Competency-Based Training and Assessment (CBTA)

Capt Yann RENIER

Head Training and Licensing
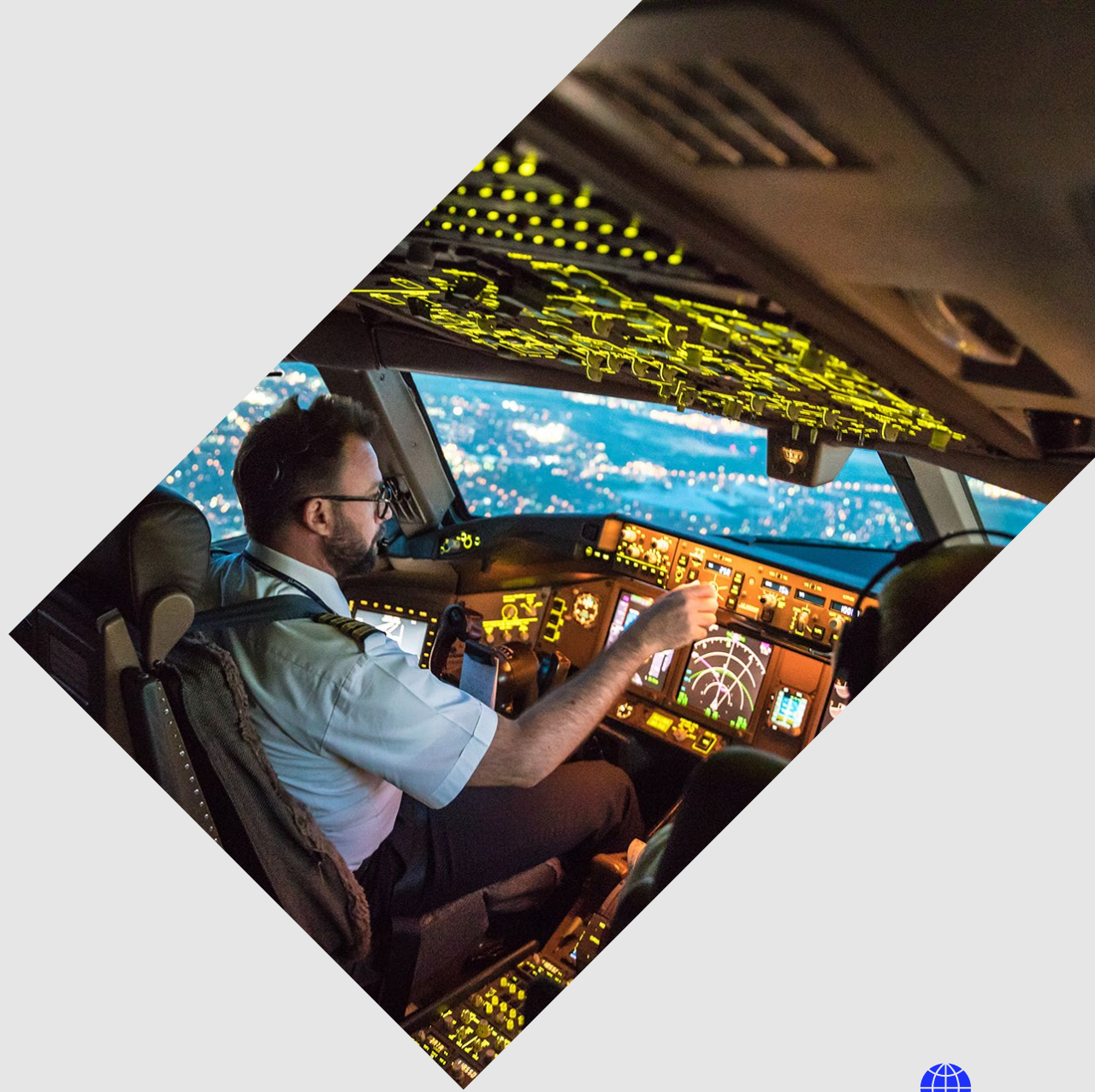
IATA Operations Safety & Security
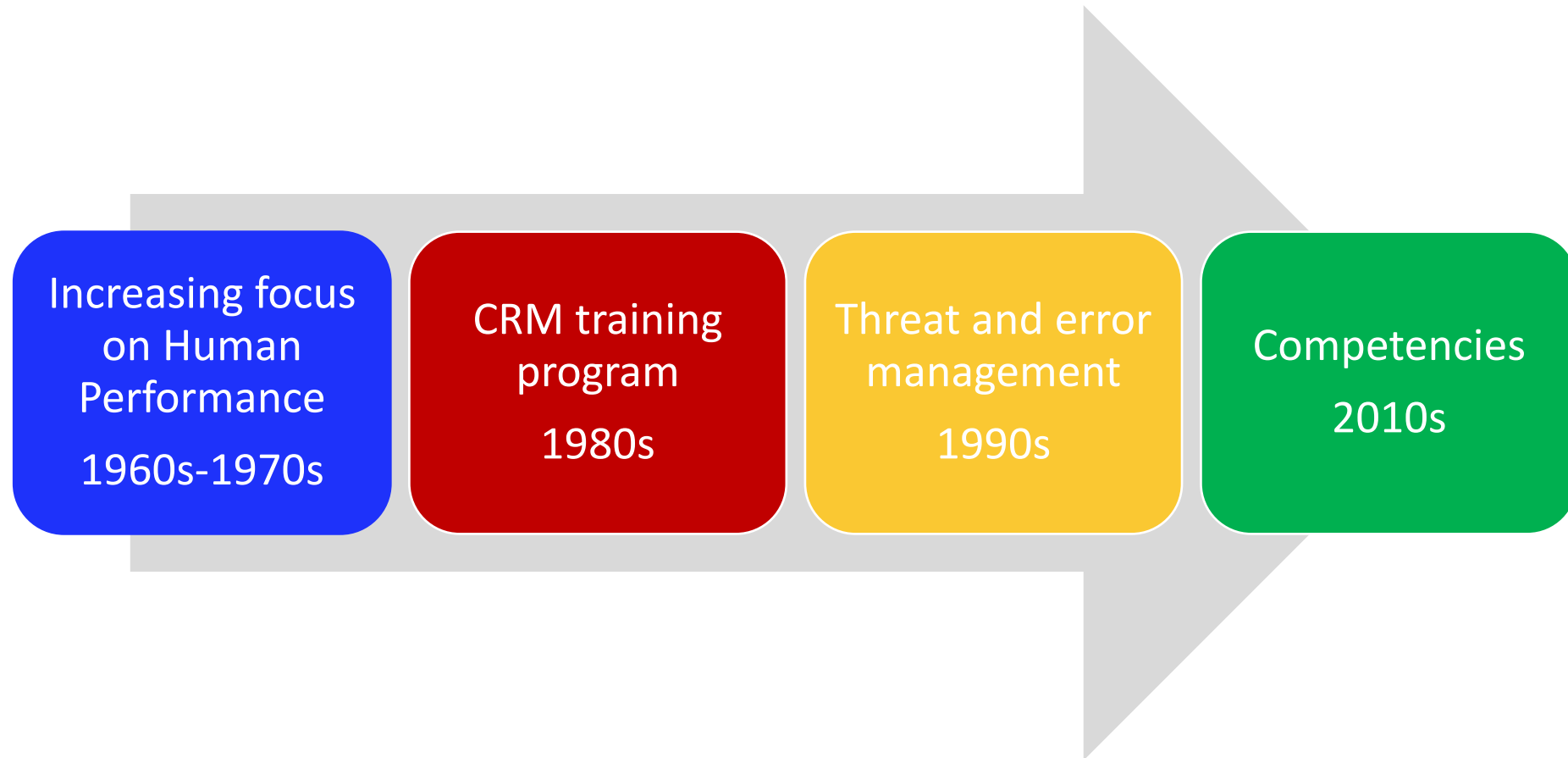
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Human Performance area

Increasing focus on Human Performance
1960s-1970s

CRM training program
1980s

Threat and error management
1990s

Competencies
2010s

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1944- Chicago convention

Article 32 *Licences du personnel*

a) The pilot of every aircraft and the other members of the operating crew of every aircraft engaged in international navigation **shall be provided with certificates of competency and licenses** issued or rendered valid by the State in which the aircraft is registered.

b) Each contracting State reserves the right to refuse to recognize, for the purpose of flight above its own territory, **certificates of competency and licenses** granted to any of its nationals by another contracting State.

