EBT
EVIDENCE-BASED TRAINING

$$E = mc^2$$

EBT – EVIDENCE

data analyses

Decription of Competencies

Ineffective performance which resulted in an unacceptable reduction in safety margin, by rarely demonstrating any of the observable actions when required	Minimum acceptable performance but which did not result in an unsafe situation, by only occasionally demonstrating some of the observable actions when required.	Adequate performance which resulted in a safe situation, by regularly demonstrating most of the observable actions when required.	Effective performance which enhanced safety, by regularly demonstrating all of the observable actions when required.	Exemplary performance, which significantly enhanced safety, efficiency and effectiveness by always demonstrating all of the observable actions when required.

APPLICATION OF PROCEDURES

Identifies and applies procedures in accordance with published operating instructions and applicable regulations, using the appropriate knowledge.	Identifies the source of operating instructions Follows SOP's unless a higher degree of safety dictates an appropriate deviation Identifies and follows all operating instructions in a timely manner Correctly operates aircraft systems and associated equipment Complies with applicable regulations. Applies relevant procedural knowledge

COMMUNICATION

Demonstrates effective oral, non-verbal and written communications, in normal and non-normal situations.	Ensures the recipient is ready and able to receive the information Know what, when, how and with whom to communicate Pass messages clearly, accurately and concisely Confirms that the recipient correctly understands important information Listens actively and demonstrates understanding when receiving information Asks relevant and effective questions Adheres to standard radiotelephone phraseology and procedures Accurately reads and interprets required company and flight documentation Correctly interprets non-verbal communication Uses eye contact, body movement and gestures that are consistent with and support verbal messages Are receptive to other people's views and willing to compromise

AIRCRAFT FLIGHT PATH MANAGEMENT, AUTOMATION

Controls the aircraft flight path through automation, including appropriate use of flight management system(s) and guidance.	Controls the aircraft using automation with accuracy and smoothness as appropriate to the situation Detects deviations from the desired aircraft trajectory and takes appropriate action Contains the aircraft within the normal flight envelope Manages the flight path to achieve optimum operational performance Maintains the desired flight path during flight using automation whilst managing other tasks and distractions Selects appropriate level and mode of automation in a timely manner considering phase of flight and workload Effectively monitors automation, including engagement and automatic mode transitions

AIRCRAFT FLIGHT PATH MANAGEMENT, MANUAL CONTROL

Controls the aircraft flight path through manual flight, including appropriate use of flight management system(s) and flight guidance systems.	Controls the aircraft manually with accuracy and smoothness as appropriate to the situation Detects deviations from the desired aircraft trajectory and takes appropriate action Contains the aircraft within the normal flight envelope Controls the aircraft safely using only the relationship between aircraft attitude, speed and thrust Manages the flight path to achieve optimum operational performance Maintains the desired flight path during manual flight whilst managing other tasks and distractions Selects appropriate level and mode of flight guidance systems in a timely manner considering phase of flight and workload Effectively monitors flight guidance systems including engagement and automatic mode transitions

KNOWLEDGE

Facts, information, and skills acquired through experience or education; the theoretical and practical understanding of a subject.	Demonstrates Practical and applicable knowledge of limitations and systems and their interaction Demonstrates required knowledge of published operating instructions Demonstrates knowledge of physical environment, air traffic environment including routings, weather, airports and operational infrastructure Demonstrates appropriate knowledge of applicable legislation. Knows where to source required information Demonstrates a positive interest in acquiring knowledge Is able to apply knowledge effectively

Decription of Competencies

LEADERSHIP AND TEAMWORK

Demonstrates effective leadership and team working.	Understands and agrees with the crew's roles and objectives. Creates an atmosphere of open communication and encourages team participation Uses initiative and gives directions when required Admits mistakes and takes responsibility Anticipates and responds appropriately to other crew members" needs Carries out instructions when directed Communicates relevant concerns and intentions Gives and receives feedback constructively Confidently intervenes when important for safety Demonstrates empathy and shows respect and tolerance for other people. Engages others in planning and allocates activities fairly and appropriately according to abilities Addresses and resolves conflicts and disagreements in a constructive manner Projects self-control in all situations

