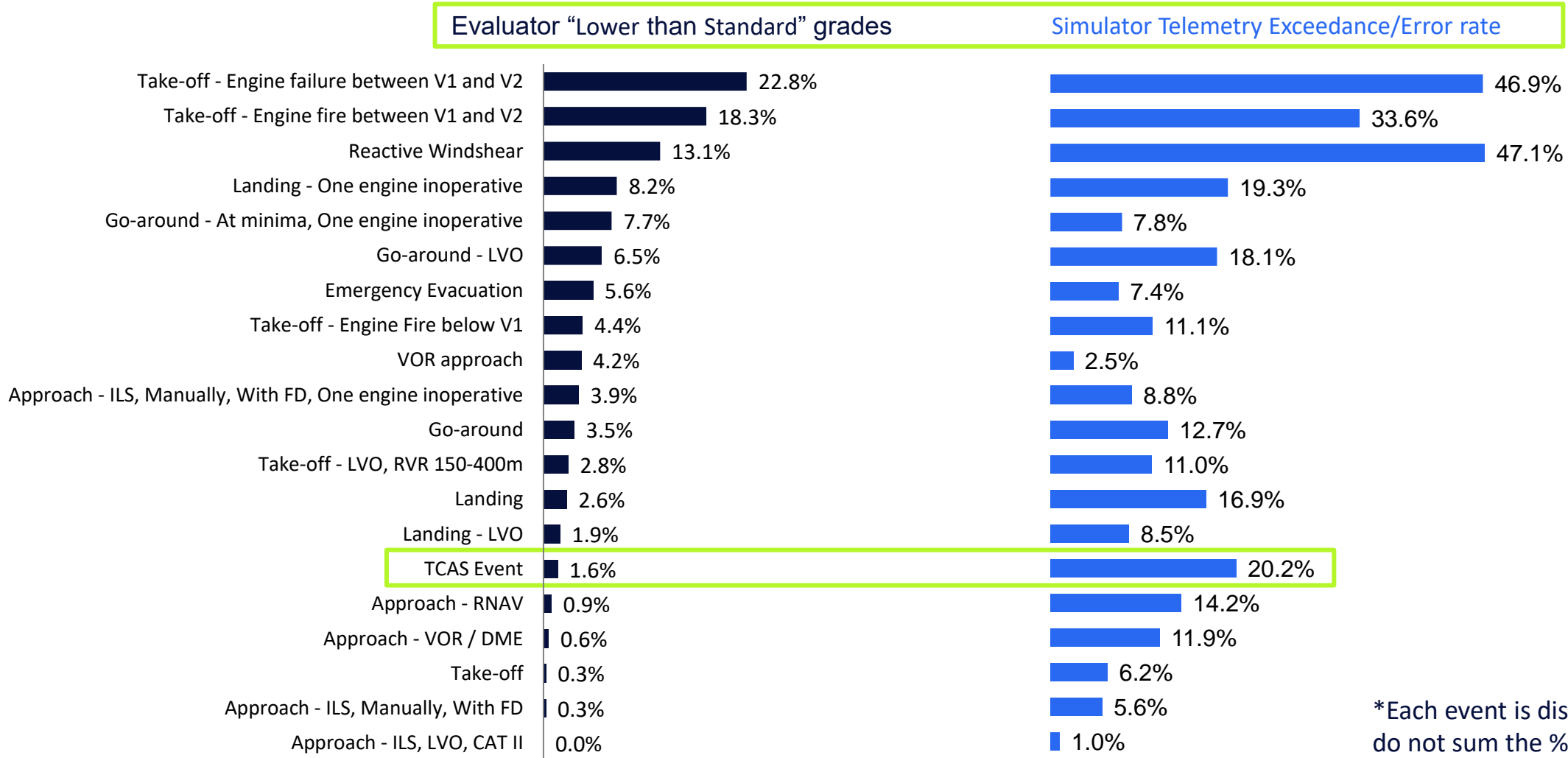
Agreement among instructors and accuracy of grading overall, are equally important.

CAE Rise™: using simulator telemetry in the context of TEM

Telemetry captures threats, errors and safety margin exceedances, allowing the instructor to focus on the crew behaviours to evaluate pilot competence.