Article 33 *Recognition of certificates and licences*

Certificates of airworthiness and **certificates of competency and licenses** issued or rendered valid by the contracting State in which the aircraft is registered, shall be recognized as valid by the other contracting States, provided that the requirements under which such certificates or licenses were issued or rendered valid are equal to or above **the minimum standards which may be established** from time to time pursuant to this Convention.
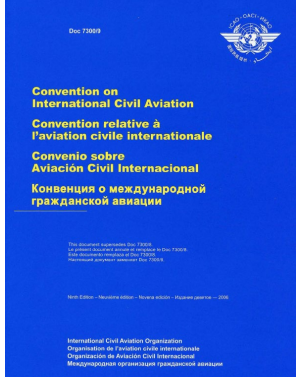
1919- Paris convention
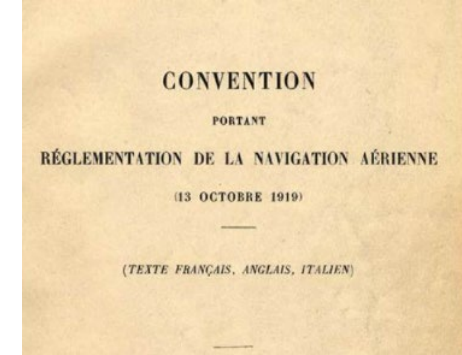
Article 12. The commanding officer, pilots, engineers and other members of the operating crew of every aircraft shall, in accordance DOCUMENTS with the conditions laid down in Annex E, be provided with **certificates of competency and licenses issued** or rendered valid by the State whose nationality the aircraft possesses.

Article 13. Certificates of airworthiness and **of competency and licenses issued** or rendered valid by the State whose nationality the aircraft possesses, in accordance with the regulations established by Annex B and Annex E and hereafter by the International Commission for Air Navigation, **shall be recognized as valid by the other States**. Each State has the right to refuse to recognize for the purpose of flights within the limits of and above its own territory certificates of competency and licenses granted to one of its nationals by another contracting State.

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Competency framework

COMMUNICATION	
Description	**Observable behaviors (OB)**
Communicates through appropriate means in the operational environment, in both normal and non-normal situations.	OB 2.1 Determines that the recipient is ready and able to receive information. OB 2.2 Selects appropriately what, when, how and with whom to communicate. OB 2.3 Conveys messages clearly, accurately and concisely. OB 2.4 Confirms that the recipient demonstrates understanding of important information. OB 2.5 Listens actively and demonstrates understanding when receiving information. OB 2.6 Asks relevant and effective questions. OB 2.7 Uses appropriate escalation in communication to resolve identified deviations. OB 2.9 Uses and interprets non-verbal communication in a manner appropriate to the organizational and social culture. OB 2.9 Adheres to standard radiotelephone phraseology and procedures. OB 2.10 Accurately reads, interprets, constructs and responds to datalink messages in English.

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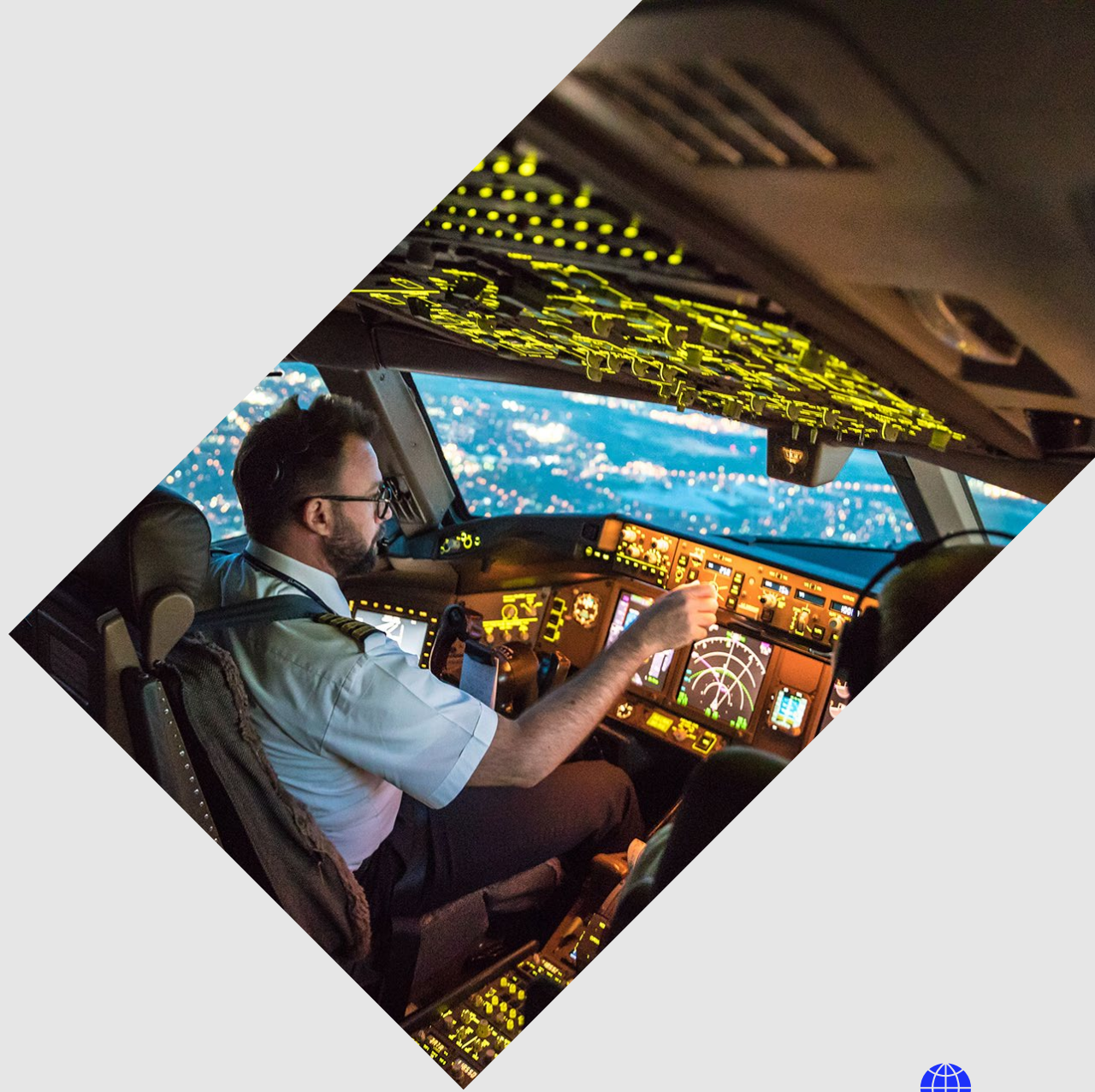
Traditional training approach

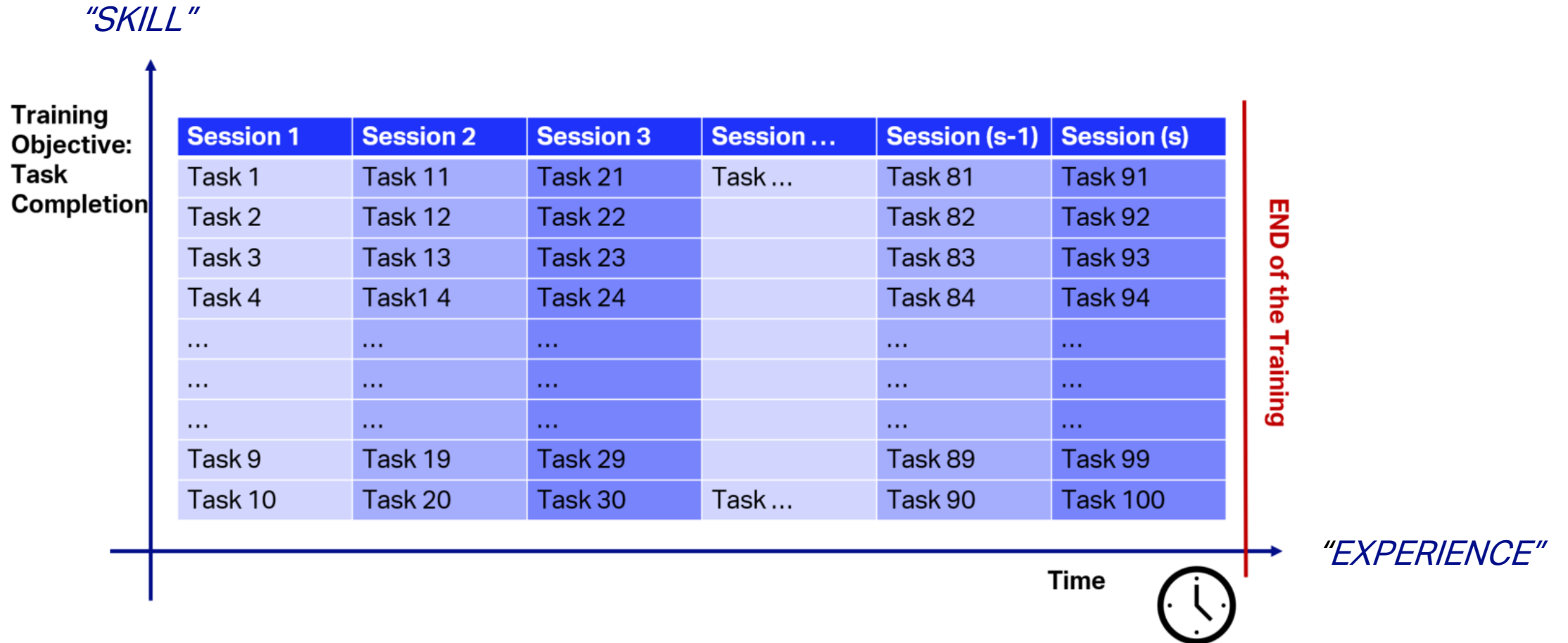|		
❑ **Flight Phase** =>**Tasks** -> **Sub-tasks**		
❑ PERFORM AEROPLANE GROUND AND PRE-FLIGHT OPERATIONS		
❑ PERFORM TAKE-OFF =>Perform take-off roll ->Applies take-off thrust PF ->Checks engine parameters...		
❑ PERFORM CLIMB		
❑ PERFORM CRUISE		
❑ PERFORM DESCENT		
❑ PERFORM APPROACH		
❑ PERFORM LANDING		
❑ PERFORM AFTER-LANDING AND POST-FLIGHT OPERATIONS		