PROBLEM SOLVING AND DECISION MAKING

Accurately identifies risks and resolves problems. Uses the appropriate decision-making processes.	Seeks accurate and adequate information from appropriate sources Identifies and verifies what and why things have gone wrong Employ(s) proper problem-solving strategies Perseveres in working through problems without reducing safety Uses appropriate and timely decision-making processes Sets priorities appropriately Identifies and considers options effectively Monitors, reviews, and adapts decisions as required Identifies and manages risks effectively Improvises when faced with unforeseeable circumstances to achieve the safest outcome

SITUATION AWARENESS

Perceives and comprehends all of the relevant information available and anticipates what could happen that may affect the operation.	Identifies and assesses accurately the state of the aircraft and its systems Identifies and assesses accurately the aircraft's vertical and lateral position, and its anticipated flight path. Identifies and assesses accurately the general environment as it may affect the operation Keeps track of time and fuel Maintains awareness of the people involved in or affected by the operation and their capacity to perform as expected Anticipates accurately what could happen, plans and stays ahead of the situation Develops effective contingency plans based upon potential threats Identifies and manages threats to the safety of the aircraft and people Recognizes and effectively responds to indications of reduced situation awareness

WORKLOAD MANAGEMENT

Manages available resources efficiently to prioritize and perform tasks in a timely manner under all circumstances.	Maintains self-control in all situations Plans, prioritizes and schedules tasks effectively Manages time efficiently when carrying out tasks Offers and accepts assistance, delegates when necessary and asks for help early Reviews, monitors and cross-checks actions conscientiously Verifies that tasks are completed to the expected outcome Manages and recovers from interruptions, distractions, variations and failures effectively

Norm vs. Criterion based

EBT Working group

KYU Grade Promotion Syllabus

5TH KYU – 4TH KYU

FUNDAMENTAL SKILLS

Tachi-waza:
- Tsuri-komi-goshi
- O-goshi
- Seoi-otoshi
- Morote-seoi-nage
- O-soto-gari

- Ko-uchi-gari
- Ko-soto-gake
- Ko-soto-gari

PERFORMANCE SKILLS

Combination Techniques:
- O-uchi-gari into Ko-uchi-gari
- Ko-uchi-gari into O-soto-gari or O-soto-gake
- Ko-uchi-gari into Morote-seoi-nage
- Ippon-seoi-nage into Ko-uchi-gari

- any technique as combinations with
  - Seoi-otoshi
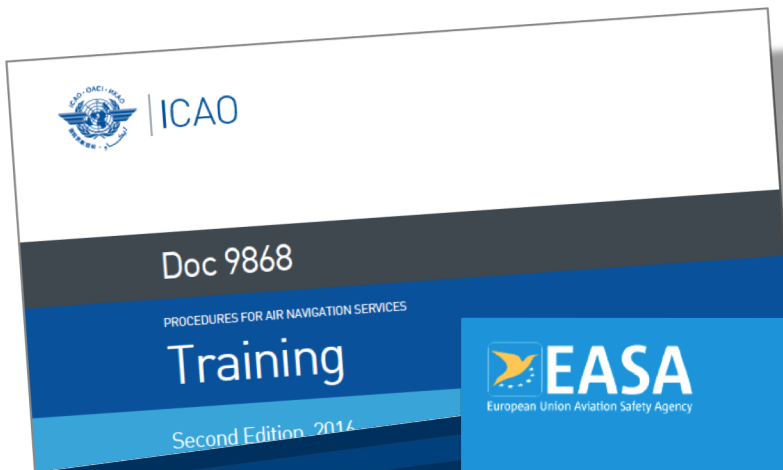 - Ko-uchi-gari

Counter Techniques:
- O-uchi-gari countered by Tsuri-komi-goshi
- Tai-otoshi countered by Ko-soto-gari or g

Ne-waza:
- escape
  - from Kesa-gatame using 'bridge and roll'
  - into Kesa-gatame from between Uke's legs'
  - into Yoko-shiho-gatame from between Uke's legs
- arm roll
  - from behind Uke
  - from in front of Uke
- turn over from underneath Uke into Tate-shi-gatame

ICAO

Doc 9868

PROCEDURES FOR AIR NAVIGATION SERVICES

Training

Second Edition, 2016

IATA

Evidenc

EASA
European Union Aviation Safety Agency

PASS

Air Operations
(IR + AMC/GM & CS/GM)

eRules

IATA

Doc 9995
AN/497

Manual of
Evidence-based Training

Approved by the Secretary General
and published under his authority

Edition — 2013

International Civil Aviation Organization

GM1 ORO.FC.230(a);(b);(f) Recurrent training and checking

ED Decision 2015/027/R

EVIDENCE-BASED RECURRENT TRAINING AND CHECKING OF FLIGHT CREW CONDUCTED IN FLIGHT SIMULATION TRAINING DEVICES (FSTDS)

ICAO developed Doc 9995 'Manual of Evidence-based Training', which is intended to provide guidance to civil aviation authorities, operators and approved training organisations in the recurrent assessment and training of pilots by establishing a new methodology for the development and conduct of a recurrent training and assessment programme, titled evidence-based training (EBT).