The statistical result of the verification against Appendix 9 criteria

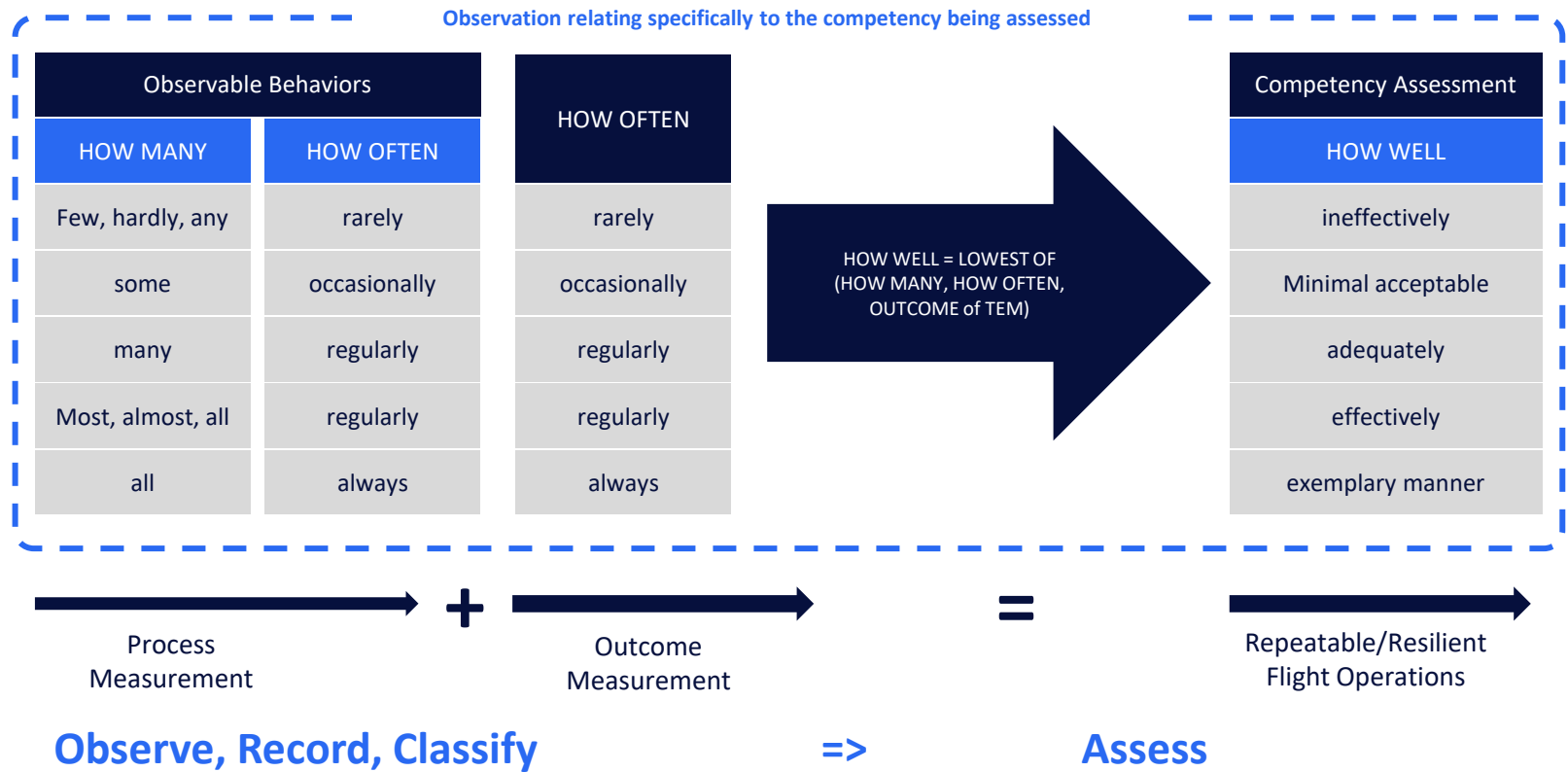


*Each event is distinct, do not sum the %

Comparison from independent sources can provide increased confidence of grading data quality.

Data Driven Support of Competency Assessment Framework

Outcomes are important but focusing on the process (behaviours) ensures more consistent safe outcomes



Gaze tracking in the context of CBTA



The instructor's seating position in a simulator does not allow them to **effectively observe and record** crew behaviours that address:

- **Active monitoring,**
- **Cross-checking, and**
- **Effective scan patterns.**

Can one use simulator telemetry and biometric data to address these challenges?

Challenges

Support the instructor perform the **Observe, Record and Classify** steps in Competency Assessment.

Designing a user interface that is efficient and intuitive.