EASA — Easy Access Rules for Aircrew (Regulation (EU) No 1178/2011) — ANNEX I (Part-FCL) — Appendices to Annex I

MULTI-PILOT AEROPLANES AND SINGLE-PILOT HIGH-PERFORMANCE COMPLEX AEROPLANES		PRACTICAL TRAINING			ATPL/MPL/TYPE RATING SKILL TEST OR PROF. CHECK	
	Manoeuvres/Procedures	FSTD	A	Instructor initials when training completed	Tested or checked in FSTD or A	Examiner initials when test or check completed
SECTION 1						
1 1.1	Flight preparation Performance calculation	OTD P				
1.2	Aeroplane external visual inspection; location of each item and purpose of inspection	OTD P#	P			
1.3	Cockpit inspection	P---->	---->			
1.4	Use of checklist prior to starting engines, starting procedures, radio and navigation equipment check, selection and setting of navigation and communication frequencies	P---->	---->		M	
1.5	Taxiing in compliance with ATC instructions or instructions of instructor	P-->	---->			
1.6	Before take-off checks	P-->	---->		M	
SECTION 2						
2 2.1	Take-offs Normal take-offs with different flap settings, including expedited take-off	P-->	---->			
2.2*	Instrument take-off; transition to instrument flight is required during rotation or immediately after becoming airborne	P-->	---->			
2.3	Crosswind take-off	P-->	---->			

Traditional training approach

"SKILL"

Training Objective: Task Completion

Session 1	Session 2	Session 3	Session …	Session (s-1)	Session (s)
Task 1	Task 11	Task 21	Task …	Task 81	Task 91
Task 2	Task 12	Task 22		Task 82	Task 92
Task 3	Task 13	Task 23		Task 83	Task 93
Task 4	Task1 4	Task 24		Task 84	Task 94
…	…	…		…	…
…	…	…		…	…
…	…	…		…	…
Task 9	Task 19	Task 29		Task 89	Task 99
Task 10	Task 20	Task 30	Task …	Task 90	Task 100

END of the Training

"EXPERIENCE"

Time

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Traditional Training = Proficiency world

A Skill Test: is a demonstration of skill for license or rating issue, including such oral examination as may be required

A Proficiency Check: is a demonstration of skill to revalidate or renew a rating, including such oral examination as may be required

'proficient' means having demonstrated the necessary skills, knowledge and attitudes that are required to perform any defined tasks to the prescribed standard

Reference EU Aircrew and Air Operation regulations

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Proficiency demonstration

Example of a Proficiency check or Skill Test content under traditional training	
Task/Maneuver/Procedure	**Limits for flight deviation** Heading with all engines operating ± 5° Speed with simulated engine failure + 10 knots/– 5 knots…
-Take-offs with simulated engine failure between V1 and V2	Pass or Fail
-Windshear at take-off/ landing	Pass or Fail
…	…
-Landing with simulated jammed horizontal stabilizer	Pass or Fail
Proficiency check global result	**Pass or Fail**

Reference EU Aircrew and Air Operation regulations

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Example of Proficiency grading scale

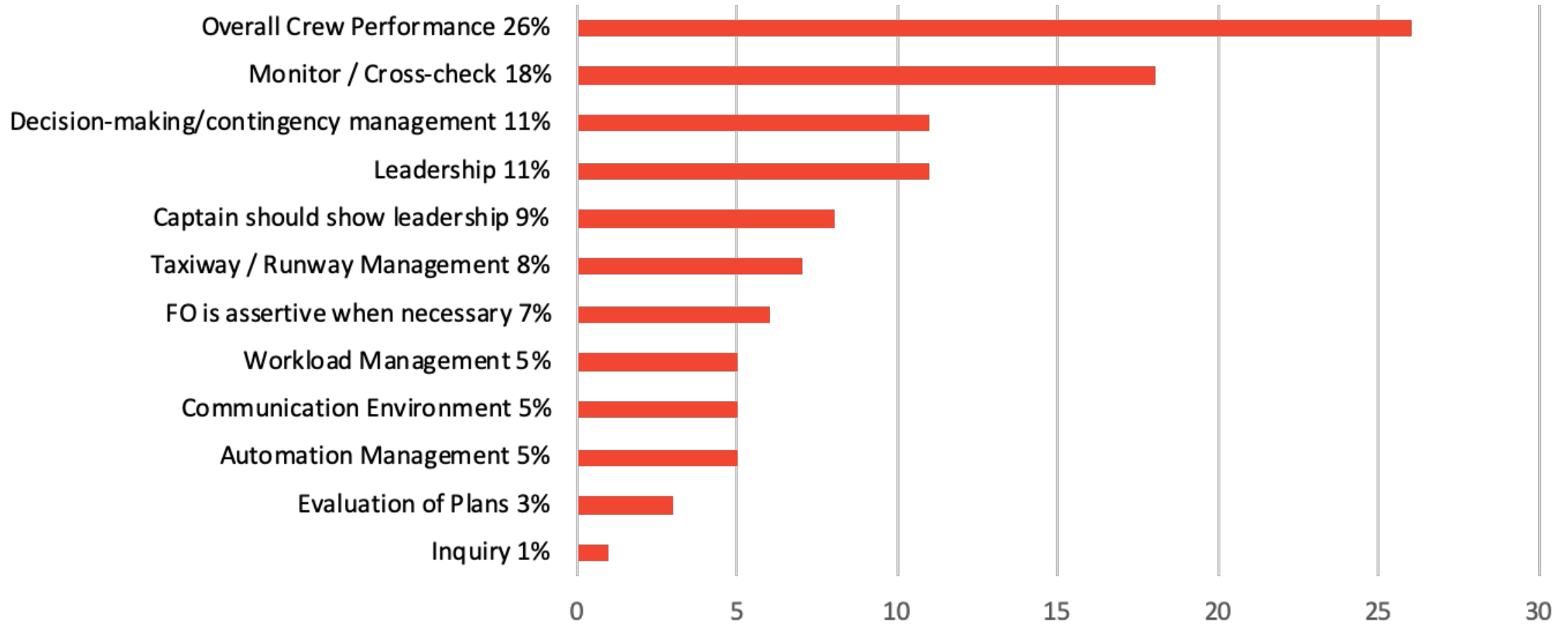| Technical Skill Evaluation		Grade			
		1	**2**	**3**	**4**
	Flight Path Management – Automation	• **Critical deviation** • Unacceptable/Poor quality and accuracy • Regulatory or aircraft limitations non-compliance • Safety of flight compromised	• **Significant deviation** • Lapses in quality and accuracy • Regulatory and aircraft limitations compliance • Safety of flight reduced	• **Minor deviation** • Acceptable quality and accuracy • Regulatory and aircraft limitations compliance • Safety of flight maintained	• **No deviation** • Effective quality and accuracy • Regulatory and aircraft limitations compliance • Safety of flight assured
	Flight Path Management – Manual Control	• **Critical deviation** • Unacceptable/Poor quality and accuracy • Regulatory or aircraft limitations non-compliance • Safety of flight compromised	• **Significant deviation** • Lapses in quality and accuracy • Regulatory and aircraft limitations compliance • Safety of flight reduced	• **Minor deviation** • Acceptable quality and accuracy • Regulatory and aircraft limitations compliance • Safety of flight maintained	• **No deviation** • Effective quality and accuracy • Regulatory and aircraft limitations compliance • Safety of flight assured
	Application of Procedures	• **Critical error** • Unacceptable/Poor practical understanding • Unacceptable/Poor following SOPs, rules and regulations	• **Significant error** • Lapses in practical understanding • Lapses following SOPs, rules and regulations	• **Minor error** • Acceptable practical understanding • Acceptable following SOPs, rules and regulations	• **No error** • Effective practical understanding • Effective following SOPs, rules and regulations

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Proficiency demonstration

Focus on specific tasks or maneuvers in isolation

Proficiency criteria defined <u>per task or maneuvers</u>:

- Flight path deviations (numerical values, e.g., speed, heading, altitude etc)
- Behavioral Markers