'Evidence-based training (EBT)' means training and assessment based on operational data that is characterised by developing and assessing the overall capability of a trainee across a range of core competencies rather than by measuring the performance during individual events or manoeuvres.

ICAO Doc 9995 is the reference document for operators seeking to implement EBT. The purpose of this guidance material (GM) is to enable the implementation of EBT according to the principles established in ICAO Doc 9995 taking into account the European regulatory framework.

In the current regulatory framework it is possible to achieve a mixed implementation of EBT. Implementation of a mixed EBT programme means that some portion of the recurrent assessment and training is dedicated to the application of EBT. This includes the Licence Proficiency Check (LPC) and the Operator Proficiency Check (OPC).

EBT Training Phases

	DAY 1		**DAY 2**
	Evaluation Phase	Manoeuvres Validation Phase	Scenario-based Training
Objective	Assess competence. Identify training needs	Train manoeuvre skills to proficiency, to a prescribed outcome	Develop resilience, learning by exposure
Conduct	Line Orientated Evaluation	e.g. "V1 cut", single eng approach, 2D, etc	Line-orientated Training + In-seat instruction

Generation 4 — Jet)	From 1988. EFIS cockpit — FMS equipped FADEC Fly-by-wire control systems Advanced flight envelope protection Integrated auto flight control system — navigation performance, and terrain avoidance systems Generation fatal accident average rate: 0,1/million flights	A318/A319/A320/A321 (including neo), A330, A340-200/300, A340-500/600, B777, A380, B787, A350, Bombardier C Series (A220), Embraer E170/E175/E190/E195
Generation 3 — Jet	From 1969 EFIS cockpit — FMS equipped FADEC Integrated auto flight control system — navigation performance, and terrain avoidance systems Basic flight envelope protection — stick shaker/pusher Generation fatal accident average rate: 0,2/million flights	A310/A300-600, B737-300/400/500, B737-600/700/800 (NG), B737 MAX, B757, B767, B747-400, B747-8, B717, BAE 146, MD11, MD80, MD90, F70, F100, Bombardier CRJ Series, Embraer ERJ 135/145
Generation 3 — Turboprop	From 1992 EFIS cockpit — FMS equipped EEC/ECU or higher engine control Integrated auto flight control system — navigation performance and terrain avoidance systems Basic flight envelope protection — stick shaker/pusher	ATR 42-600, ATR 72-600, Bombardier Dash 8-400, BAE ATP, Saab 2000
Generation 2 — Jet	From 1964. Integrated auto-flight system. EEC/ECU or higher engine control Analogue/CRT instrument display Basic flight envelope protection — stick shaker/pusher Generation fatal accident average rate: 0,7/million flights	A300 (except A300-600), BAC111, B727, B737-100/200, B747-100/200/300, DC9, DC10, F28, L1011
Generation 2 — Turboprop	From 1964 Analogue/CRT instrument display EEC/ECU Basic flight envelope protection — stick shaker/pusher Integrated auto flight control system	ATR 42, ATR 72 (all series except -600), BAE J-41, Fokker F27/50, Bombardier Dash 7 and Dash 8-100/200/300 Series, Convair 580-600 Series, Shorts 330 and 360, Saab 340, Embraer 120
Generation 1 — Jet	From 1952 First commercial jets. Manual engine control Analogue instrument display Not integrated auto flight control system	DC8, B707

Comparison by aircraft generation

Fatal accident per million departures

2nd generation:

