

TRAINING MODEL TO OPERATE IN AN INTELLIGENT FLIGHT DECK ENVIRONMENT

AI

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29 June 2020

Innovation

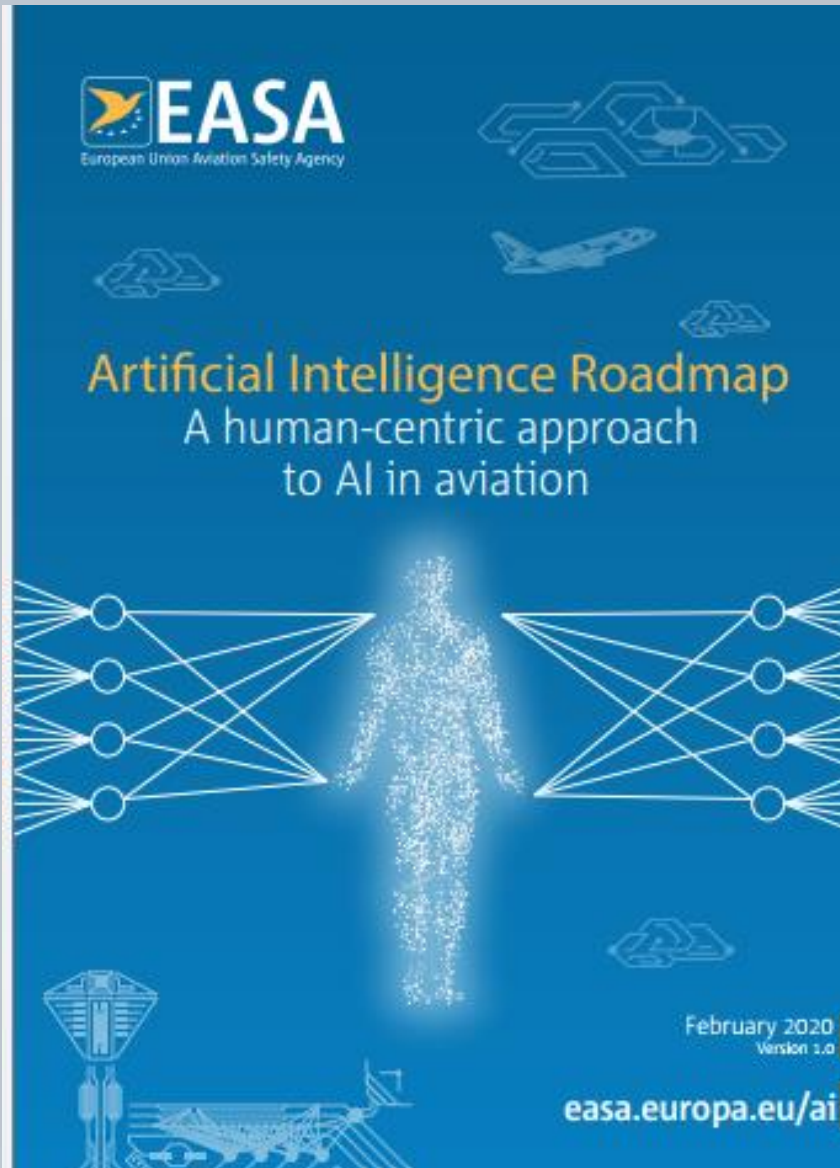
Airbus concludes ATTOL with fully autonomous flight tests

AIRBUS PRESS RELEASE (Excerpts)

Following an extensive two-year flight test programme, Airbus has successfully concluded its Autonomous Taxi, Take-Off and Landing (ATTOL) project.

Airbus has achieved autonomous taxiing, take-off and landing of a commercial aircraft through fully automatic vision-based flight tests using on-board image recognition technology - a world-first in aviation.