Research & Development framework



2

Landing Scenarios

300

Line Pilots

150+

Recorded Sessions

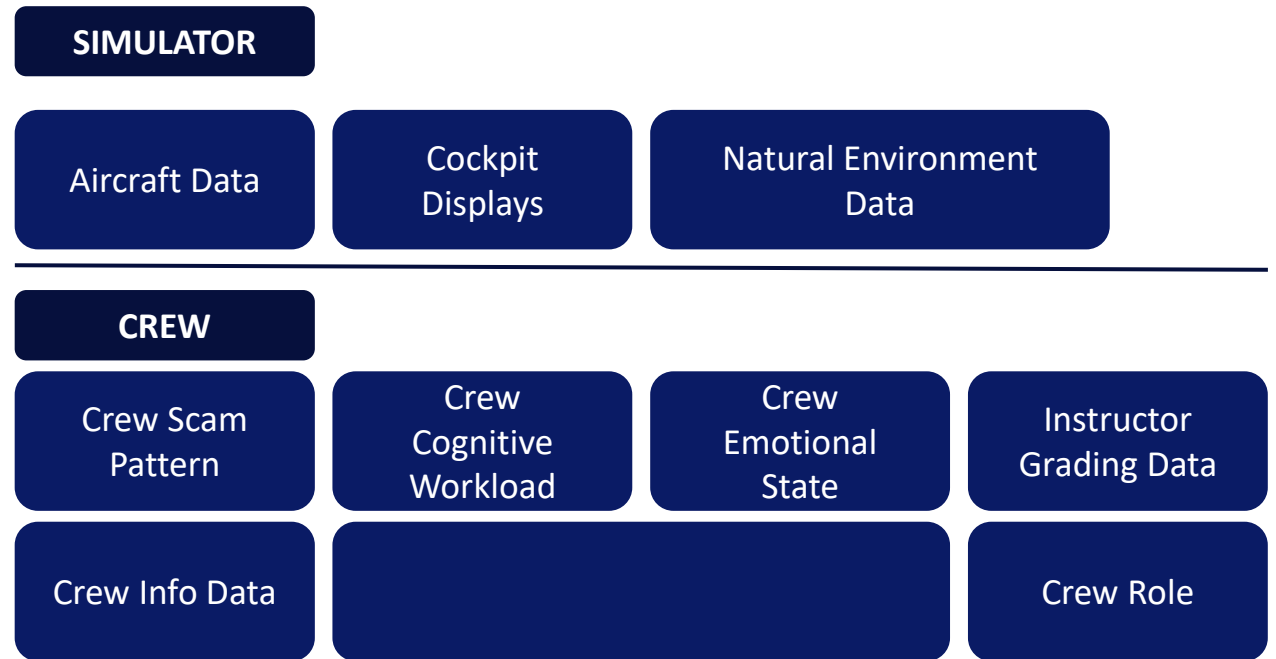
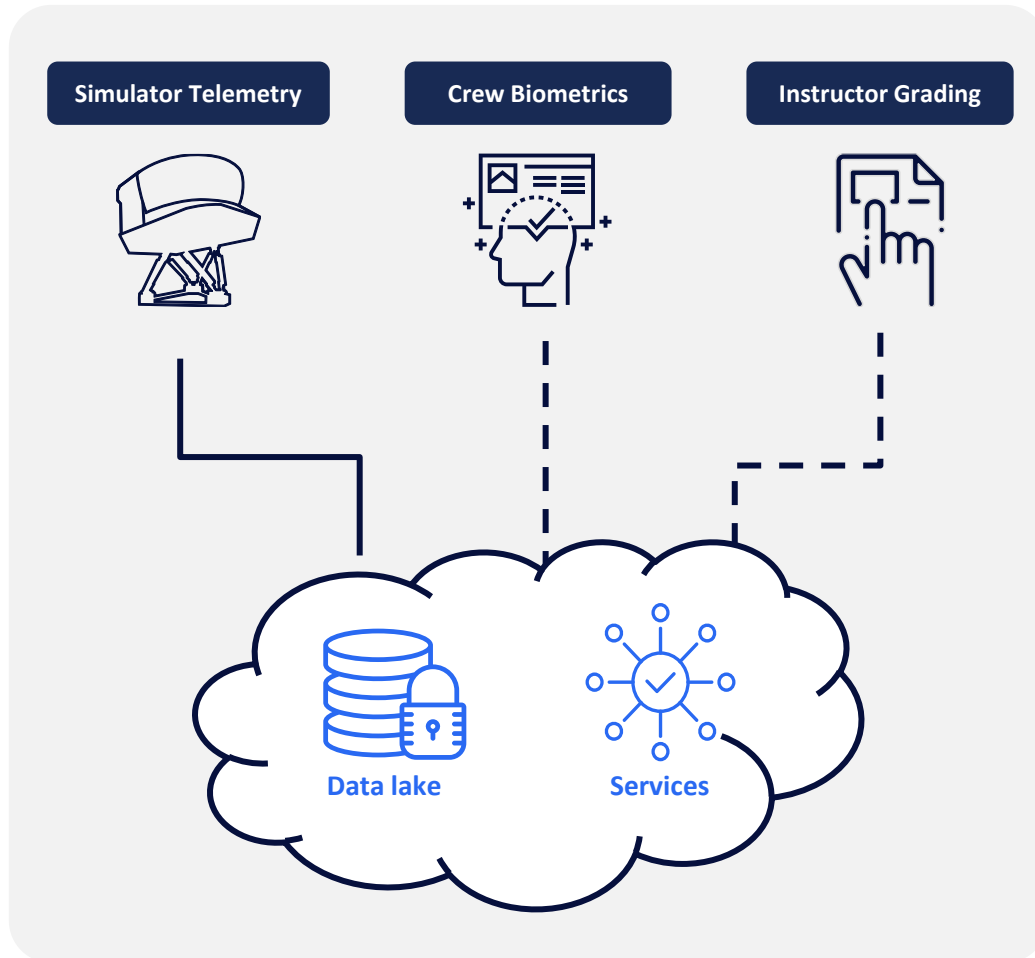