2nd jet generation

3rd generation:
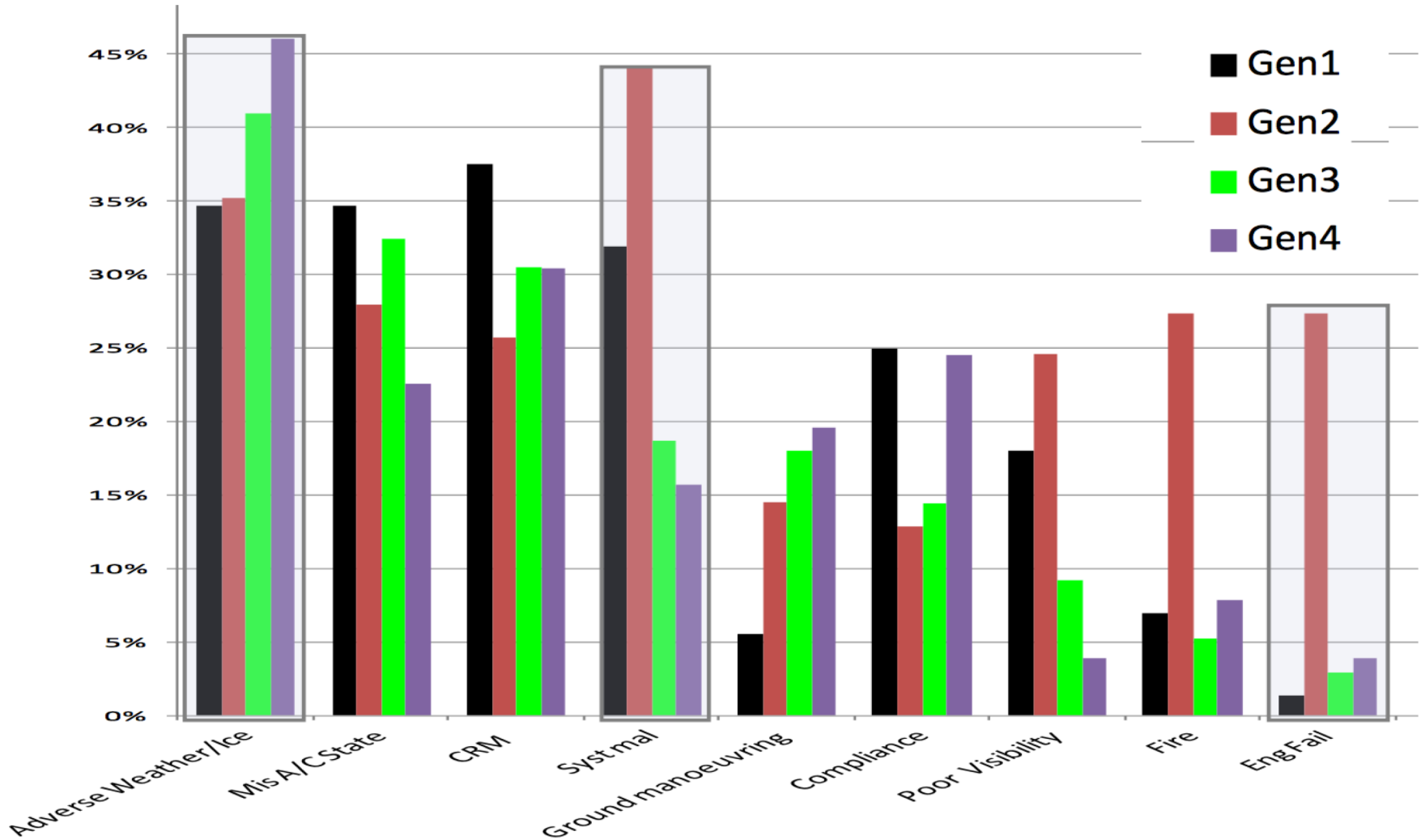
Glass-cockpit
Nav display
FMS

4th generation:

FBW
Flight Envelope
Protection

2nd generation

further improvement ?

4th generation

3rd generation

Years of operation

Sources: Ascend, Airbus

% of accidents & incidents with each factor

Training topics

Gen4 Jet

A: Every EBT Modul

B: Every alternate EBT Modul

C: At least ones in the 3-year cycle

Gen4 Jet Training Topics	A		B		C	
		Adverse weather		Adverse wind		ATC
		Automation management		Aircraft system malfunction		Engine failure
		Competencies non-technical (CRM)		Aircraft System management		Fire and smoke management
		Compliance		Approach, visibility close to minimum		Loss of communications
		Error management		Landing		Managing loading, fuel, performance errors
		Go-Around management		Runway or taxiway condition		Navigation
		Manual aircraft control		Surprise		Operations or type specific
		Mismanaged aircraft state		Terrain		Pilot incapcitation
		Monitoring & cross-checking		Workload, distraction, pressure		Traffic
		Unstable approach				Upset recovery
						Windshear recovery

