



TRACKING EYE MOVEMENTS FOR THE BENEFIT OF PILOT TRAINING

October 29, 2019

Colin Rydon, Vice President Training, Standards & Development / Head of Training – Commercial Aviation

CURRENT SITUATION



- Fleet, Traffic, Pilot, and Passenger volumes all projected to grow significantly 2018-2037
- Poor flightpath (performance) monitoring issues involved in 50-90% of accidents
- Regulations do not explicitly address pilot active monitoring skills
- Increasing instructor workload, increased autonomy levels, and pilots shifting role from flying to monitoring
- Introduction of Evidence-Based Training (EBT) to support positive behaviors and create better debriefing opportunities



EYE TRACKING TECHNOLOGY



Eye tracking is a monitoring technology that allows us to watch the faces and eyes of others, which helps us better understand their thinking.

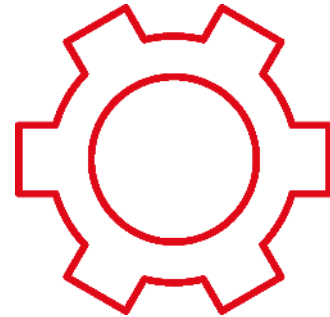


- This helps overcome gaps in traditional flight simulator training by enabling instructors in real time to directly understand:
 - pilot behaviour
 - decision-making patterns
 - scanning
 - attention levels
- This technology provides us with the data required to quickly analyse certain aspects of a pilots performance in training
- This data can be used for more than just debriefing training sessions. It's a part of a bigger set of data that will inform airlines of so much more!

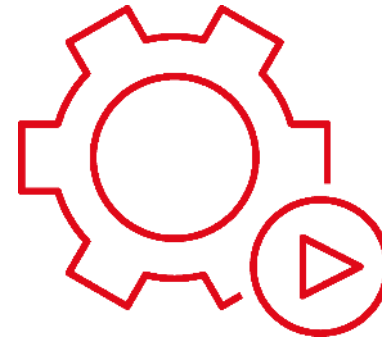
ICAO 9 COMPETENCIES



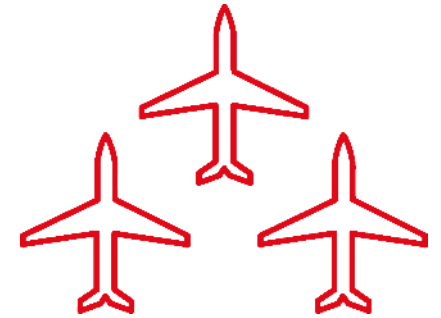
Communication



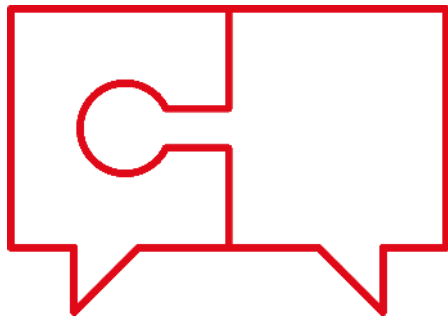
**Aircraft Flight Path Management
- Manual Control**



**Aircraft Flight Path Management
- Automation**



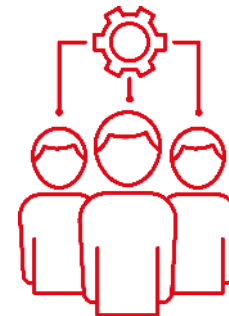
Leadership and teamwork



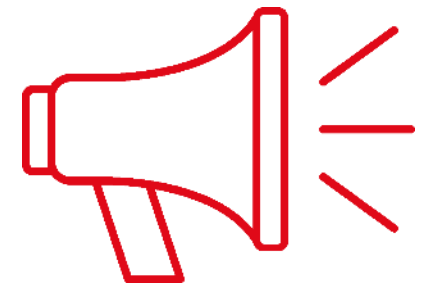
**Problem solving and decision
making**



Application of procedures



Workload management

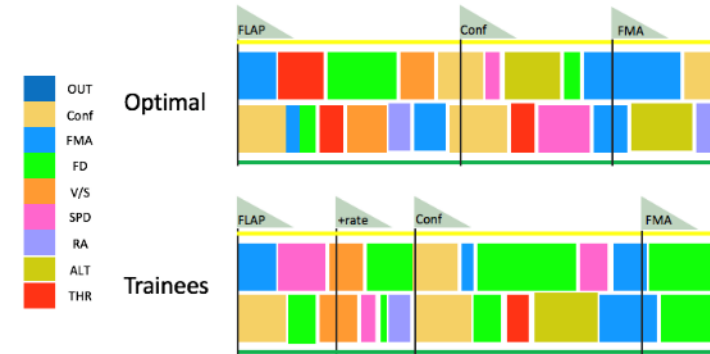


Situational Awareness

EYE TRACKING FEATURES



- **High Fidelity Tracking** – Calibrated and precision eye-gaze tracking provides reliable attention results against instruments and areas-of-interest, including through HUD/HGS.
- **Real-time Scanning View** – Instructors can identify scanning breakdowns in real-time, and annotate events for debrief.
- **Debrief Scanning Replay** – Instructors can replay scanning behaviors to pilots.
- **CandyBar™ Time Plot Tracking** – The CandyBar dashboard allows instructors to “see” how aircrew divide their attention over time and monitoring function.
- **Synchronise with Simulator Performance Data (SPD)** – Synchronise crew attention data with audio, visual, actions, and SPD/SOQA data to add context to scenarios.
- **Data Driven Training** - High-level, robust, validated algorithms enable analysis on stored data in order to search for trends and identify improvement opportunities



Example CandyBar™ multi-crew attention-time plot against customisable Areas of Interest, event markers, and time periods.

WHATS THE BIG PICTURE – BIG DATA



- L3Harris has integrated data analysis services into both aircraft avionics and pilot training
 - Providing operators and manufacturers instant insight across their operations
 - Eye tracking becomes interlinked with other data sources
 - This enables us to extend training technology to also deliver operational efficiencies as well as improve safety
- Data driven training
 - Enhanced data analysis supports the transition to evidence-based pilot training
 - Supports training teams to develop tailored training programs based on key trends and safety issues identified from the data of real flights and captured from L3Harris' simulators
- Future outlook – Single crew flying



