

A well trained Instructor + technology

Reliable pilot performance data from training

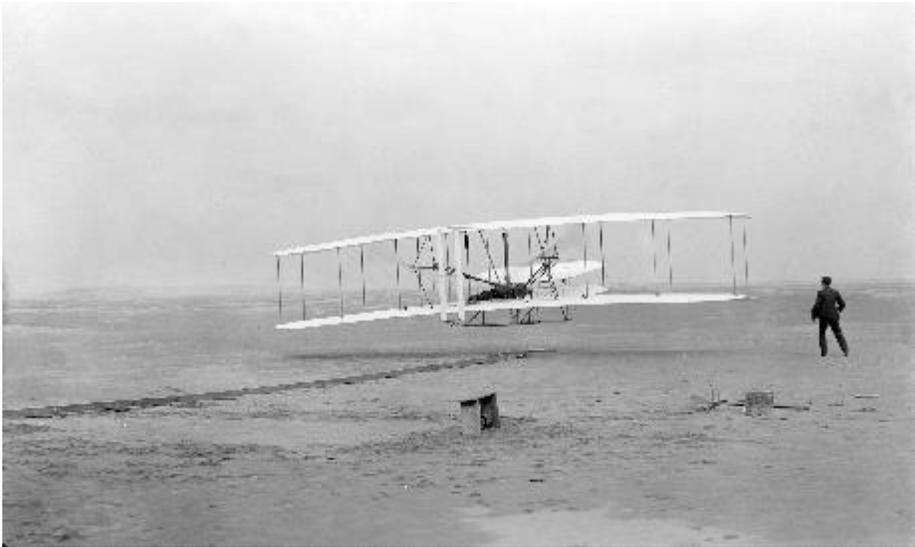
EATS
November 2022

David Owens
Head of Training Policy – Civil Aviation



CAE

Measuring training effectiveness in the context of a Safety Management System



The history of data – primary source of and confirmation of SAFETY in real world

Measuring training effectiveness in the context of a Safety Management System



What about training data?