EBT Baseline Programme ICAO Doc 9995

ICAO Doc 9995 — Recurrent Assessment and Training Matrix

Assessment and training topic	Frequency	Flight phase for activation	Description (include type of topic, being threat, error or focus)	Desired outcome (includes performance criteria OR training outcome)	Example scenario elements	Application of procedures	Communication	Flight path management, automation	Flight path management, manual control	Leadership and teamwork	Problem solving and decision making	Situation awareness	Workload management
					Generation 4 Jet — Recurrent Assessment and Training Matrix					*Competency map*			
		TO			Take-off with different crosswind/tailwind/gust conditions							x	x
		TO			Take-off with unreported tailwind		x			x			
		TO			Crosswinds with or without strong gusts on take-off	◯			◯				
		APP			Increasing tailwind on final (not reported)	x	x					x	x
Adverse wind	B	APP	Adverse wind/crosswind. This includes tailwind but not ATC mis-reporting of the actual wind	Recognize adverse wind conditions. Observe limitations. Apply appropriate procedures. Maintain directional control and safe flight path	Approach and landing in demanding weather conditions, e.g. turbulence, up and downdrafts, gusts and crosswind including shifting wind directions				x		x	x	
		APP			Adverse wind scenario resulting in increasing tailwind below DA (not reported)		x		x		x		
		APP			Adverse wind scenario including strong gusts and/or crosswind out of limits below DA (not reported)		x		x		x		
		APP			Adverse wind scenario including strong gusts and/or crosswind out of limits below 15 m (50 ft) (not reported)		x		x		x		
		APP LDG			Crosswind with or without strong gusts on approach, final and landing (within and beyond limits)	x			x		x		

(Evaluation and scenario-based training phases)

EQUIVALENCY OF MALFUNCTION / MALFUNCTION CLUSTERING

Malfunction characteristics	TYPE	IMMEDIACY	COMPLEXITY	DEGRADATION OF AIRCRAFT CONTROL	LOSS OF INSTRUMENTATION	MANAGEMENT OF CONSEQUENCES	EBT
F/CTL SLATS AND FLAPS FAULT IN CONF 0	MC	2	3	3	-	3	Y
F/CTL SLATS AND FLAPS LOCKED IN CONF 0	MC	2	3	3	-	2	Y
F/CTL SPD BRK FAULT	MC	-	-	-	-	-	N
F/CTL SPLR FAULT	MC	-	1	-	-	-	Y
F/CTL STABILIZER JAM	MC	2	-	3	-	3	Y
FORCED LANDING	QRH	3	4	-	-	4	Y
FUEL CTR TK PUMP 1(2) LO PR	MC	-	-	-	-	-	N
FUEL CTR TK PUMPS LO PR	MC	-	-	-	-	2	Y
FUEL FQI CH 1(2) FAULT	MC	-	-	-	-	-	N
FUEL IMBALANCE	QRH	2	-	-	-	-	Y
FUEL L (R) OUTER (INNER) TK HI TEMP	MC	-	-	-	-	-	N
FUEL L (R) OUTER (INNER) TK LO TEMP	MC	-	-	-	-	-	N
FUEL L (R) TK PUMP 1 + 2 LO PR	MC	-	2	-	-	2	Y
FUEL L (R) TK PUMP 1 + 2 LO PR (Center Tank Empty)	MC	-	2	-	-	2	Y
FUEL L (R) TK PUMP 1 + 2 LO PR (Center Tank not Empty)	MC	-	2	-	-	2	Y
FUEL L (R) TK PUMP 1(2) LO PR	MC	-	-	-	-	-	N
FUEL LEAK	QRH	2	3	-	-	3	Y
FUEL X FEED VALVE FAULT	MC	-	-	-	-	-	N
FWS FWC 1 + 2 FAULT	MC	2	-	-	-	-	Y
FWS FWC 1(2) FAULT	MC	-	-	-	-	-	N
FWS SDAC 1 + 2 FAULT	MC	2	-	-	-	-	Y
FWS SDAC 1(2) FAULT	MC	-	-	-	-	-	N
G/S DRIFT BEAM (AUTOLAND)		3	-	-	-	-	Y
GPS PRIMARY LOST		-	-	-	-	-	N
GPWS ALERTS	MW	5	-	-	-	-	Y
HYD B RSVR LO LVL	MC	-	-	-	-	-	N
HYD B RSVR OVHT	MC	-	-	-	-	-	N
HYD B+Y SYS LO PR	MW	4	5	4	-	5	Y
HYD G ENG 1 PUMP LO PR (PTU Inoperative)	MC	-	2	2	-	2	Y
HYD G ENG 1 PUMP LO PR (PTU Operative)	MC	-	-	-	-	-	N
HYD G RSVR LO LVL		-	2	2	-	2	Y
HYD G RSVR OVHT		-	2	2	-	2	Y
HYD G+B SYS LO PR	MW	4	5	5	-	5	Y
HYD G+Y SYS LO PR	MW	4	5	5	-	5	Y