Threat and Error Management Model

Threat(s)

Error(s)

Context

Undesired Aircraft State

Accident Incident

Performance in operations **?**
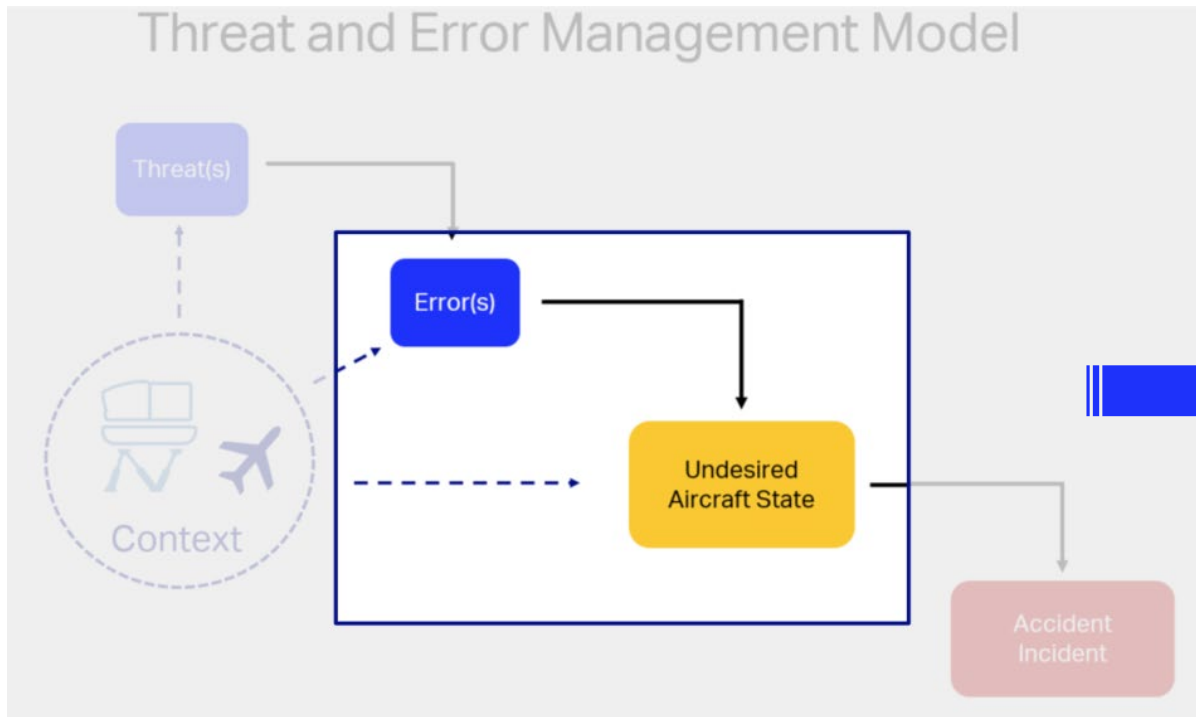
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Flight Crew Countermeasures

Source IATA Safety Report

CBTA approach

Competency. A dimension of **human performance** that is used to reliably predict **successful performance** on the job.
A competency is manifested and observed through behaviors that mobilize the relevant knowledge, skills and attitudes to carry out activities or tasks under specified conditions.

Competency-based training and assessment. Training and assessment that are characterized by a **performance orientation**, emphasis on **standards of performance and their measurement**, and the development of training to the **specified performance standards**.

Reference ICAO Doc 9868 PANS-TRG 3rd Edition

Pilot Competencies

Acronyms	Pilot Competencies
KNO	Application of Knowledge
PRO	Application of Procedures and compliance with regulation
COM	Communication
FPA	Aero plane Flight Path Management, automation
FPM	Aero plane Flight Path Management, manual control
LTW	Leadership and Teamwork
PSD	Problem Solving and Decision Making
SAW	Situation awareness and management of information
WLM	Workload Management

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Threat and Error Management Model
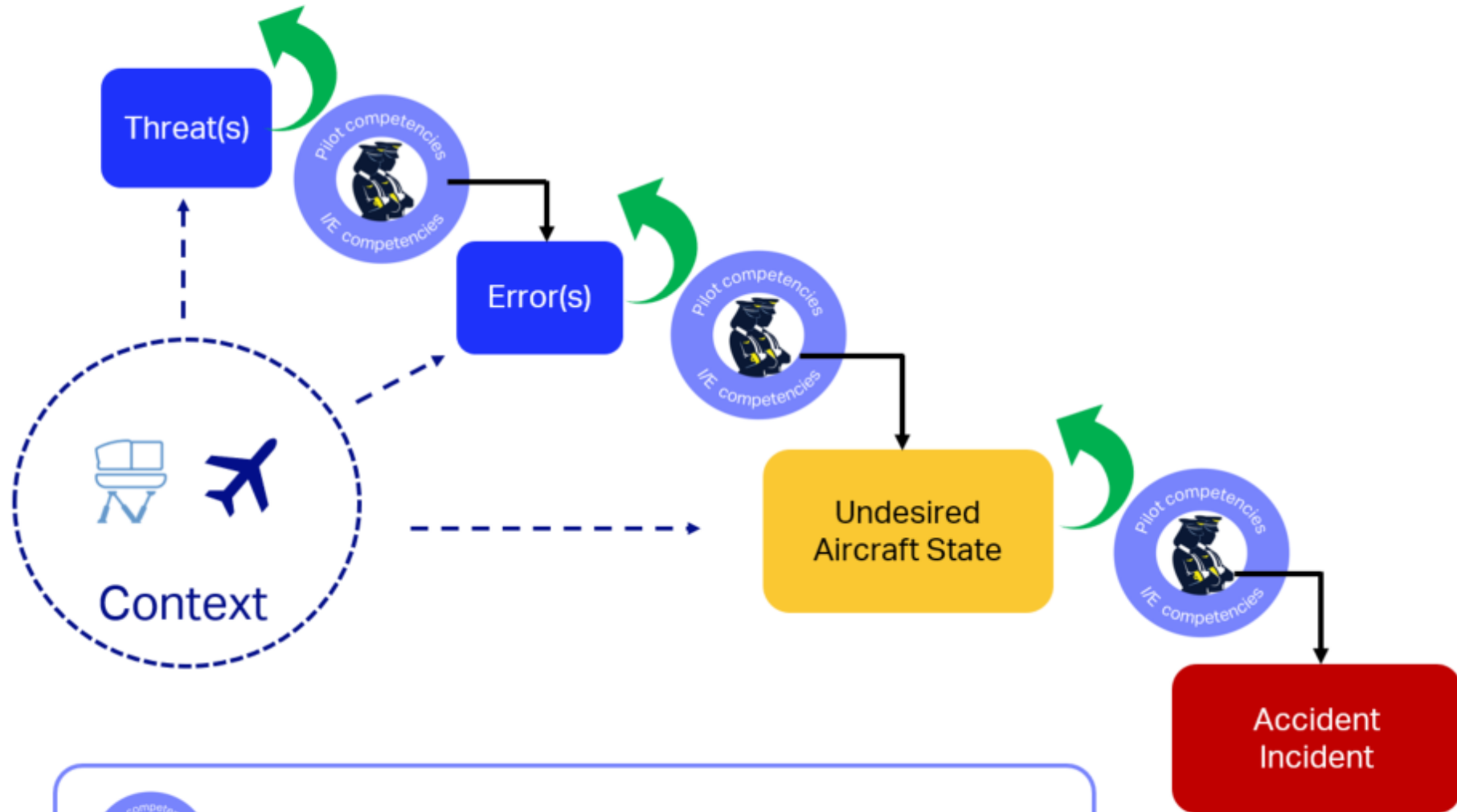
Pilot and Instructor/Evaluator (IE) competencies are the individual and team counter measures

CBTA approach

Training Objective: Competency Development

Session 1	Session 2	Session ...	Session (n)
Competency 1	Competency 1	Competency 1	Competency 1
Competency 2	Competency 2	Competency 2	Competency 2
Competency 3	Competency 3	Competency 3	Competency 3
...	...		...
...	...	Vehicules: • Tasks, • Maneuvers, • procedures, ...	...
...	...		...
...	...		...
Competencies	Competencies	Competencies	Competencies
Competencies	Competencies	Competencies	Competencies

END of the Training

Performance Standard Achievement

Competency demonstration

Example of a CBTA evaluation	
Line Oriented	**The instructor collects evidence**
-Departure Airport	▪ Observe performance (behaviors) during the evaluation.
-Introduction of relevant threats during the flight profile	▪ Record details of effective and ineffective performance (behaviors) observed during the evaluation ('record' in this context refers to instructors taking notes).
-Destination Airport (or Alternate)	
End of the Evaluation session	▪ Classify observations against the Observable Behaviors (OBs) and allocate the OBs to each competency (or competencies). ▪ Assess the performance by determining the root cause(s) according to the competency framework. Low performance would normally indicate the area of performance to be remediated in subsequent training.
Evaluation result	**Competent or not competent**