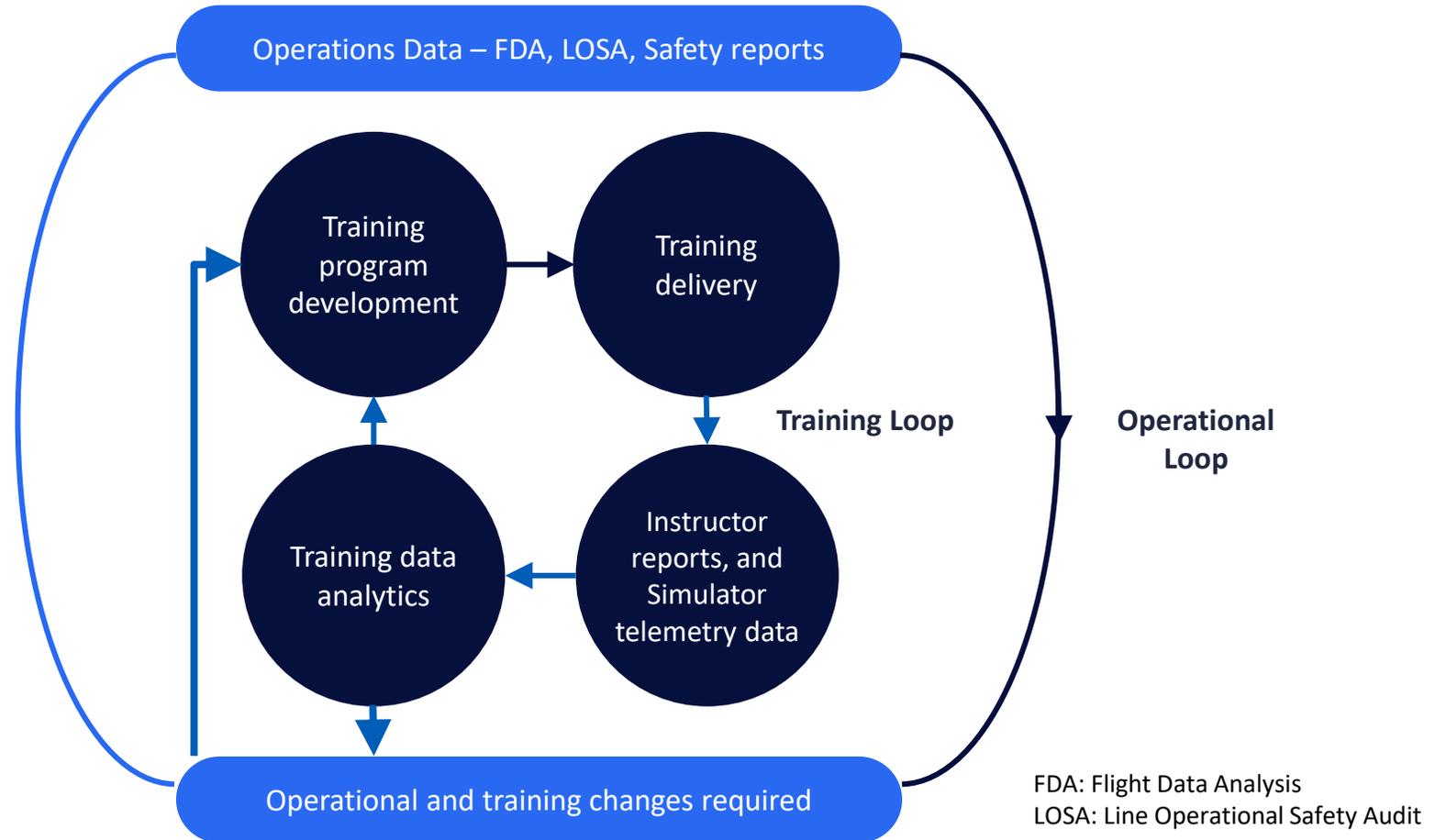
Measuring training effectiveness – why do we train?



- Is there correlation between training and flight ops safety?
- Is there causality?
- We are at a new dawn where our new training data will revolutionise safety in the same way FDM has

Why do we train?