5 Use Cases

Use Case 1

Pilot Monitoring Behaviour

Context is king—What data is being collected?



Represents one of the richest data sets collected to date on airline crew performance

Data analytics – What does good look like?

“Golden Run” Baseline



“Peer” Baseline



Multiple baselines were generated in support of data analytics work.

R&D scenarios – target competencies



SCENARIO 2



SCENARIO 1 – Link to Obs. and expected scan areas

Competencies Associated to complete Specific TASK's - Eng L Severe Damage / Followed by L Eng Fire.

COMPETENCY	DESCRIPTOR	OBSERVABLE BEHAVIOR	ADDITIONAL DESCRIPTORS	SCAN PATTERN PF	SCAN PATTERN PM
FPA					
ENG SVR. DAMAGE/ ENG FIRE.	Controls the aircraft flight path through automation, including appropriate use of flight management system(s) and guidance.	1. Maintains the desired flight path during flight using automation whilst managing other tasks and distractions.	PF/PM - Time taken to recognize the severe damage- PF - Was the Flight Path / Yaw controlled while trouble shooting, assessing damage, and carrying out recall actions PF - VOICE commands Sequence of Asking for ECL / RT When PF using RT, what was PM management of ECL	Gaze- EICAS /PFD Quality of voice. Gaze to MCP / THRUST LEVER / FUEL CONTROL SW ENG FIRE SW Time to commence ECL / RT calls	Gaze- EICAS /PFD Quality of Comm Gaze to MCP/ THRUST LEVER/FCS/FIRE SW Reminds PF of ECL if did not initiate
		2. Contains the aircraft within the normal flight envelope		Gaze PFD /ND	Gaze PFD/ ND

Scenarios designed to target Competencies/OBs potentially correlated with telemetry + biometric signals.

Pilot flying / Pilot monitoring

Engine Seizure/Fire Drill

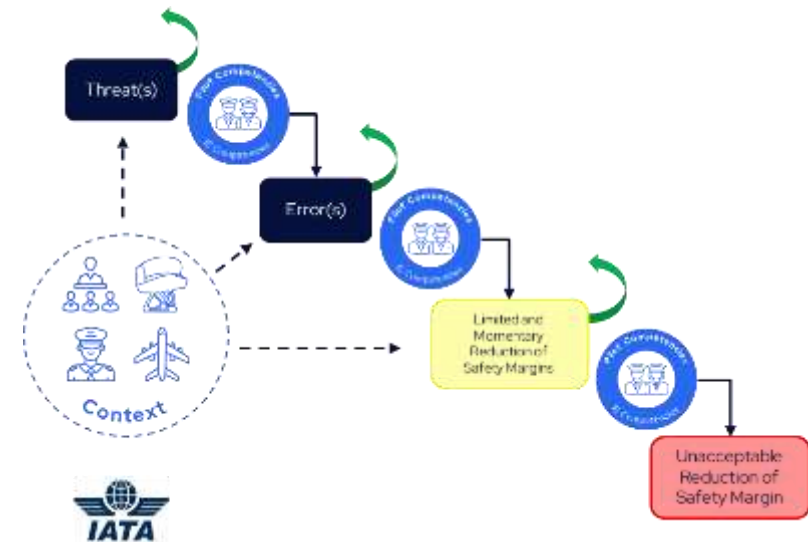


PF/PM Competencies

General for ILS approach. : PRO, COM, FPA, FPM, WLM

With Threat (Engine Fire):