Competency demonstration visualization
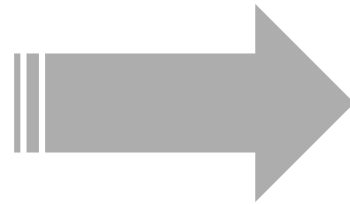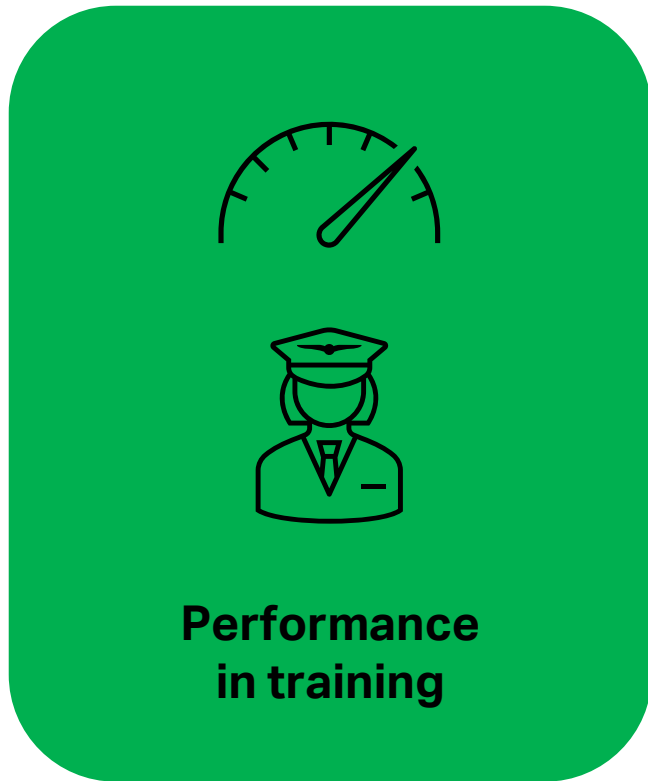
Performance
in training

Predictive performance
in operations

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ICAO CBTA Standards for pilots

2006 – MPL

Multi Crew Pilot License

2013 - EBT

Operator

Recurrent

Training

2016-RPAS

Remote Pilot License

2020 - CBTA

PPL-CPL- IR- MPL - ATPL

Type Rating

Instructor - Evaluator

Operator training

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ICAO CBTA provisions design

2014 – Competency Task Force

PANS TRG Amdt 5

2016 – RPAS panel

Annex 1 RPL

PANS TRG Amdt 6

2018 – CBTA Task Force

PANS TRG Amdt 7
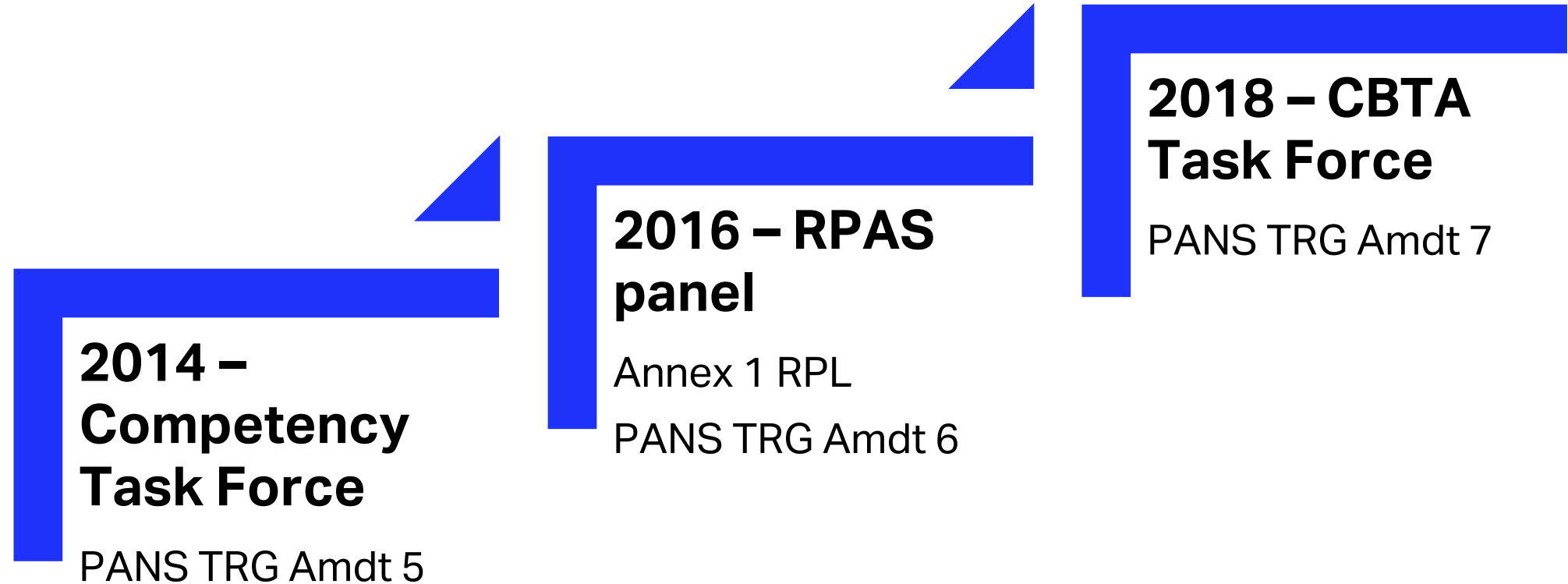
Global expansion of CBTA-EBT

EBT
endorsed by ICAO
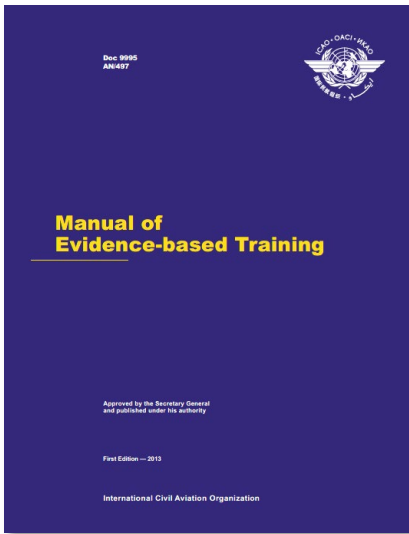
EASA mixed &
Baseline EBT

ICAO
CBTA endorsement

EASA
CBTA extension
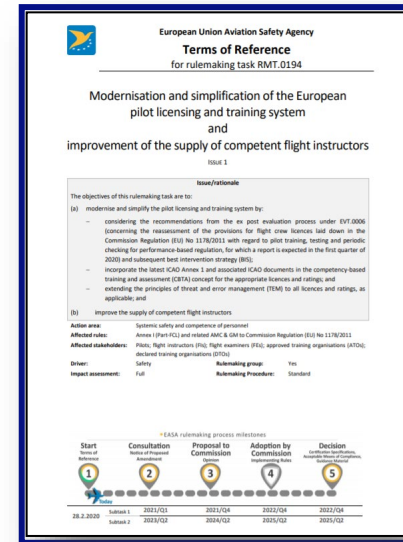
India CAR
CBTA-EBT mandatory
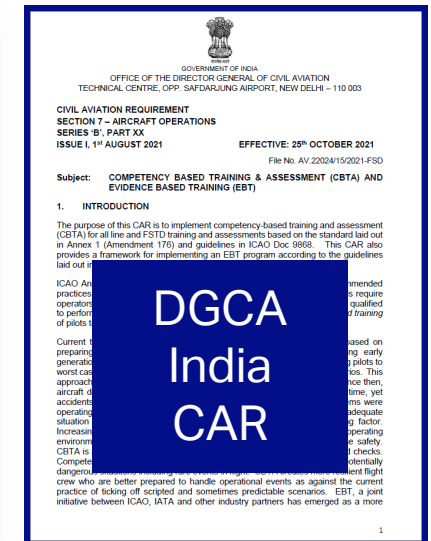
2013   **2016-2020**   **2020**   **2022**   **2022**

