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Agenda:

1. Welcome and Project presentation
2. Use Case Discussion − Go Around
   − Autopilot off
   − Abnormal a/c behaviour
3. Presentation of Aircraft Atypical Approach Detection
4. Open discussion

1. Welcome and Project presentation

○ *Francois (Pilot):*

   − HARVIS should reference to how improvements have been done in the past (there was an improvement in safety brought by new automation, even if crew was reduced)
   − "Part of our job is to adapt to the machine, now it's a little bit different"
   − Adapting to AI "should not be more difficult than adapt to another human" −
   A350 is the reference as the most advanced automation available

○ *Vincent (Safety expert)*

   − If the safety is the same, you can do whatever you want (acceptable in ICAO terms)
   − Organisational safety (7 whys)

2. Use Case Discussion

   • **Go Around**

Figure 1: Questionnaire results

Can you think about situations in which the proposed Digital assistant would be a very important support for a single pilot?

📊 Mentimeter

Collecting, analysing(perfos, weather, airport suitability...) the diversion airport available in crz or before approach incase if diversion	validate decision when room for hesitation provided no contradictory message is possible	Interesting use case if it is oriented toward a non prescriptive concept for the unstabilized approach

Can you think about possible drawbacks or safety issues related to the proposed solution?

📊 Mentimeter

Depending on installation principles, consider risk of contradicting inputs with data provided by the avionics	Wrong assessment from the AI about the pilot skill and environment analysis	False alarms ? How pilots will trust the system ?

Figure 2: Comments on the use case

Discussion:

- ⦿ *Vincent (Safety expert)*
  - Redefine what is a stabilised approach: even if not stabilised.
  - If I know the pilot can land, I could decide to have the AI saying that can be done (a less prescriptive approach than the current one), also considering individual difference (the workload of the pilot, its previous performance, skills) ❼ good for money (you increase the number of landings).
  - Decide to go-around is like having a window getting smaller and smaller, taking into consideration the possible issues.

- ⦿ *Francois (Pilot)*
  - Most of the time, when we have non stabilised approach not followed by go around, 90% of the case pilots then say "we should have done go around".
  - A good situation to analyse is when you are borderline on every parameter.
  - Remember that go around is a normal procedure.
  - Remember that in simulator it will be different than in real life (in simulators they are more precise and rules are more respected).
  - A possible solution is to train the AI asking pilot after the landing/go around. – Examples of non-stabilised approach that was better than going around (e.g. fuel)
  - So, AI should know also about weather, fuel, etc...

- ⦿ *Vincent (Transavia)*
  - Airlines changing criteria for stabilised approach (they have 100ft, in others is more) -> e.g. 100 is ok in case of bird strikes, engine failures; they made studies on events, class 3, no safety issue ❼ pilot skills are important; pilot assistant,
  - The pilot should know how much the margin in case of problems (failure) is.

- ⦿ *Jean-François (Regulation)*
  - Consider the possibility of giving pilot two different contradictory information (AI vs. normal avionics) or we remove the other?

- *Adriana (Instructor)*
  - To be considered: how the information will be used by pilot and how AI failure will affect the pilot.

- *Requirements for data gathering (from trainer and safety):*
  - Flight data (you see if it was a harsh landing, in the expected part of the railway, what speed).
  - Pilots data (experience in the airport, in general).
  - Contextual data: meteorological, wind, airport conditions.
  - This could be enough for AI training, without actually asking pilot.
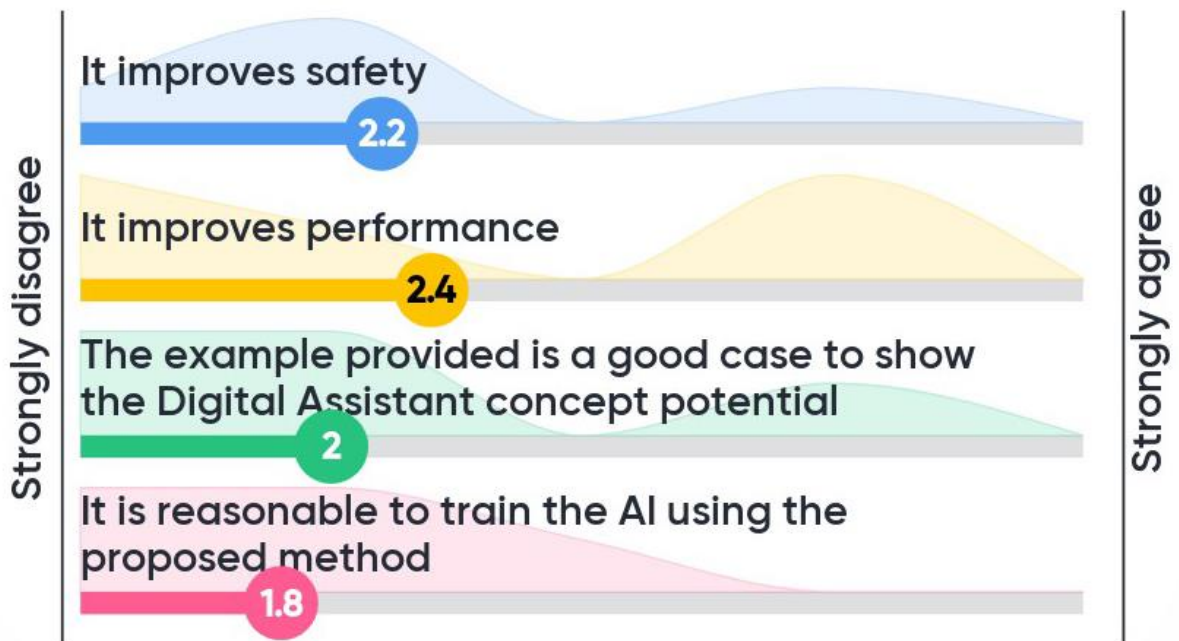
- **Autopilot off**