Conditional Obs./Competencies: PSD, LTW, COM



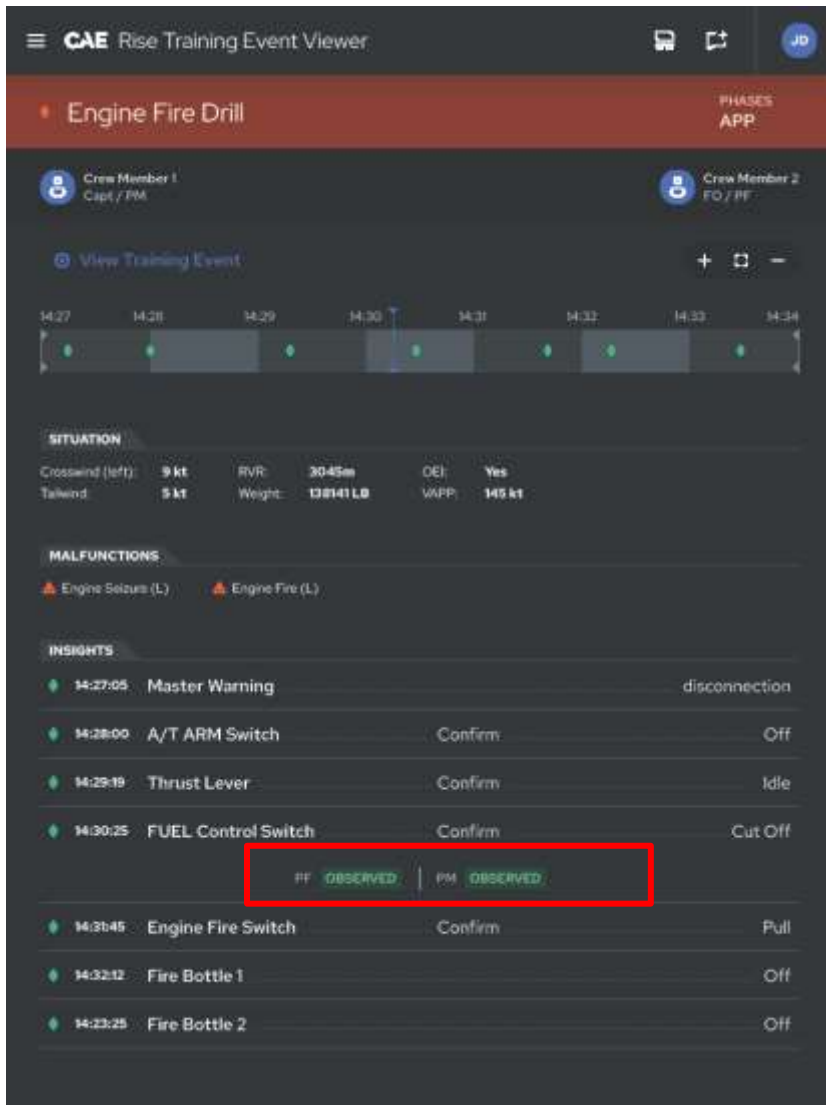
Scan behaviors, correlated with competencies/observable behaviors

PF

PM



REPORT CARD – Assists Instructor: To Observe, Record & Classify



Telemetry data of Exceedances + Video/Audio snippet of the training event

FPA

- 3.4 Maintains the intended flight path during flight using automation while managing other tasks and distractions
- 3.5 Selects appropriate level and mode of automation in a timely manner considering phase of flight and workload

Procedure (Steps, Order, Timing, Visual Confirmation)

PRO

- 1.2 Applies relevant operating instructions, procedures and techniques in a timely manner
- 1.5 Monitors aircraft systems status.