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▲ Introduction

▲ CBTA principles

▲ CBTA expansion

▲ Opportunities

▲ Challenges
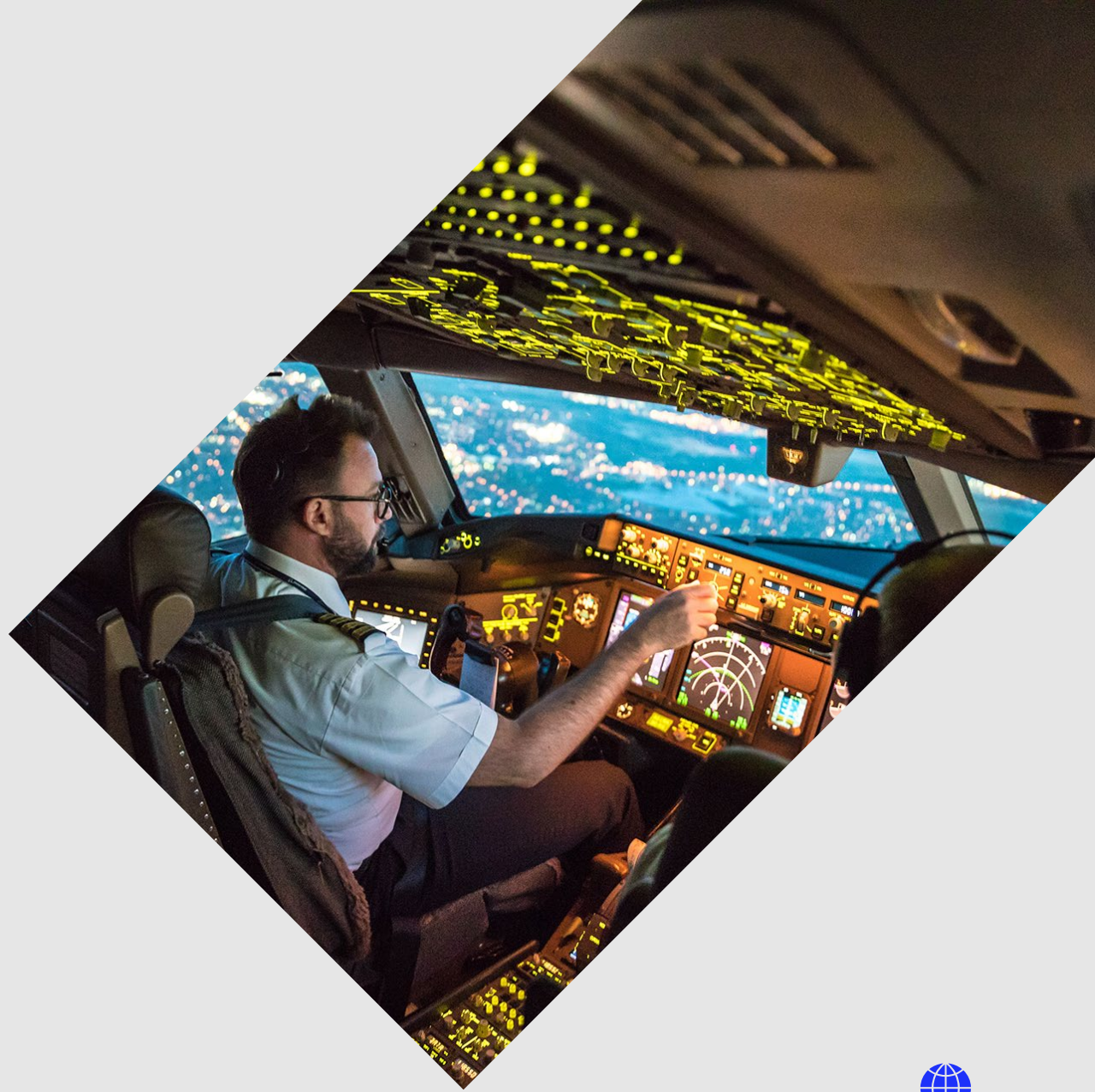
"Total system safety approach"

Aviation system / Safety Management

States-CAAs / State Safety Program (SSP)

Service Providers' Safety Management System (SMS)...

ATOs' SMS

AOCs' SMS

OEMs' SMS

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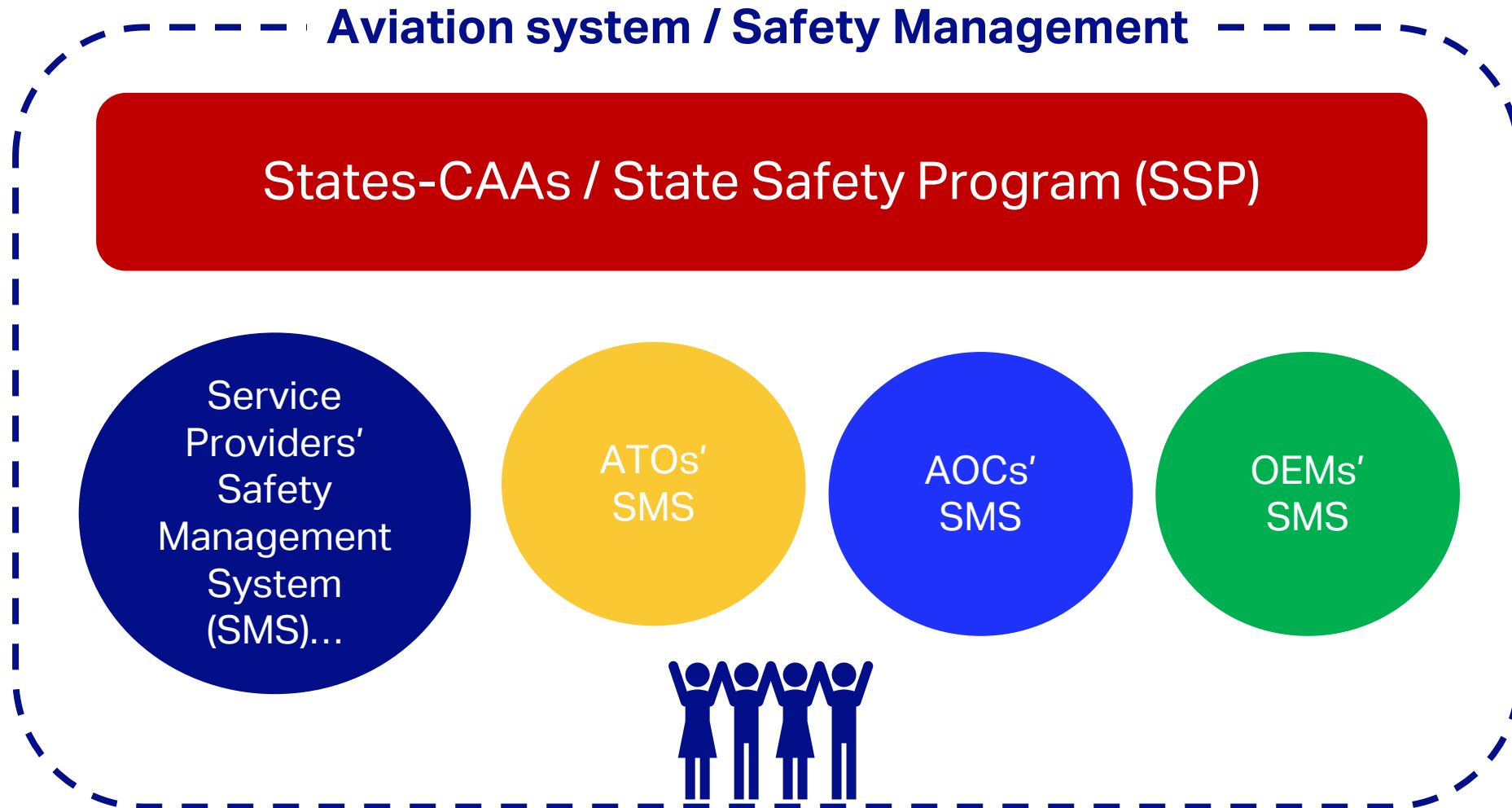
Safety Management framework

States-CAAs State Safety Program (SSP)	Service Providers' Safety Management System (SMS)

☐ Safety policy, objectives (and resources)
☐ Safety risk management
    ▪ Hazard identification (from data collection) and risk management
    ▪ Licensing, certification, authorization and approval obligations (CE-6)
    ▪ Resolution of safety issues (CE-8)
    ▪ Accident Incident investigation (Annex 13)
☐ Safety assurance
☐ Safety promotion
	☐ Safety policy, objectives (and resources)
	☐ Safety risk management
	    ▪ Hazard identification
	    ▪ Safety risk assessment and mitigation
	☐ Safety assurance
	☐ Safety promotion

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Hazard Identification

Example of hazard identification methodology		
Reactive	Reactive/Proactive	Proactive
E.g., Analysis Accident-Incidents	E.g., Analysis of event including Undesired Aircraft States	E.g., Analysis of Threat and Error Management
Safety Report 2019 — Issued April 2020 — Edition 56	Flight Data Analysis (FDA) — Mandatory Occurrence reporting	Line Oriented Safety Audits (LOSA) — Voluntary Safety reporting

Safety Data

States [• Accident/incident database • State audits • National aviation reviews • State safety programme • SPIs and SPTs • ICAO USOAP • In-flight medical incapacity database • Other state partner]