Flight Operations and Training data – combining



‘Safety + Efficiency’ measurement and improvement needs a Total Systems Approach

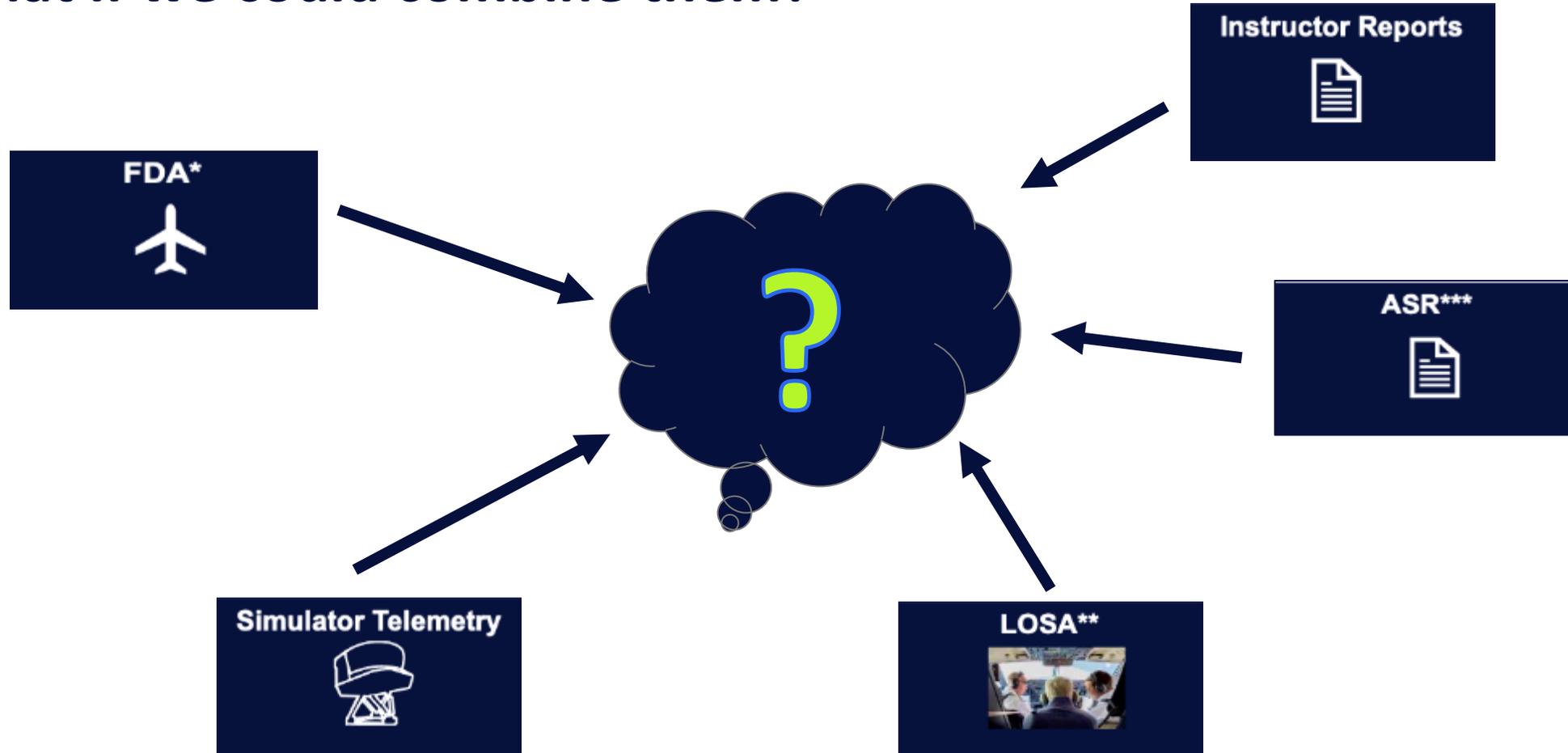
Sources of Crew Performance Data

 Data Source  Data Characteristic	FDA* 	LOSA** 	ASR*** 	Instructor Reports 	Simulator Telemetry 
What Triggers Analysis?	Usually Abnormal Event	Line activity	Usually Abnormal Event	All Training activity	Targeted Training Events
What happened?	✓	✓	✓	✓	✓
Why it happened?	After investigation	✓	✓	✓	
Captures “Positive” Crew behaviour?		✓		✓	
Captures “Natural” Crew behaviour?	✓	✓			
Sample Frequency	Continuous	Periodic or Continuous	Continuous	Continuous	Continuous
Opportunity for Bias	Some Risk	Some Risk	Medium Risk	Medium Risk	Some Risk
Peer Operator Opportunity for Benchmarking	Some	Scientifically Calibrated	Some	Some	Some

Each is a useful data source and provides a complementary perspective

* Flight Data Analysis; ** Line Operational Safety Audit; *** Air Safety Reports

What if we could combine them?