Figure 3: Questionnaire results

Can you think about situations in which the proposed Digital assistant would be a very important support for a single pilot?   Mentimeter

We never operate single pilot, we have no opinion on single pilot operations

Autopilot expected reliability and anticipated modern cockpit (even for light aircraft at the 2030 horizon) does not make this use case consistent with the demonstration of AI benefits.

e.g. engine fire, eye tracking may be a way to prevent discharge of extinguishing agent in the wrong engine. But, in 1(years from now, other fire fighting technologies may be available

For now, it is part of the basic pilot skills to be prepared for manual fliying

Can you think about possible drawbacks or safety issues related to the proposed solution?

Spurious information given to the pilot that can increase the complexity of the environment	Reliability of such device and adaptability to various pilot populations.

Figure 4: Comments on the use case

Discussion:

- **O** *Adriana (Instructor)*

  – Industry is working to have AP 100% available, so it will not be so relevant (maybe better for smaller A/C?). **O** *Francois (Pilot)*

  – Are basic skills, is not stressing (and now we often don't use AP during take-off and landing, to preserve our skills).
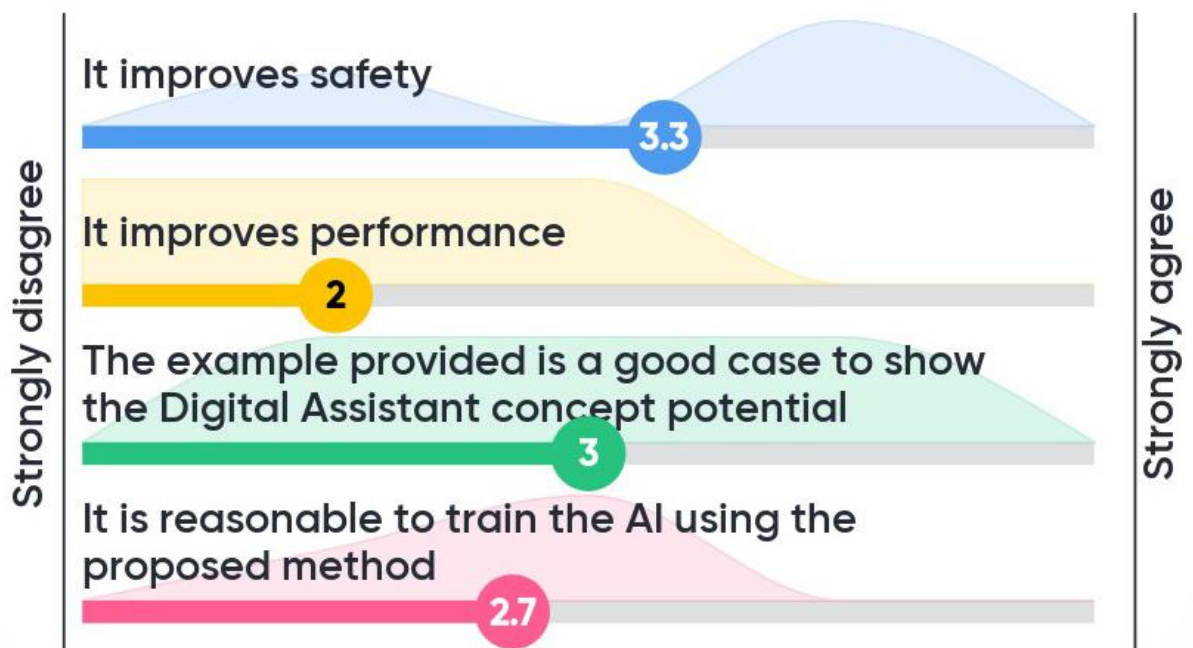
- **Abnormal a/c behaviour**

Figure 5: Questionnaire results

Can you think about situations in which the proposed Digital assistant would be a very important support for a single pilot?

All flight phases	Just change the environment.

Can you think about possible drawbacks or safety issues related to the proposed solution?

⠿ Mentimeter

| Yes, situation awarness | High precision and reliability in sensor design, and high level in redundancy design. Risk of to reduce more the situation awareness of the pilot. |

Figure 6: Comments on the use case

Discussion:

- ⊙ *Vincent (Safety expert)*
  - – Flight data + pilot info ❼ support decision making (too complex scenarios).