PF/PM Attentiveness (Focal vs/ Ambient)

SAW

- 7.1 Monitors and assesses the state of the aeroplane and its systems.
- 7.2 Monitors and assesses the aeroplane's energy state, and its anticipated flight path.
- 7.5 Maintains awareness of the people involved in or affected by the operation and their capacity to perform as expected.

PF/PM Cognitive Workload

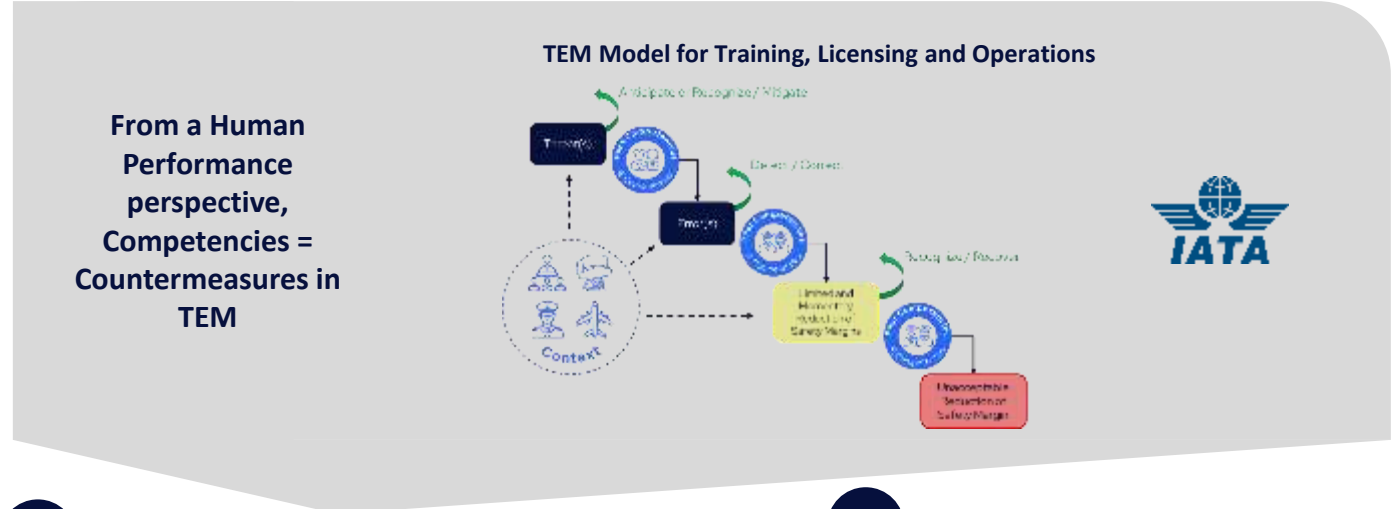
WLM

- 8.7 Monitors, reviews and cross-checks actions conscientiously
- 8.9 Manages and recovers from interruptions, distractions, variations and failures effectively while performing

Biometric data - Value Creation

Use Case – Engine Seizure/Fire

THREATS			
AIRCRAFT – Engine Seizure / Active Engine Fire			
ATC - NIL			
ENVIRONMENT – NIL			
AIRPORT – Obstacles/Aircraft on runway			
ERRORS			
PF: Cross - verification			
PM: SOP, Checklist execution, and callouts.			
COMPETENCIES/OBS	PF	PM	Biometrics
PRO:			
1.2 Applies relevant operating instructions, procedures and techniques in a timely manner	X	X	X
1.5 Monitors aircraft systems status.	X	X	X
FPA:			
3.4 Maintains the intended flight path during flight using automation while managing other tasks and distractions	X		X
3.5 Selects appropriate level and mode of automation in a timely manner considering phase of flight and workload	X		X
SAW:			
7.1 Monitors and assesses the state of the aeroplane and its systems	X	X	X
7.2 Monitors and assesses the aeroplane's energy state, and its anticipated flight path.	X	X	X
7.5 Maintains awareness of the people involved in or affected by the operation and their capacity to perform as Expected	X	X	X
WLM:			
8.7 Monitors, reviews and cross-checks actions conscientiously		X	X
8.9 Manages and recovers from interruptions, distractions, variations and failures effectively while performing		X	X



1 Data Gathering

- > Root Cause Analysis
- > Observable Behaviours / Competencies
- > Threat and Errors

2 Implement Training + Programmes

- > Tailored Training (Individual)
- > EBT (Regulatory + Airlines)
- > Ground Training
- > Safety Programmes
- > HFCRM

3 Enhance

- > Safety Behaviour
- > Resilience
- > Operations and Training response



Thank you!

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