DISCO: DISRUPTIVE COCKPIT



- *reducing the use of human resources for tasks a machine can do, thus allowing them to better concentrate on high added-value tasks, in particular the safety of the flight;*
- *putting humans at the centre of complex decision processes, assisted by the machine; and*
- *addressing the impact of human performance limitations*



Possible classification of AI/ML applications

Level 1 AI/ML : assistance to human

- Level 1A – Routine assistance
- Level 1B – Reinforced assistance

Applications like assistance and augmentation of crew for tasks ranging from flight preparation to flight execution

Level 2 AI/ML : human/machine collaboration

- Level 2A – Human performs a function / Machine monitors
- Level 2B – Machine performs a function / Human monitors

Enhanced human/machine collaboration still based on the fundamental crew role sharing flying/monitoring

Level 3 AI/ML : more autonomous machine

- Machine performs functions with no human intervention in operations.
- Human is in the loop at design and oversight time

Design and oversight phase would be to a great extent performed by the machine under the supervision of the human

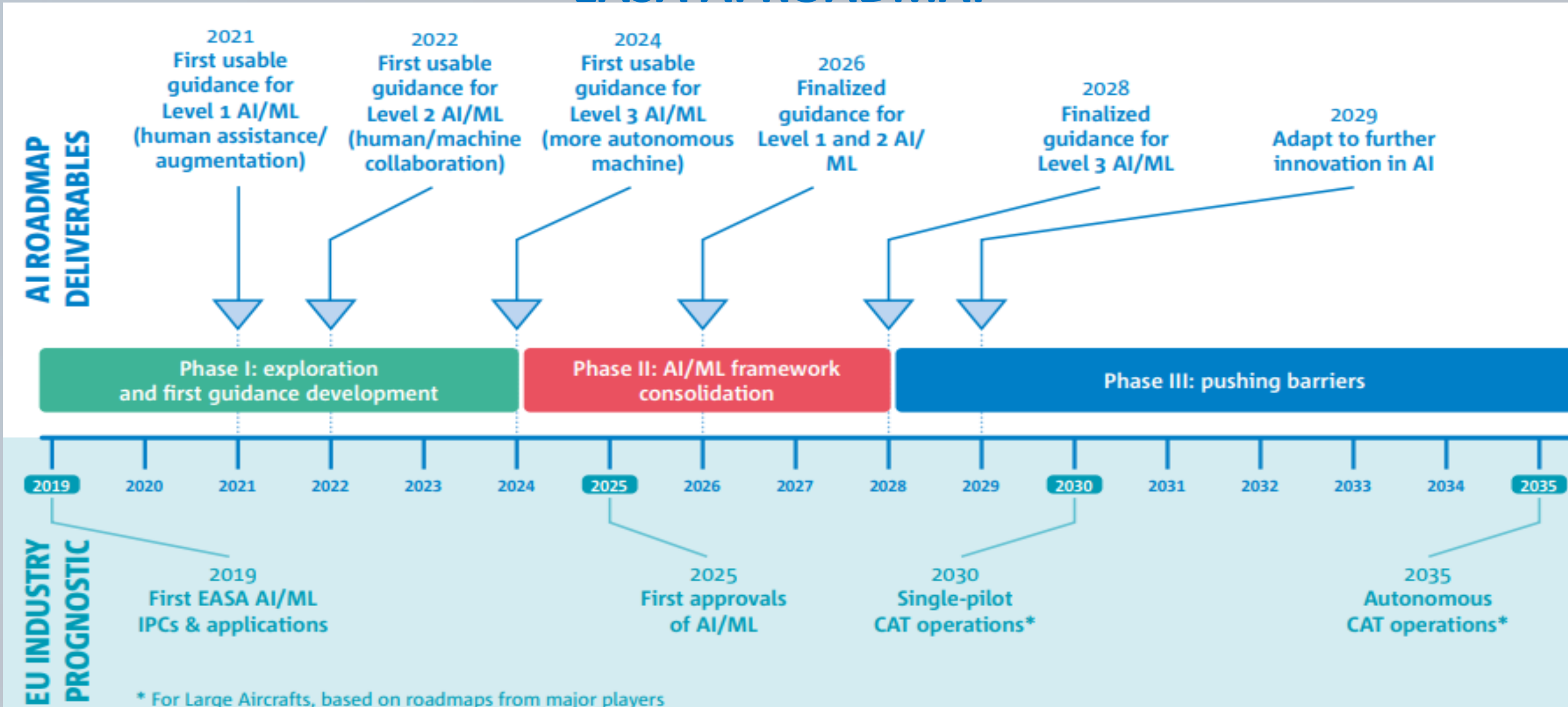
Credits: European Union Aviation Safety Agency