Civil aviation authority [• Mandatory occurrence reports • Voluntary reports • Risk assessments • Risk profiles • Industry SPIs/trend analysis • Service provider surveillance • External and internal audits • Enforcement records • Incident/accident reports • Certification records • Aircrew in-flight medical incapacity reports • Trends in medical assessment findings]
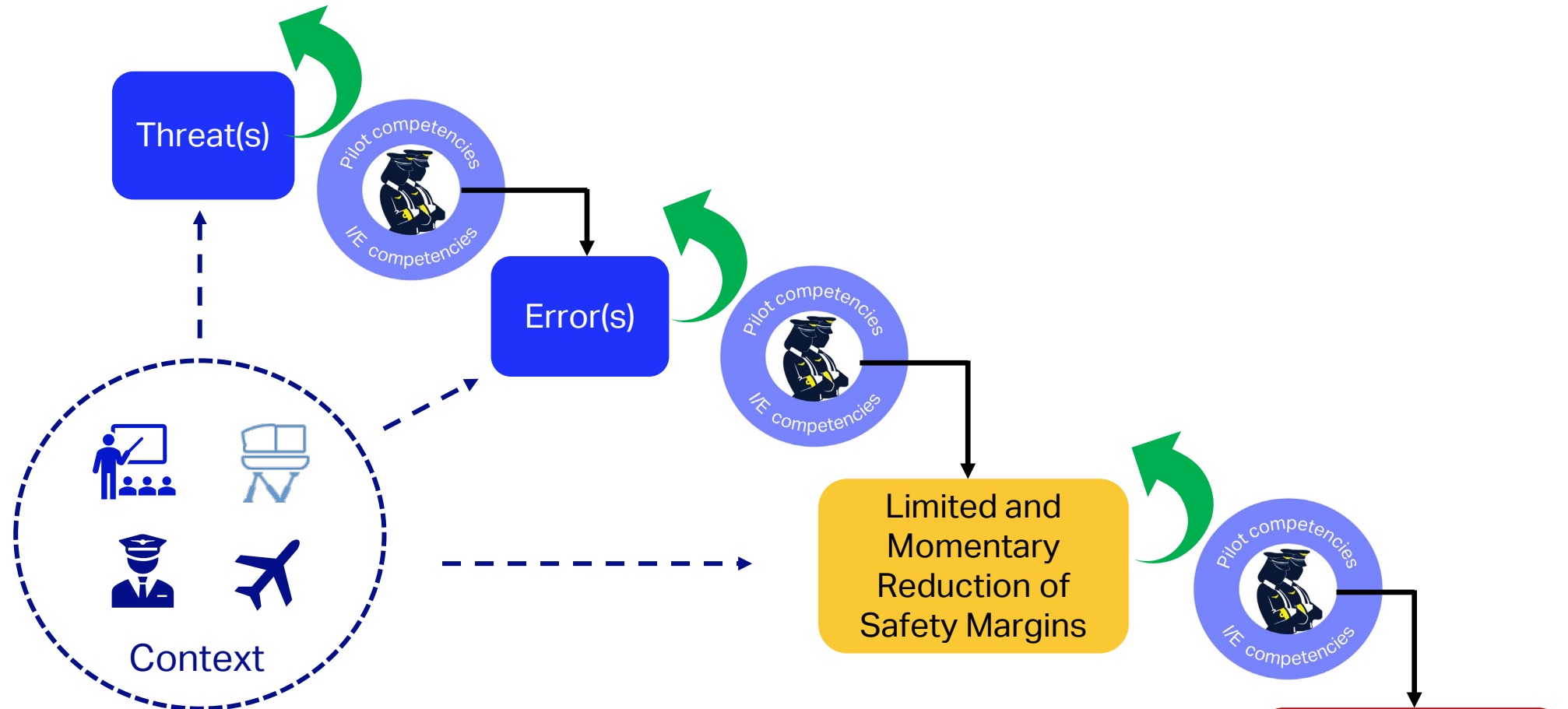
Approved training organizations (ATOs)
• Mandatory occurrence reports
• Voluntary reports
• Risk assessment register
• SPIs trend analysis
• Quality assurance reports
• Training data

Air operators (AOCs)
• Mandatory occurrence reports • Voluntary reports
• Flight data analysis (FDA) • Recorded data (flight data recorder, cockpit voice recorder, video...)
• Fatigue risk management system
• Risk assessment register • SPIs/trend analysis
• Maintenance records • Internal audits
• Reliability programme reports
• Training records

Safety Data vs Training Data

States [• Accident/incident database • State audits • National aviation reviews • State safety programme • SPIs and SPTs • ICAO USOAP • In-flight medical incapacity database • Other state partner]

Civil aviation authority [• Mandatory occurrence reports • Voluntary reports • Risk assessments • Risk profiles • Industry SPIs/trend analysis • Service provider surveillance • External and internal audits • Enforcement records • Incident/accident reports • **Certification records** • Aircrew in-flight medical incapacity reports • Trends in medical assessment findings]

Approved training organizations (ATOs)
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• Quality assurance reports
• **Training data**

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• Mandatory occurrence reports • Voluntary reports
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• Risk assessment register • SPIs/trend analysis
• Maintenance records • Internal audits
• Reliability programme reports
• **Training records**

TEM Model for Training, Licensing and Operations

CBTA Metrics

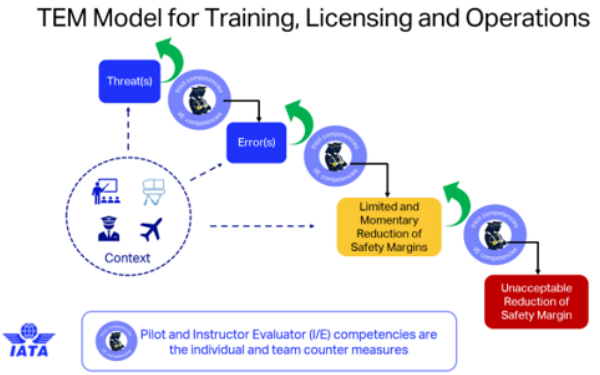| Example of grading metrics |
|---|
| **Level 0** (competent metrics): The information whether the pilot(s) is (are) competent or not. |
| **Level 1** (competency metrics): Level of performance reflected by numeric grade of the competencies (e.g., 1 to 5). |
| **Level 2** (observable behavior metrics): The instructors record OBs predetermined or required by the organization (Regulatory or Policy requirements). |
| **Level 3** (TEM metrics): The instructor records Threats, Errors or Reduction of Safety Margin predetermined or required by the organization. |

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Opportunities

Global Safety Management enhancements by:

- **Supporting proactive-predictive hazard identification**

Example of hazard identification methodology			
Reactive	Reactive/Proactive	Proactive	Proactive/Predictive
E.g. Analysis Accident-Incidents	E.g. Analysis of event including Undesired Aircraft States	E.g. Analysis of Threat and Error Management	E.g. Analysis of CBTA -EBT Training metrics

Opportunities

Global Safety Management enhancements by:

- **Providing more robustness to the licensing system (CE-6)**

From a Pass/Fail Licensing system…
[Focus on 3 technical skills]

- ✓ Rejected TO
- ✓ T.O engine failure
- ✓ ILS engine out
- ✓ GA engine out
- ✓ NPA engine out
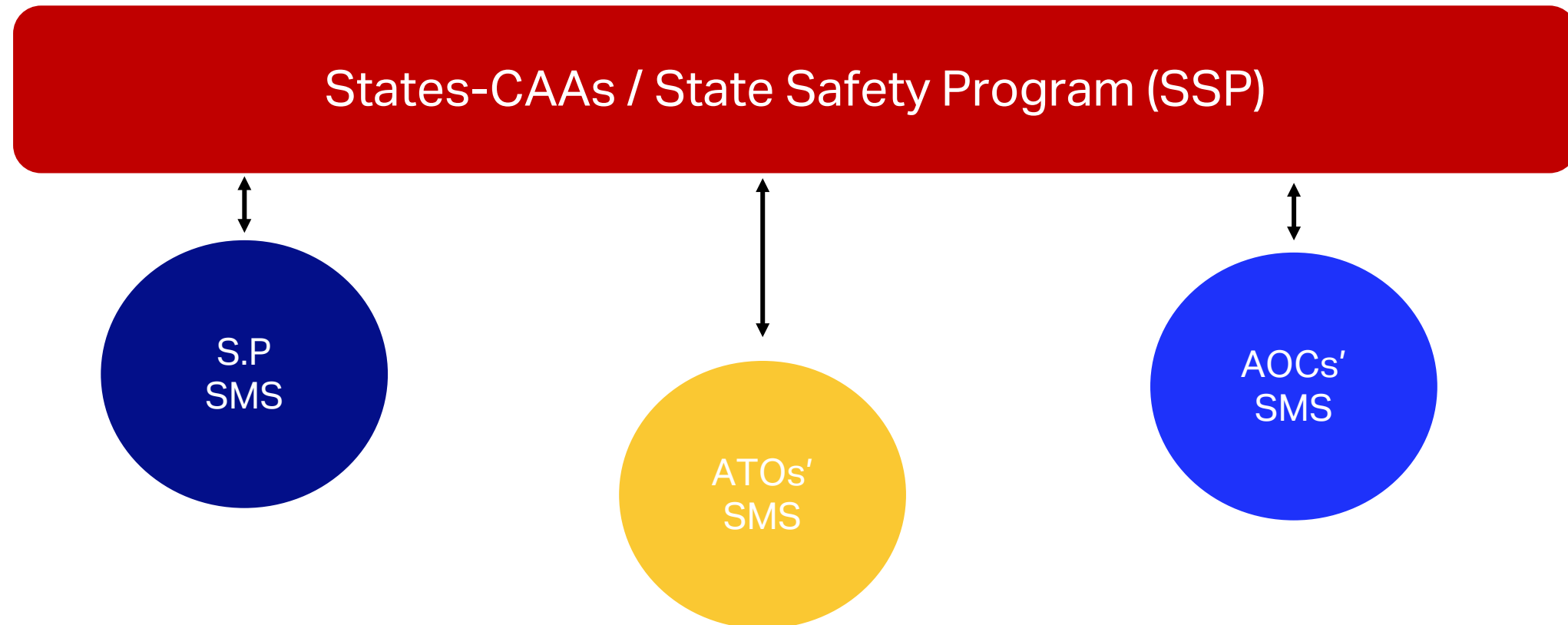- ✓ LDG engine out