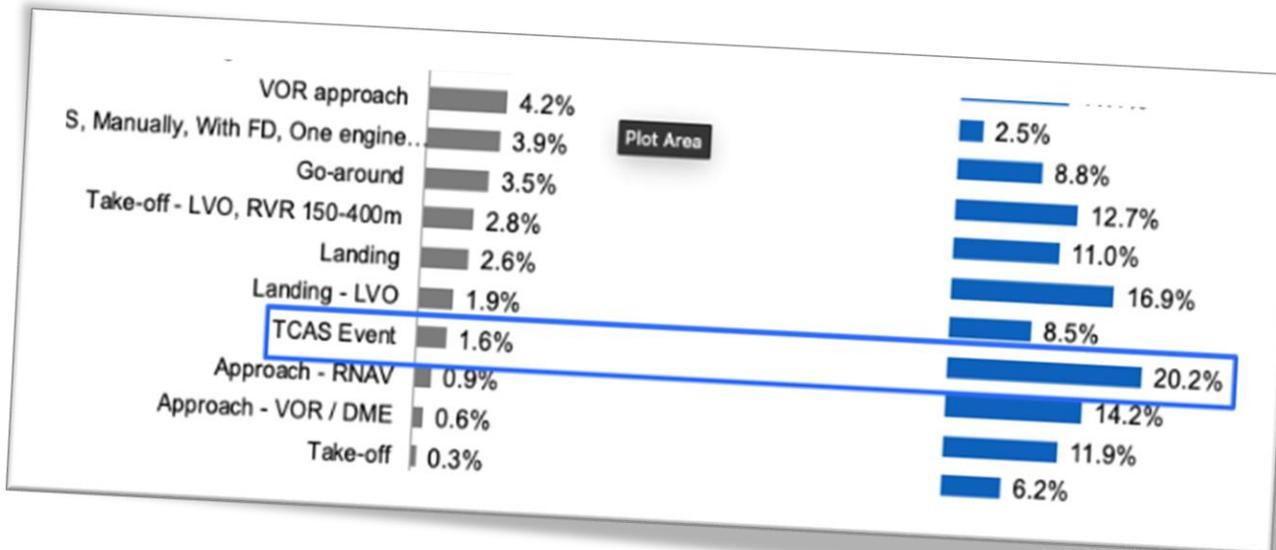
Together, they exceed the sum of their parts

What can we see?

We can now benchmark one operator against another at the manoeuvre level

One aircraft type against another at the same level

One student, one instructor



Concordance versus Accuracy

There may be a high degree of agreement (concordance) when analysing instructor grades,

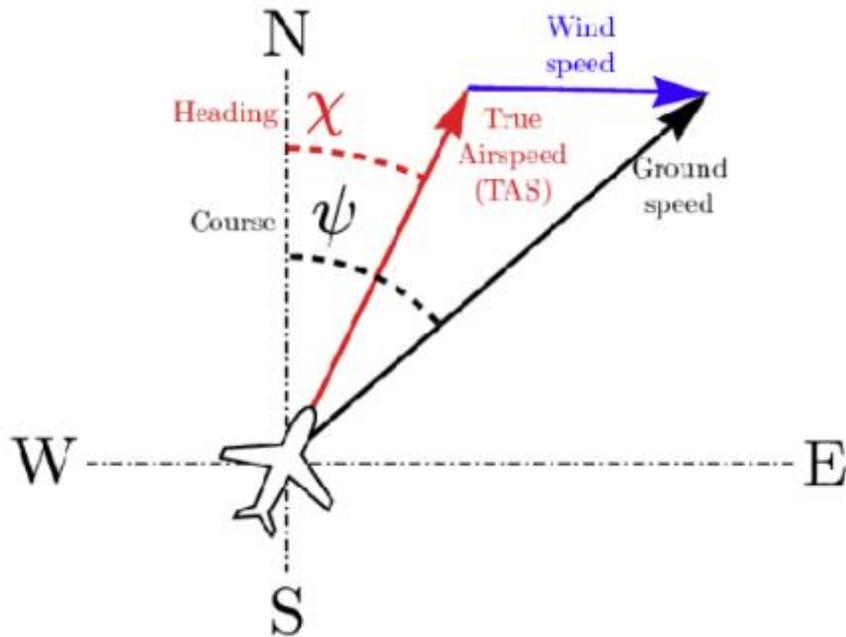
.....however the entire group may be grading systematically higher or lower than the documented airline standard.

Comparison to an independent data source is required to provide confidence of accuracy.