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EASA AI ROADMAP



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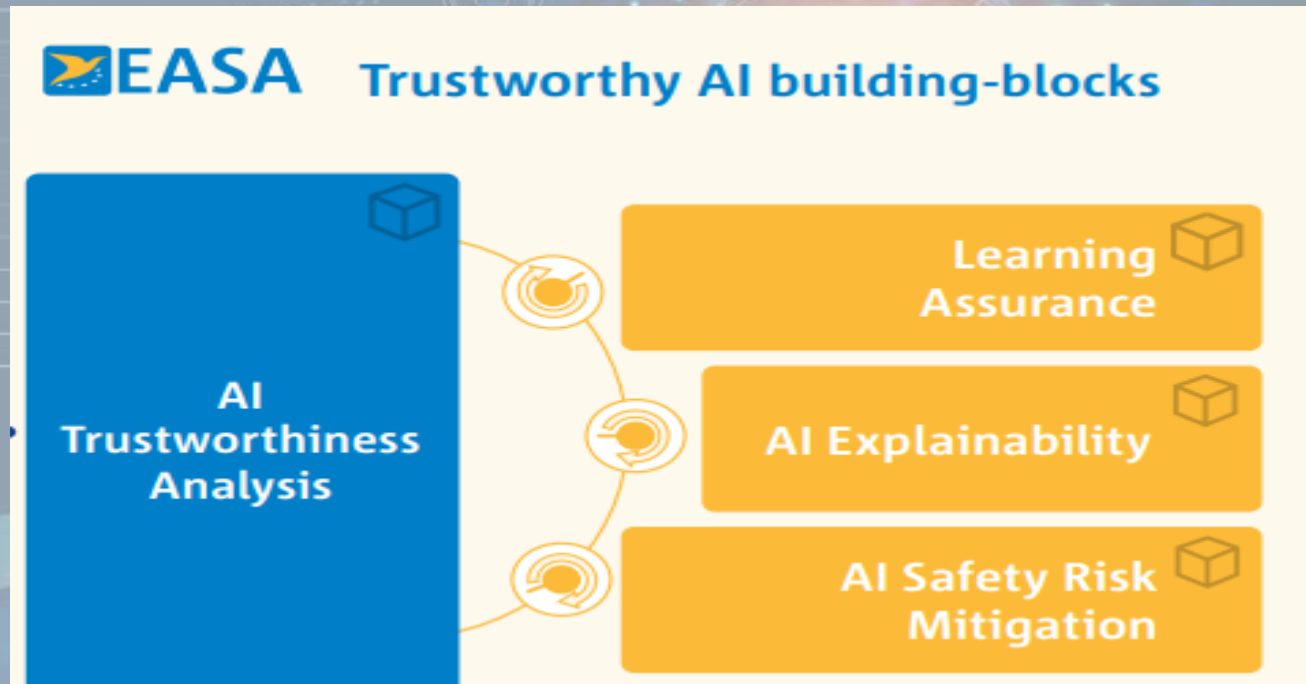
AI IN FLIGHTDECK...INEVITABLE

**BASIC AI: Existing
sophisticated
automation**
BASIC AUTOMATION

FOUNDATIONAL AI:
Provide intelligent
automation by
2030..eMCO...
ASSIST

**GENERATIVE AI: Shared
automation by
2040...SiPO...
COLLABORATE**

**AGI Superhuman: using
LLM by 2050 or 2075 or
2300.....
AUTONOMOUS FLIGHT**



THE AI APPREHENSION.....

- Trustworthiness
- Push towards Persuasion
- Overwhelming sense of loss of control
- Exclusion from the decision-making matrix
- Bewilderment
- Pursuit of Goals, Meaning and Purpose
- What is expected out of the pilot?



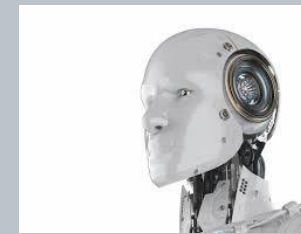
Luddites, techno-skeptic, technophiles, utopians...