- ⊙ *Francois (Pilot)*
  - – When there could be ice is during landing, and we are aware.
  - – A better example is bad weather: the pilot is not avoiding -> Flying in a not known Cumulonimbus area.

- ⊙ *Vincent (Transavia)*
  - – Actually, it could happen (e.g. cumulonimbus, but in that case your SA should be high) and the AI would help
  - – The ice probe could not say that it is not working

- ⊙ *Adriana (Instructor)*
  - – Flight warning sensors are already there, we are not improving safety

- **Procedures compliance in case of system failure**
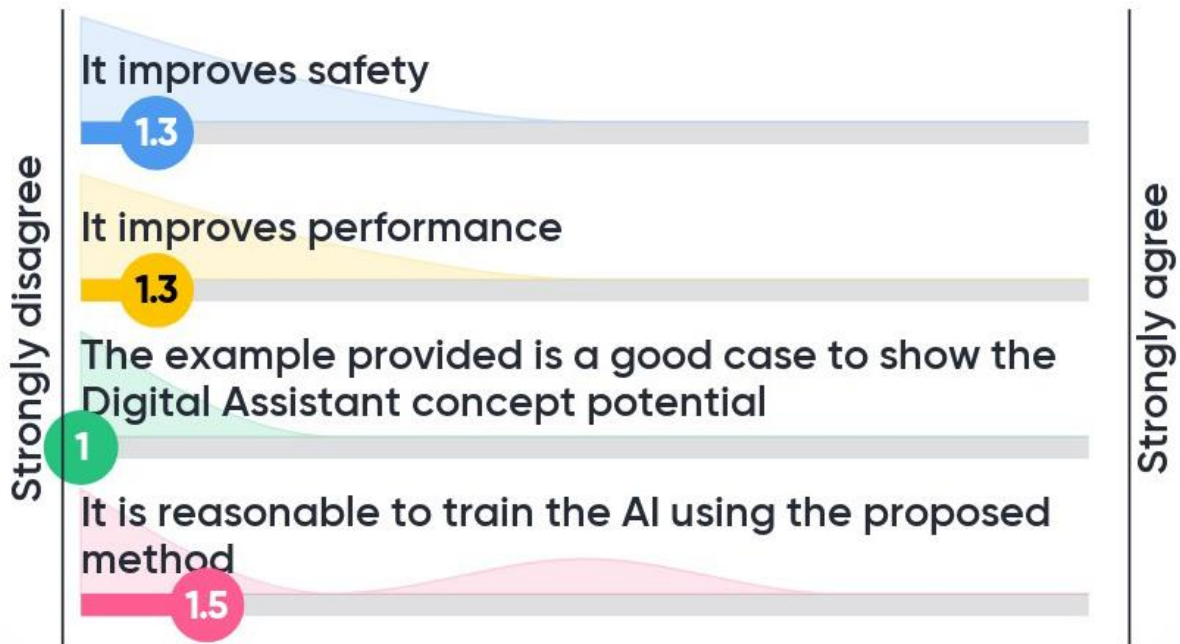
Basically covered by current or upcoming solutions

Figure 7: Questionnaire results

3. Presentation on Aircraft Atypical Approach Detection

 [Presentations are confidential]

4. Open discussion

The discussion generated 2 additional use cases:

- **Case 1:** Fançois Badiche **-> Aircraft diversion support**
  Address what's done during cruise regarding where the a/c could land if an emergency situation occurs (airport position, weather, performance, other possible failure, railway lenght).
    - When pilots are flying in Europe, where they have several fields to land, the choice is based in discussion between them and even the airliner.
    - The First Officer has to give his opinion first and the captain is the one taking the decision and convincing the F.O. of the decision.
    - When the pilots have time, they try to get the information from all the sources available.
    - Two Humans share the benefits and the risks of every option, so they can make a discussion.
    - Statual effect is kind of new in training. It assures that you take time to react in an appropriate way
    - *"I would like to have options with benefits and risks".*

- **Case 2:** Adriana **-> Anticipate ATCO clearances on arrival**
  Enhance arrival procedures. Although you load them, you know that the ATCO will give you a different one, for example, a new radar vector (so lateral) that normally is always the same one for that situation in that airport. So we could do the analysis of the operations and look for regularities (normally when they give you a shortcut you are too

high, and too much energy). This will impact in fuel consumption, comfort and foresee if you can do it.

- If a pilot goes to an airport which he/she is not familiar with, he/she could benefit from the experience of other pilots.
- Provide information that could simplify workloads.
- The consideration will be independent for every kind of aircraft.
- The PF will adapt the received information for the appropriate A/C.
- Usually controller don't care about A/C speed (or energy), so it would be very helpful to have this information in advance.
- Anticipate the instruction from the controller.
- The information should be given when you select your arrival procedure. With suggestions about on how to handle it.
- Gather all the information from many pilots landing to an airport, with different inputs like traffic, meteorological, available runways, etc.