Core competencies

Application of Procedures (APK)

Communication (COM)

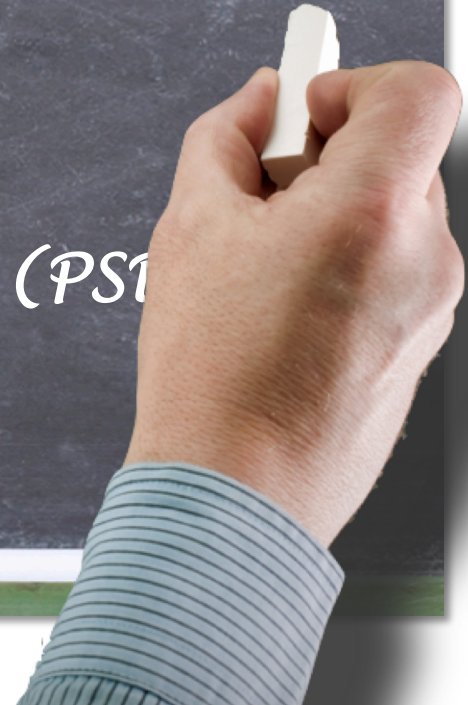Flight path management automation (FPA)

Flight path management manual (FPM)

Knowledge* (KNO)

Leadership & teamwork (LTW)

Problem solving & decision-making (PS1

Situation awareness (SAW)

Workload management (WLM)

CBTA - GRADING

Word pictures describe the various steps of the five level grading scale.

•They are a direct function of the underlying "**Performance Indicator".**
•Every Word picture is thus constructed, according to the *VENN - m*ethodology of grading, combining the four elements (A, B, C, D) where:

A = HOW WELL *(e.g. Ineffective performance…)*
B = HOW OFTEN *(e.g. …by rarely demonstrating…)*
C = HOW MANY (e.g. … *any of the performance indicators when required…)*
**D = OUTCOME** *(e.g. … which resulted in an unacceptable performance...)*

WORD PICTURES

1	2	3	4	5
*Ineffective performance which resulted in an unacceptable redustion in safety margin, by **rarely** demonstrating **any** of the observable actions when required*	*Minimum acceptable performance but which did not result in an unsafe situation, by **only occasionally** demonstrating **some** of the observable actions when required.*	*Adequate performance which resulted in a safe situation, by **regularly** demonstrating **most** of the observable actions when required.*	*Effective performance which enhanced safety, by **regularly** demonstrating **all** of the observable actions when required.*	*Exemplary performance, which significantly enhanced safety, efficiency and effectiveness by **always** demonstrating **all** of the observable actions when required.*

VENN methodology

The pilot _managed_ the workload in an exemplary manner, by _always_ demonstrating _all_ of the performance indicators when required, which _significantly enhanced safety_ effectiveness and efficiency