- Pilots don't design AI but shall bear the consequences of it's design
- Choice to flourish or self-destruct
- Create beneficial intelligence instead of undirected intelligence
- Transition from human focused to human-machine collaboration focussed Pilot competencies
- Paradigm shift in training objectives and content





HOW ARE WE DIFFERENT



LIMITED MEMORY CAPACITY

LIMITED COMPUTATIONAL CAPACITY
WITH FIXED WORKING MEMORY

SLOW COMPUTATION

PREDICTION ON APPROXIMATIONS

AI
FLIGHT DECK

EXTREMELY LARGE MEMORY

MIND NUMBING COMPUTATIONAL
CAPACITY WITH EXPANDABLE CONTEXT
WINDOWS

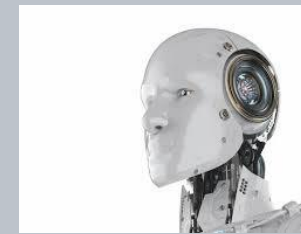
LIGHTSPEED COMPUTATION

PREDICTS USING PRECISE FUNCTION DATA

IS THE HUMAN PILOT INFERIOR TO THE AI PILOT?



HOW ARE WE DIFFERENT



RATIONALITY BUILT ON EXPERIENCE

**SELF-AWARENESS THROUGH
CONTEXTUALISATION**

MEMORY BY ASSOCIATION

**SHARED COMMUNICATION SUPPORTED
BY CONTEXTUALISATION**

**AI
FLIGHT DECK
COLLABORATE**

BOUNDED FUNCTION BASED RATIONALITY

**LACK OF AWARENESS DUE INABILITY TO
CONTEXTUALISE**

ADDRESS BOUND MEMORY

**UNABLE TO GENERATE COHERENT AND
CONTEXT-AWARE TEXT**

IS THE HUMAN PILOT REDUNDANCY TO THE AI PILOT?

CHALLENGES IN OPERATING ENVIRONMENT.....

- Coping with a growing and shifting number of challenging externalities
- Communication and information sharing interface (External/Internal)
- Lack of sentient engagement
- Lack of visual or sensory cues
- Decision making protocols
- Application of human judgement...the Unknown
- Identifying situations requiring transfer of control

EXERCISING CONTROL

- Intelligence is the ability to accomplish complex goals, it enables control
- Maintain a goal-oriented approach instead of Task based approach
- Explain things by goals instead of causation (back propagation)
- Align the AI's goal to your goals
- Exercise control and maintain the desired goal

***If we cede our position as the smartest in the flightdeck,
it's possible we might also cede control***

CONTROL OF THE AI PICUS

AI LEARNING GOALS

Design

What How & Why

Model

Interface Protocol

AI ADOPTING GOALS

Mode Selection

Mode Awareness

Communication

**Maximise Goal
Satisfaction**

AI RETAINS OUR GOALS

Monitor & Control

**CAN WE MENTALLY
FLY THE AIRCRAFT**

THE TRAINING FOOD FOR THOUGHT

- The AI environment functions through the 'Black Box' model
- Smarter environment creates complexity leading to evolution of complex intelligence
- Are we dumbing our pilots by training them on procedures (mechanical repetitive task) without exploring why?
- Are SOPs for standardization or Homogenisation, what are it's limits
- AI is becoming human--- Will train to be like an AI lead to harmonisation

THE TRAINING PRINCIPLE

- Simple rules can assist in learning complex data, provided we understand the rule
- Deeper understanding rather than memorization of numbers..PHYSICS FIRST MATHEMATICS NEXT
- Learning improves by increase in available data
- If exposed to frequent complex states, the mind gets fired up and learns better, decision making is better
- Errors in functions will lead to error in output: understanding AI limitations

THE TRAINING STRATEGY

INTUITION

- Develop deeper understanding
- Strong Foundational Knowledge
- Reduce Clutter

ANALYTICAL REASONING

- Progressively improve by increasing available data
- Focus on essentials

LOGICAL REASONING

- Exposure to varied complex states through low-tech KSA exercises
- Diversification

COMPETENCY

- Intuition & Logic leads to Creativity & Strategy
- Training beyond standards
- Training for everyday safe flights