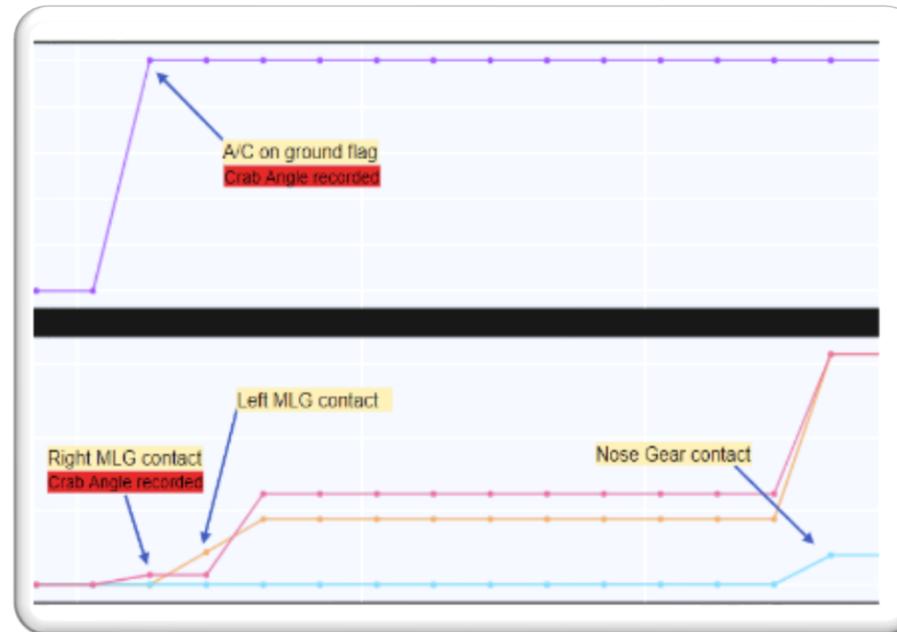
Would you like to see a glimpse of some more?

Have we seen anything yet?

Crab angle (drift) = heading \sim ground track



Touchdown captured at first main-oleo compression

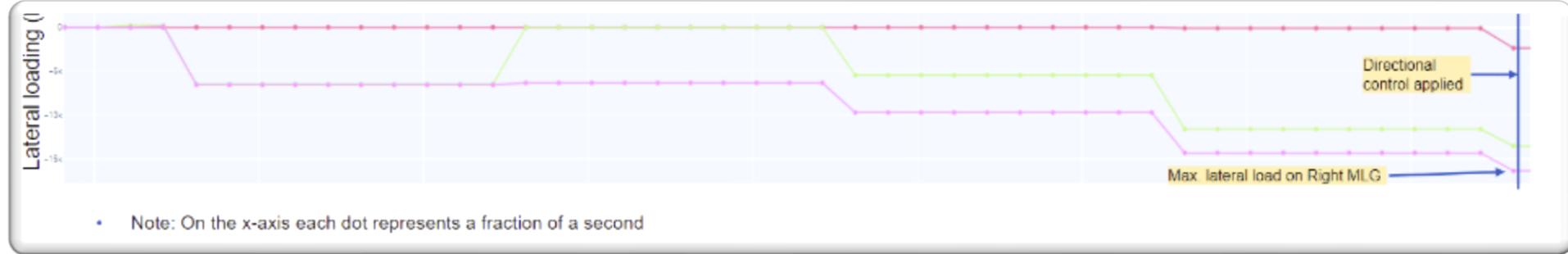


Yannick Nkengsa



Of 2,300 A320 crosswind landings, around 60% exceeded the OEM crab-angle limit

What did we learn?