How often

Outcome

How well

How many
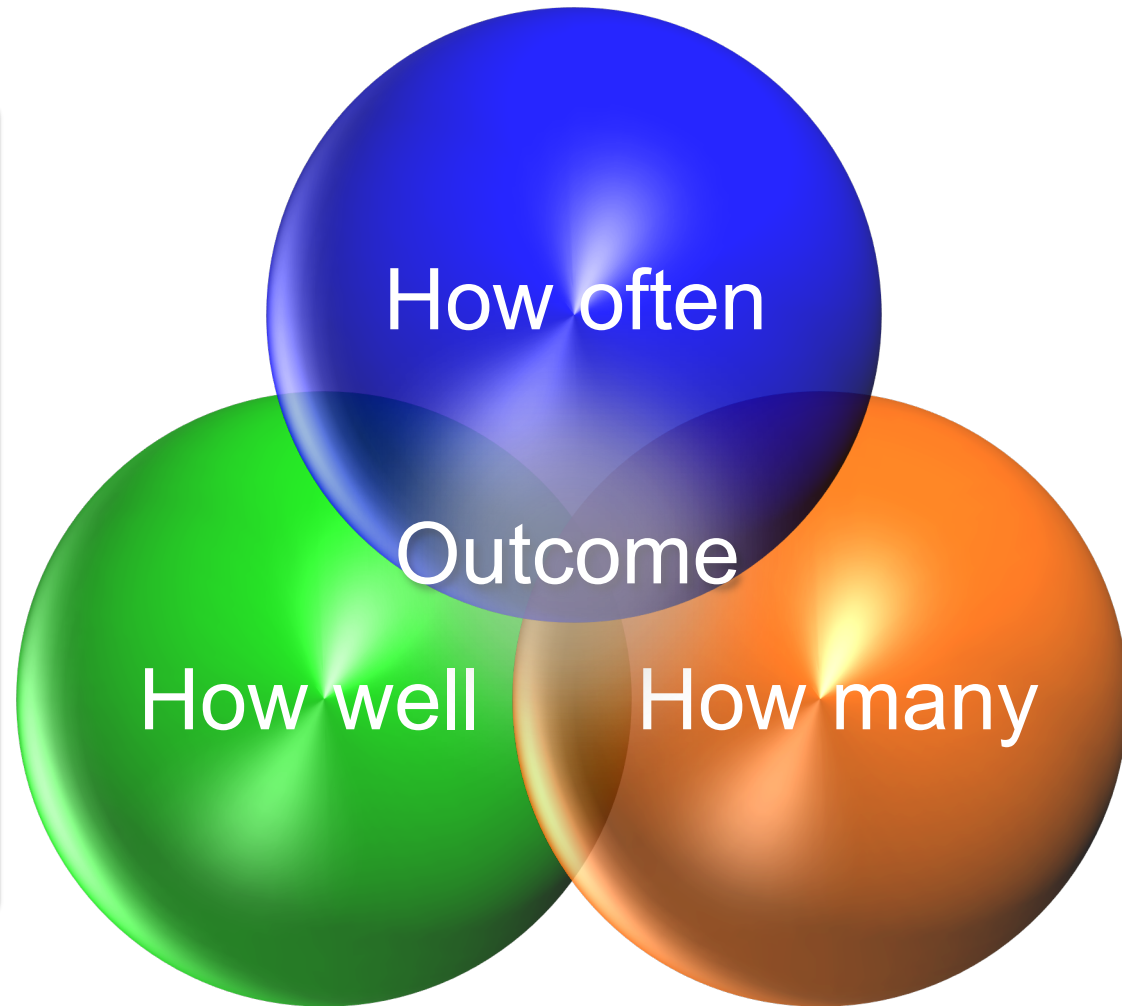
CBTA exercise

IRR Inter-rater reliability/ concordance

Flight: MUC → MAD → MUC

Takeoff from MAD

Returning to home base (MUC)

Weather: CAVOK

Notams: NO

Tech log: NO entries

T/O weight: MAX LDG WEIGHT

CBTA exercise

IRR Interrater reliability/ concordance

Communication:

- *Knows what, how, where, when, how much and with whom he or she needs to communicate*
- *Ensures the recipient is ready and able to receive the information*
- *Conveys messages and information clearly, accurately, timely and adequately*
- *Confirms that the recipient correctly understands important information*
- *Listens actively, patiently and demons...*
- *Asks relevant and effective questions,*
- *Uses appropriate body language, eye ... ...ion of others*
- *Is receptive to other peoples views an...*

Problem Solving & Decision-making

- *Identifies and verifies why things hav... ...ed assumptions*
- *Seeks accurate and adequate inform...*
- *Perseveres in working through a problem...*
- *Uses appropriate, agreed and timely decision-making processes*
- *Applies essential and desirable criteria and prioritizes*
- *Considers as many options as practicable*
- *Makes decisions when needed, reviews and changes them if required*
- *Considers risks but does not take unnecessary risks*
- *Improvises appropriately when faced with unforeseen circumstances to achieve the safest outcome*

ORCA -observation Tool

- OBSERVE
- RECORD
- CLASSIFY
- ASSESS / EVALUATE

Adult Learning
Andragogy

✓ **Selv kontrol**: voksne har _____ ære en del af undervisningen i modsa_____ ndervisning. Voksne skal have mulighed fo_____ en indlæring

✓ **Tidligere erfaring**: _____ se sammenhæng mellem tidligere erfa_____ e relatere ny viden til gammel erfa_____

✓ **Meningsfuld viden**: Vo_____ e kan se meningen med læring; at den er b_____

✓ **Motivation**: Motivering til ind_____ re ekstern (bedre job, løn, karriere), men i højere grad internt ønske om større jobtilfredshed, bedre selvværd etc.