EBT

- Diversification and Repetition of cognitive based exercises

CAPTAINCY

- Training in Continuum
- REMEMBERS COMPUTES LEARN

Institutional Learning Curve

The Road Ahead

Agile and Adaptable Learning Content



ANALYSE

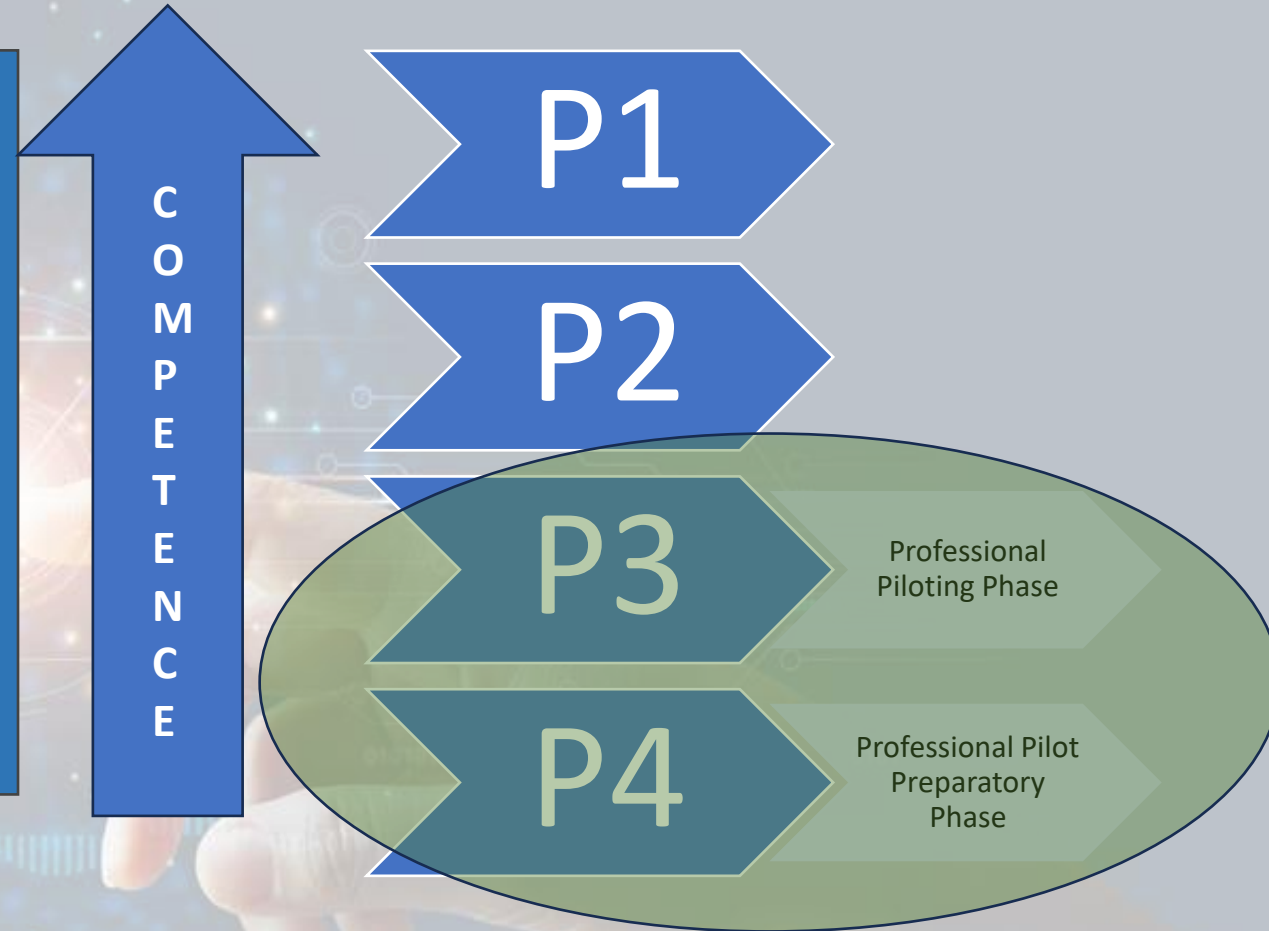
REFLECT

RELATE

GENERATE

PLUS: Pilot Learning Uptake Synthesis

- Within the overall context of pilot training
- Robust effective pre-entry assessment
- Early spotting of uptake issues
- Learning Curve Monitoring
- Normalization within the population metrics
- Archived & Accessible across career span