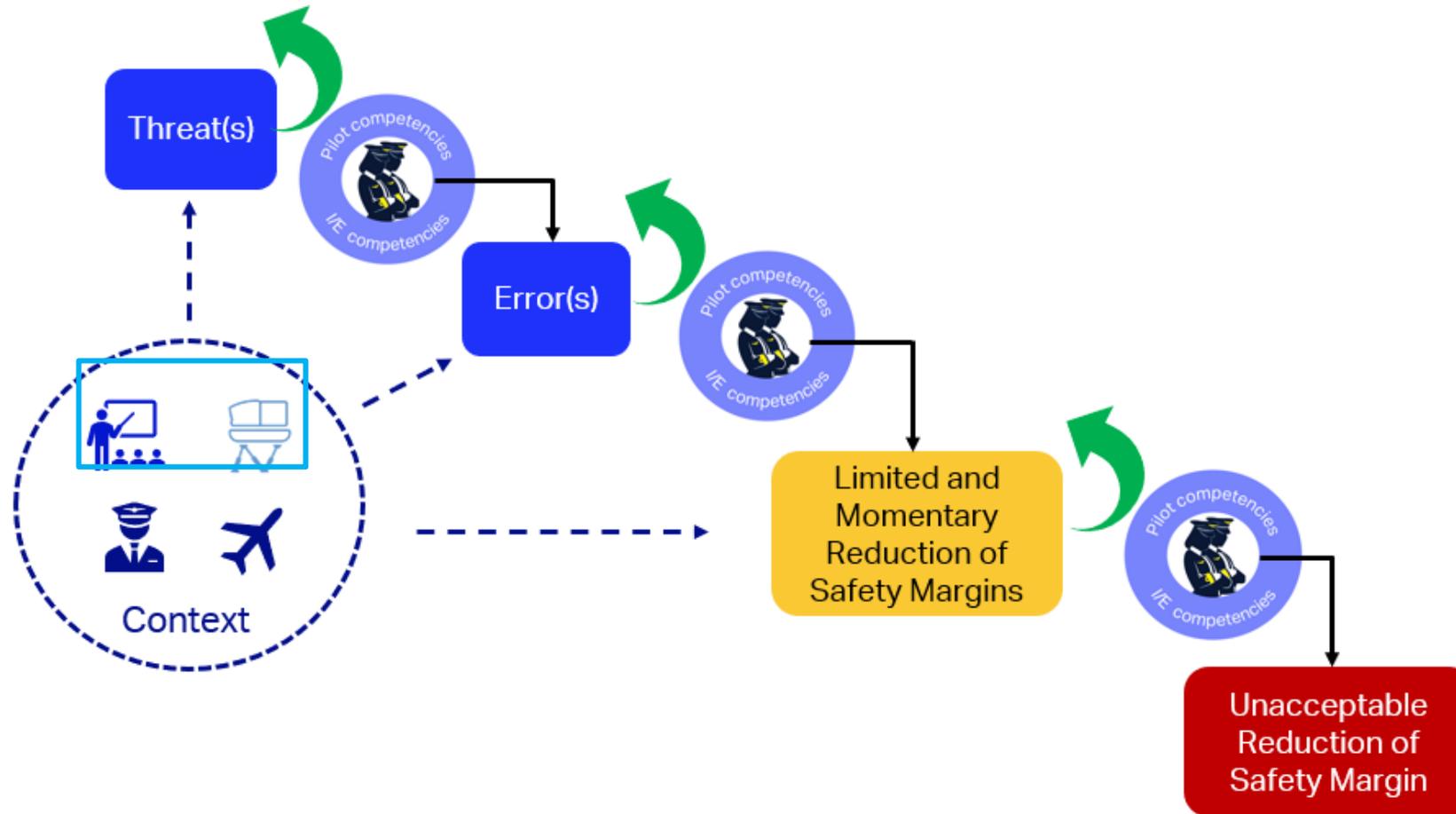


- FDM data does not know the context exterior to the aircraft (e.g., contamination)
- Our data implies that a better landing occurs from NOT getting the aircraft straight
- Maximum lateral load occurs several seconds AFTER oleo compression
- Higher side-loads result from getting straight too soon, resulting in down-wind drift and increased loads on the main gear
- Are we teaching this right? Threat? Error?
- Are we flying right?