FACILITATION TECHNIQUE

Ethvert job kræves en mængde **viden/knowledge**, et niveau af **færdigheder/skills** og et sæt af **holdninger/attitudes**. Dette gælder for læger, fodboldspillere, soldater, advokater og selvfølgelig piloter.

Den formelle træning lægger oftest vægt på at udvikle **Knowledge** og **Skills,** idet kompetence-vurderingen næsten udelukkende vedrører måling mod et sæt faste standarder.

Facilitering giver eleven mulighed for <u>selv</u> at opdage, hvad de laver, og hvilken effekt det har på andre og på opgaven, så de selv kan tage beslutning om at <u>ændre adfærd.</u>

Faciliserings-teknikken er mere effektiv end visnings- og fortællingsteknikken, idet elevens involvering og oplevelser er en del af læringsprocessen.

Instruktørens rolle er derfor, ved hjælp af facilitering, at udvikle elevens **Knowledge, Skills og Attitudes** ved at give større selv indsigt og selv-analyse.

Teknikken er ikke kun for den dårlige performance, men bruges også til at <u>styrke effektiv adfærd</u>, idet den giver eleverne en forståelse af, hvorfor de er gode, hvilket yderligere tilskynder til deres fortsatte udvikling.

	Instruktions teknik	Facilitation teknik
Hvad betyder ordene instruktion/facilitering?	*Vise, fortælle*	*At finde svaret selv*
Hvad er målet?	*Overføre viden og udvikle færdigheder*	*At ændre adfærd ved hjælp af selvindsigt*
Hvem kender indholdet/topic?	*Instruktøren*	*Både elev og instruktør*
Hvem har erfaringen/videnen?	*Instruktøren*	*Både instruktøren og eleven*
Hvem sætter agendaen?	*Instruktøren*	*Både instruktøren og eleven*
Hvem taler mest?	*Instruktøren*	*Eleven*
Hvor er fokus mest?	*Instruktør - topic*	*Elev-performance og udvikling*
Hvordan er progress evalueret?	*Ved observation*	*Guidet selv-evaluering*
Hvordan er arbejds intensiteten?	*Lavt*	*Højt*

QUESTIONING

TYPE	EXAMPLE	PURPOSE
OPEN	*How can you improve?*	Start discussion
CLOSED	*Did you know your height*	Control/check
DIRECT	*What is your age?*	Get information
PROBING	*Why? Or explain to me?*	Starts learning
SUMMARIZING	*How will you use this?*	Check understanding
LEADING	*Did you ever considered to…?*	Nil
MULTIBLE	*When, how and why did you..?*	Nil

Facilitation and CBTA Grading exercise

Scenario:

A revenue flight with cabin crew from Tronheim(ENVA/TRD) to Oslo (ENGM/OSL) with call Sign "AIRWING 727".

Scenario begins in ENVA with cockpit preparation completed at the gate.

There are no NOTAMS and the aircraft Status is normal without outstanding MEL's.

Weather: 240/12 4000 –RA SCT011 OVC020 12/05 1010 Nosig

The F/O will operate this sector as PF.

During T/O run:

- *TANK FUEL LEAK L INNER*
- *Engine 1 failure at V1*

Eng failure procedure: NON-STD: Join NEGIM HP. Inbound 087 LEFT turn

European Union Aviation Safety Agency

SAFETY MATERIAL

RMT.0599
'Evidence-based and competency-based training.'
SPT.012
'Promote the new European provisions on pilot training'

Oversight guidance for the transition to EBT Mixed Implementation

According to:

GM1 ORO.FC.230 (a); (b); (f) Recurrent training and checking GM2 ORO.FC.A.245, ATQP

Future EBT

EASA rulemaking process milestones

Start	Consultation	Proposal to Commission	Adoption by Commission	Decision
Terms of Reference	Notice of Proposed Amendment	Opinion	Implementing Rules	Certification Specifications, Acceptable Means of Compliance, Guidance Material
1	2	3	4	5
5.2.2016	27.7.2018	DD.MM.2019	2020/Q4	2020/Q4

Today