e-KASP

Knowledge Attitude Skills Profiling

Across all stages
of pilot training

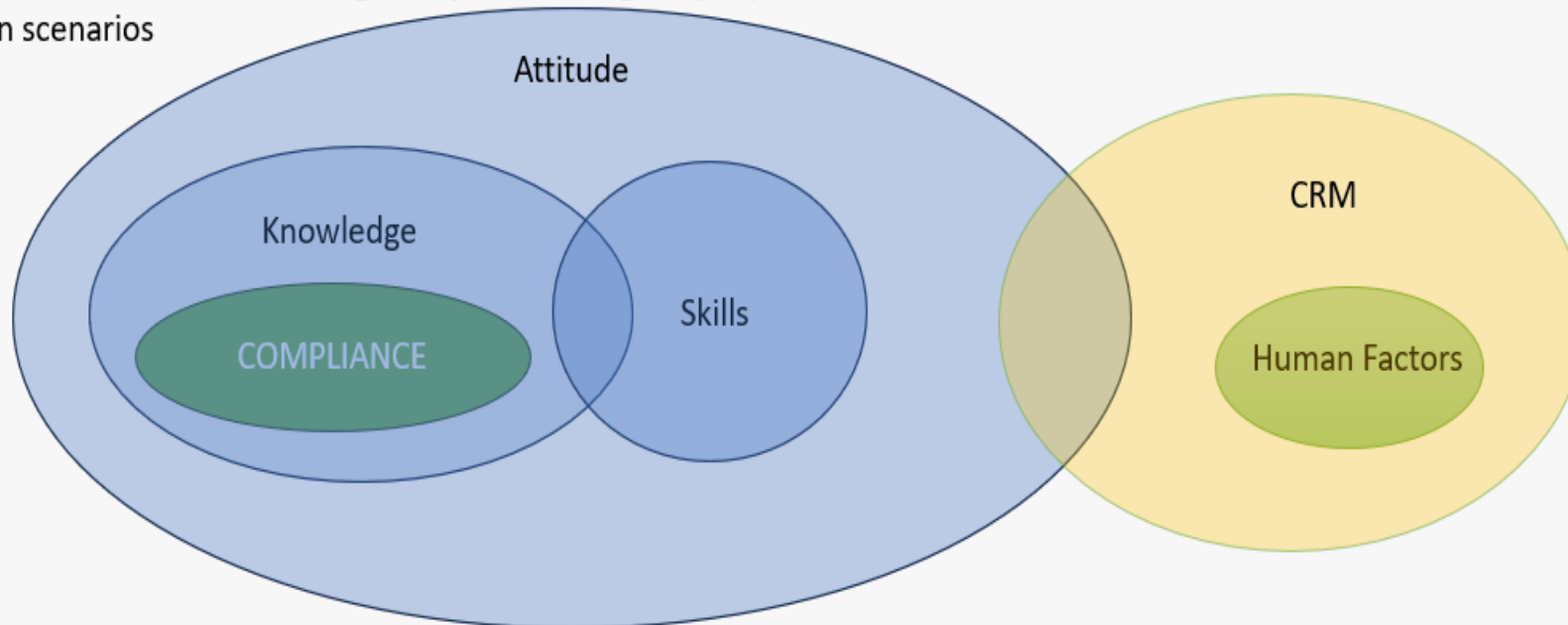
Individual
Aptitude

ICAO Core
Competencies

CRM Profiling

1. Learning-in-Continuum,
2. Robust evidence-based continuously evolving learning methodology
3. Connect-the-dots Approach to Correlation
4. Application Orientation: Amongst subjects, Amongst topics,
Within scenarios