More research required – interested?

TEM in the context of training/testing (IATA model)



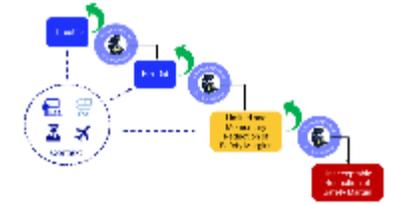
Instructors demonstrate managing safety margins and effectiveness of training

ICAO Instructor competency framework

Pilot Competencies	Competencies required of a pilot.
Management of the learning environment	Ensures that the instruction, assessment and evaluation are conducted in a suitable and safe environment.
Instruction	Conducts training to develop the trainee's competencies.
Interaction with the trainees	Supports the trainees' learning and development and demonstrates exemplary behaviour (role model).
Assessment and Evaluation	Assesses the competencies of the trainee and contributes to continuous training system improvement.

Capturing accurate pilot performance data in training, requires a competent instructor

TEM in the context of training/testing (IATA model)



Errors

- Does not prepare sufficiently for the training session (not familiar enough with the facilities access, training device functionalities, IT procedures...)
- Promotes pet theories/topics.
- Does not manage time appropriately.
- Does not manage priorities appropriately. (e.g., during flight instruction focuses on instruction instead of safety of the flight, ...)
- Omits safety briefings elements or training tool limitations.
- Intervenes inappropriately (too early or too late).
- Refers to personal customized documentation.
- Uses inappropriate teaching method (does not facilitate, ...).
- Generates unrealistic or inappropriate conditions for the training.
- Demonstrates negative attitude towards trainees (is careless, is harsh, has bias, is lacking empathy, ...)
- Does not allocate enough time for trainee feedback.
- Is not familiar with training policy and procedures.
- Cuts corners with the training program.
- Does not apply organizational performance standards.

Outcome of TEM in the context of training/testing (IATA model)



Limited and momentary reduction of the safety margin / effectiveness of training

- Temporary involuntary reduction of safety margin during training.
 - (e.g., mismanagement of a stall exercise) recognized and timely recovered by the instructor.
- Temporary Negative transfer of training, recognized and timely recovered by the instructor.
- Temporary Negative training, recognized with timely remediation by the instructor.

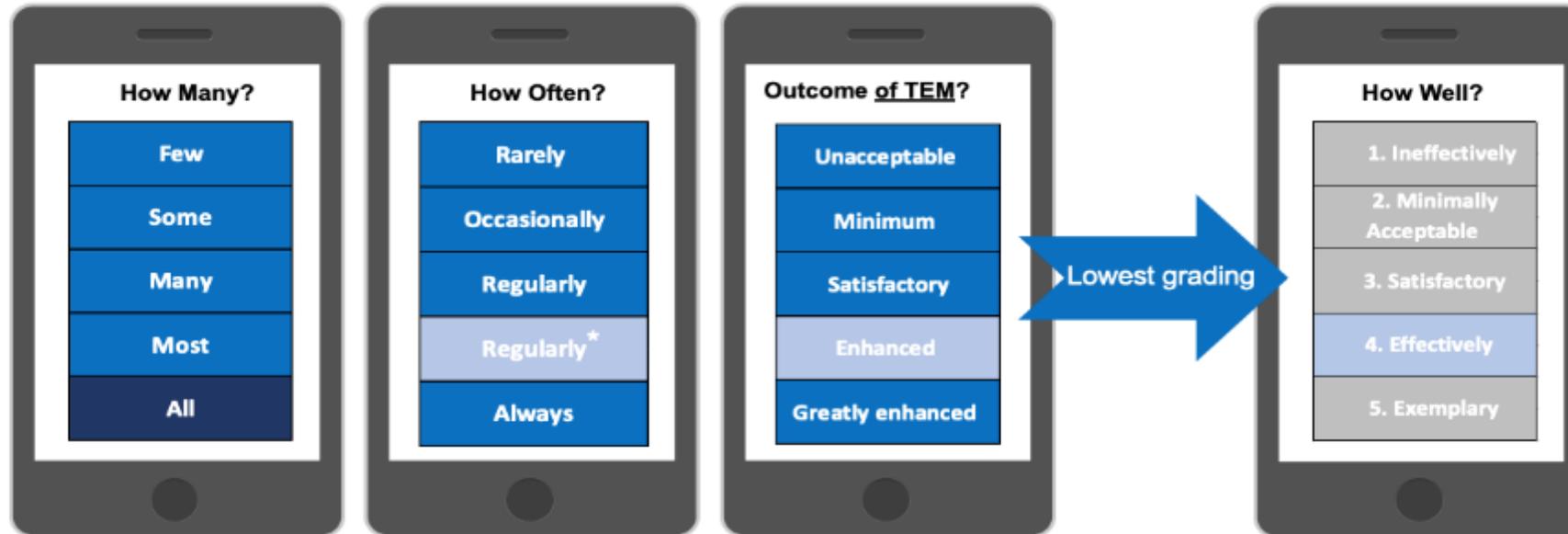
Unacceptable reduction of the safety margin / effectiveness of training