…To a Performance based Licensing system

KNO
FPA
LTW
PSD
FPM
PRO
WLM
COM
SAW

Opportunities

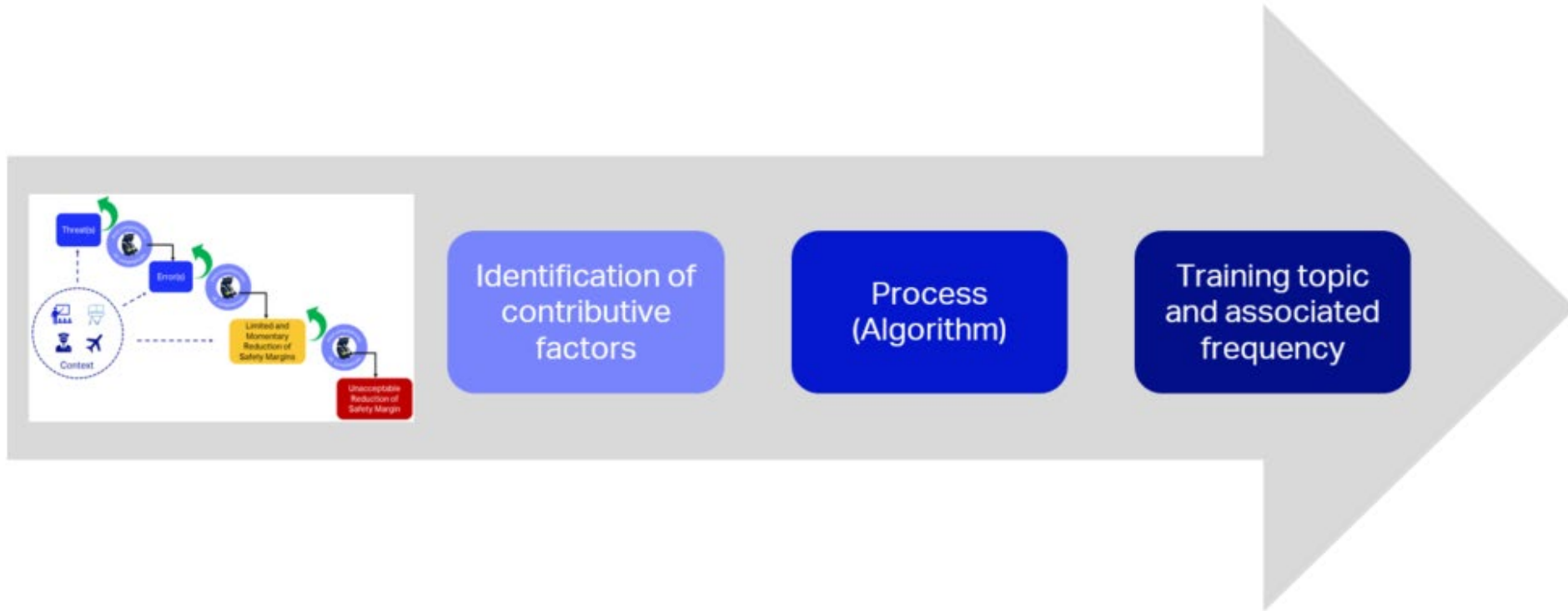Global Safety Management enhancements by:

- **Facilitating resolution of safety issues (CE-8)**

Opportunities

Global Safety Management enhancements by:

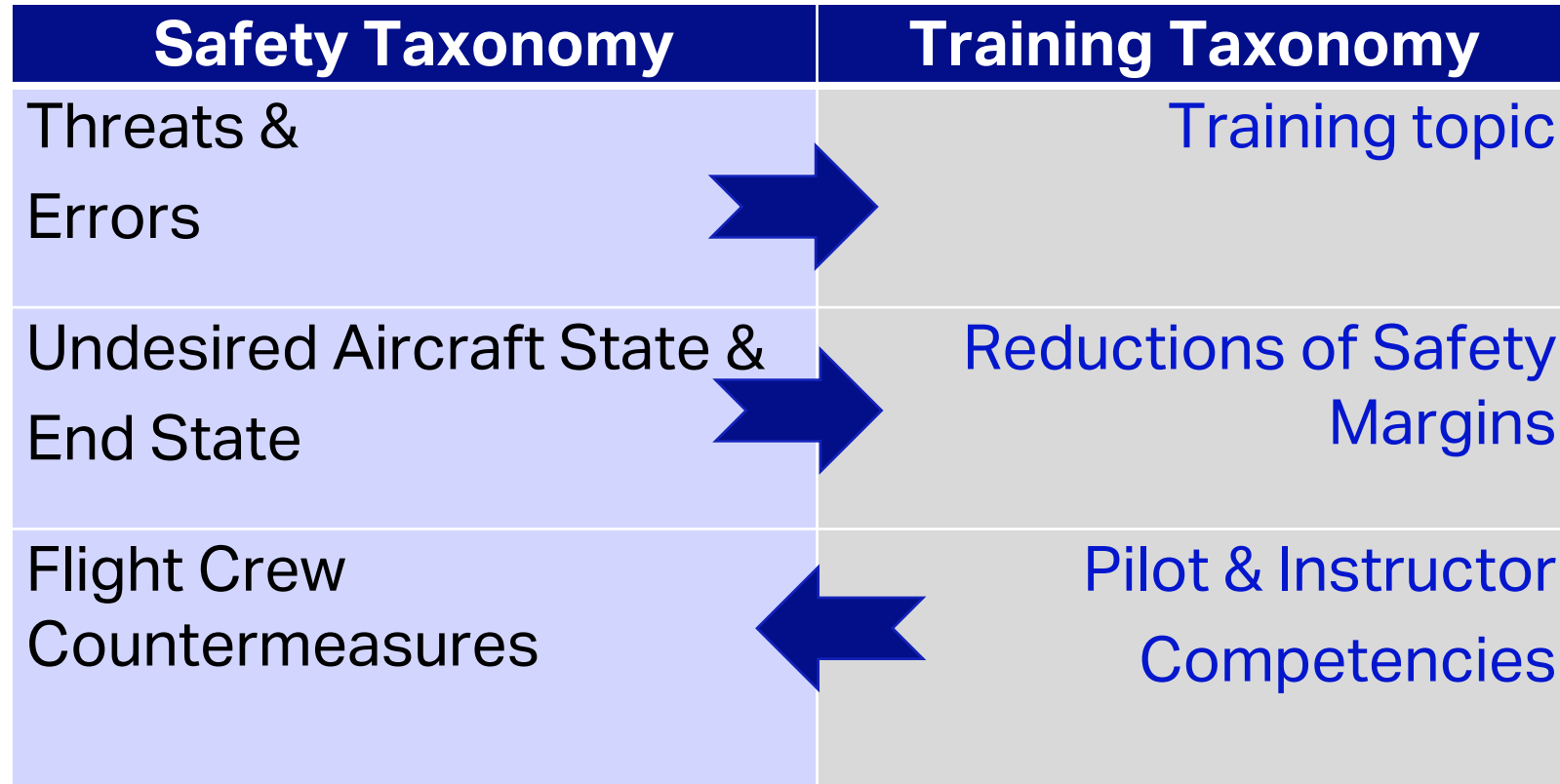- **Supporting the EBT data report continuous update**

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▲ Introduction

▲ CBTA principles

▲ CBTA expansion

▲ Opportunities

▲ **Challenges**

Challenge: Alignment of the Taxonomies

Safety Taxonomy	Training Taxonomy
Threats & Errors	Training topic
Undesired Aircraft State & End State	Reductions of Safety Margins
Flight Crew Countermeasures	Pilot & Instructor Competencies

Challenge: Training data protection

Challenge: license recognition

Problem Statement:
-Transition from the Proficiency world to the Competency world

Needs International harmonization of:
-The Assessment process methodology
-The minimum acceptable competency standard
-The qualification of the CAA's personnel due to CBTA oversight

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Thank you

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