5. Student Ownership of Learning
6. Performance Analysis
7. Attitude Appraisal



8. Virtual Classroom Components with Knowledge Portal

9. Dynamic Grade Book

Hover

Compile

Patternize

Normalise

Extrapolate

Predict

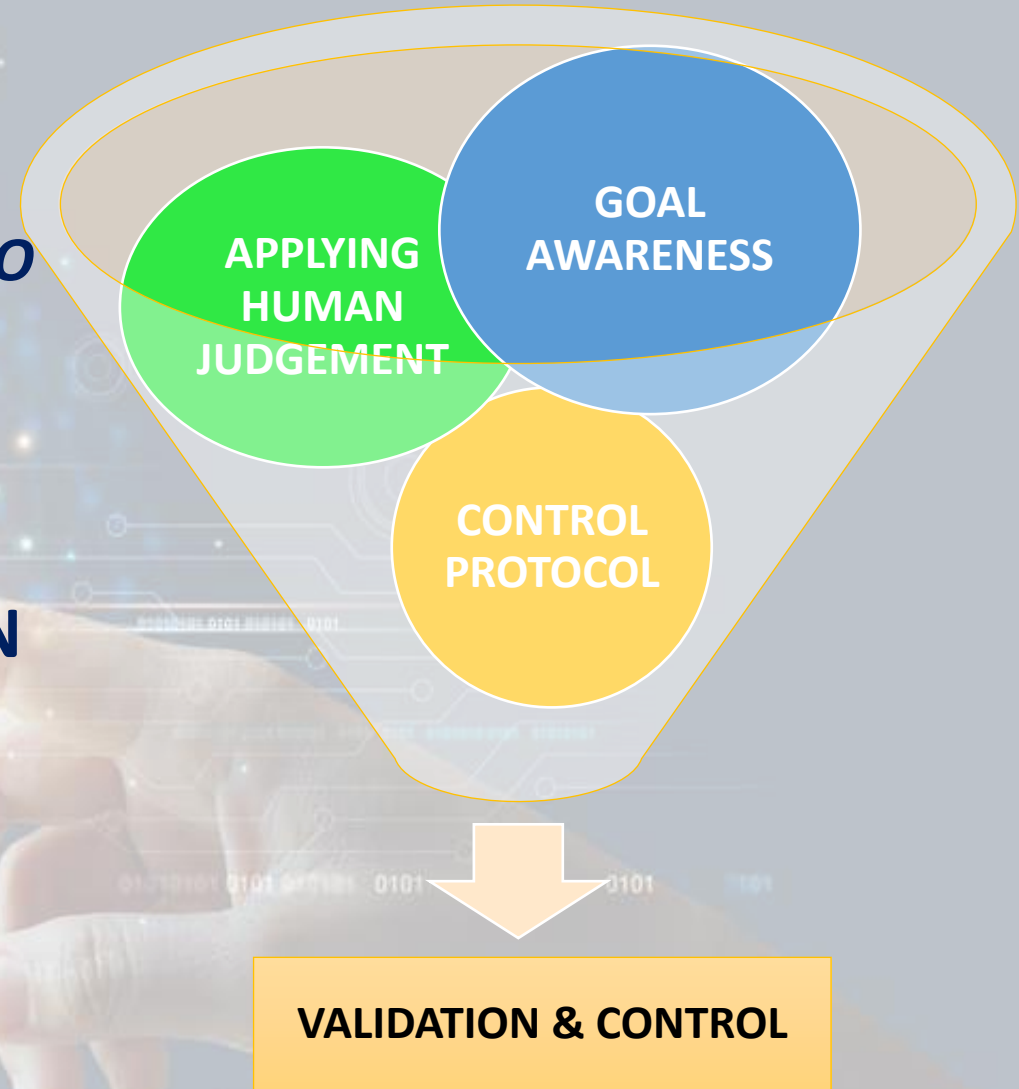
THE TRAINING OUTCOME

STOP WONDERING WHAT SHE IS DOING

*DETERMINE WHETHER HER ACTIONS ARE ALIGNED TO
YOUR GOALS*

INTERVENE WHERE & WHEN REQUIRED

- **STANDARDISATION NOT HOMOGENISATION**
- **HUMAN IN LOOP OR AUTONOMOUS????**



THE OPEN SLATE

- Are present lesson objectives and assessments relevant
- Does our training develop that 6th sense: INTUITION
- Does our training encourage creativity
- How often we facilitate Problem solving and learning opportunities
- Do we need to retrain our instructors for an AI-assisted FlightDeck
- Do we believe AI may take the lead in the FlightDeck

THE MAN-MACHINE COLLABORATION