- Involuntary reduction of safety margin during training.
 - (e.g., mismanagement of a stall exercise) not recognized or recovered late by the instructor
- Negative transfer of training not recognized or not remediated by the instructor.
- Negative training not recognized or not remediated by the instructor.
- Incident or accident during training.

TEM in the context of Safety AND Training Effectiveness

IEC Assessment and Grading

Defining TEM in the context of safety and training



The instructor regularly demonstrated all the applicable OBs which contributed to improved safety margin /enhanced level of training effectiveness ► Grade 4

Using TEM as concept to mitigate real-world operational consequences of training effectiveness

CBTA Tutor Course schedule and content

Day 1 FUNDAMENTALS

- Introduction
- TEM review and exercise
- CBTA Principles & PCs
- Resilience review and exercise
ORCA/VENN and Training
Data review and exercise
- Summary and Day 2 prep

Day 2 PRINCIPLES/ PRACTICE

- CBTA/EBT review
- Instructor/Evaluator
Competencies (IECs) review
and exercise
- TA-SE concept
- Instructional methods and
facilitation review and
exercise
- ORCA for IECs review and
scenario 2, 3 and 4
- Summary and Day 3 prep

Day 3 PRACTICE

- ORCA review (5 and 6)
- Facilitated debrief and CBTA
template review and exercise
- Final assessment
- ICAP and IRR review
- IRR development review
- IRR exercise discussion
- Summary and Course
feedback

Training required for a core group of tutors/standards instructors is often overlooked

Challenges with the use of training data

1. Insufficient investment in instructor initial and recurrent training, needed to provide valid and consistent pilot performance data
2. Airline training managers may not be sufficiently trained in data statistical analysis
3. Lack of optimal collaboration between flight operations, safety and training departments
4. Lack of regulation safeguarding the use of training data

Our recommendations

1. Operators and ATOs must invest in instructor training and calibration to ensure valid pilot performance data
2. Technology to assist the instructor, operator and OEM in gathering valid pilot performance data should be welcomed (correlation and causality)
3. Operators and ATOs must consider if they have suitable expertise in-house to analyze training data
4. Data must be shared and integrated (no silos) for optimal interpretation and solution implementation
5. ICAO and State regulations need to be explicit in data protection, to assure everybody that training data is used and treated as safety data

An abstract graphic composed of numerous thin, light blue lines that form a complex, curved, and somewhat grid-like structure. The lines are arranged in a way that creates a sense of depth and movement, resembling a stylized wing or a futuristic architectural element. The overall color palette is a range of blue tones, from very light to dark navy.

Our mission is to lead at the frontier of digital immersion with high-tech training and operational support solutions to make the world a safer place

CAE