EUROPEAN AVIATION SAFETY AGENCY
AGENCE EUROPÉENNE DE LA SÉCURITÉ AÉRIENNE
EUROPÄISCHE AGENTUR FÜR FLUGSICHERHEIT

Flight Deck Technologies

New means of pilot-system interaction, new applications and connectivity

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Introduction

Introduction [1/2]

- New technologies are making their way to the GA aircraft flight decks:
  - Touchscreens
  - Speech recognition
  - Downlink weather information
  - Telephony and Text messaging
- Some technologies are still being tried in the lab. Some others are waiting to make their way into the cockpit.
- The automotive industry sometimes seems to lead the way.

Introduction [2/2]

- New features are most often introduced with a genuine intent to improve safety.
- Improper and sometimes inadvertent use of such features however, could result in workload increase, distraction and delayed detection and response to hazards and thereby reduce safety.
- This presentation discusses some of the new features/technologies, some of their issues and concerns and how EASA works on those future applications.

Current applications

Touchscreen Technology

- Issues & Concerns
  - Touchscreens work very well with phones and tablets, but on aircraft?
  - Absence of tactile feedback.
  - Requires more concentrated effort (head-down).
  - Display characteristics.
  - Use in turbulent weather conditions.
  - Use with gloves.

Touchscreen Technology

- EASA has a Certification Review Item (CRI) available.
  - Addresses the issues associated with touchscreen technology.
  - Addresses evaluation and testing.
  - Will be issued on project applications for installation of such devices.

Speech Recognition

- Issues & Concerns
  - New systems are available on the market that recognise and subsequently perform speech commands.
  - Available in computers, phones and cars.
  - Difficulties recognizing accents.
  - Doesn't fully meet CS 23.1301(a) & (d)
    - Be of a kind and design appropriate to its intended function
    - Function properly when installed.
  - Not yet certified.

Satellite Weather Services

- Issues & Concerns
  - Providers provide “real-time” weather data downlink though satellites.
  - Concerns with timeliness and accuracy of data provided.
  - Depending on how the data is being presented, distinction from Weather Radar data and TAWS Terrain data may be a concern.
  - The use of red and amber colours not consistent with CS 23.1322

Satellite Weather Services

- CRI:
  - EASA has drafted a CRI addressing the concerns mentioned before.
  - CRI will be issued on project applications for activation of the system.

Airport Moving Map [AMM] & Charts

- Issues and Concerns:
  - Airport Moving Maps and navigation charts are more commonly displayed.
  - Concerns may arise when the aircraft's position and heading is depicted on the chart.
  - The charts and maps may lack conformity and navigation should not be predicated upon its use.
    - Example: Capturing the ILS localiser using A/C position on an approach chart.

Airport Moving Map [AMM] & Charts

- CRI:
  - The use of moving maps will be addressed in future AMC 20-25.

    (See CRD to NPA 2012-02 as published on EASA website).
  - Until publication of the AMC, a CRI may be used that reflects the content of AMC 20-25.

Telephony and Text Messaging

- Issues & Concerns:
  - Iridium services are becoming more widely available to GA operators.
  - Allows use of telephone and text messaging on board, including by pilots.
  - Raises concerns of distraction and disruption (e.g. incoming call on final approach)
  - Are the systems robust enough to be used as (primary) means to communicate with ATC?

Telephony and Text Messaging

- CRI:
  - A CRI may be raised for applications for installation of Iridium transceiver systems, if intended for use by the pilots.
  - CRI addresses aspects of Human Machine Interface (HMI) and may require limitations on its use, e.g.:
    - No use as (primary) means to communicate with ATC.
    - Prevent alerting during critical phases of flight.

Synthetic Vision

- Issues & Concerns:
  - Synthetic Vision Technology (SVT) depicting the contour of the terrain ahead has become commonplace on many aircraft equipped with advanced display systems.
  - SVT is inherently compelling, and provides many benefits, but what if..
    - The presentation is not conform with the actual terrain?
    - The artificial horizon starts to deviate from the aircrafts' attitude?

Synthetic Vision

- CRI:
  - A CRI may be raised for applications installing an SVT.
  - Addresses intended function, Human Factor (HF) concerns, display characteristics, database issues, etc.
  - Additionally seeks system design compliance with industry standards: EUROCAE ED-179 / RTCA DO-315.

Future Applications

Future Applications

- The technologies and applications discussed before are available on the market.
- Some others are still being developed, tried or tested:
  - Eye movement recognition (e.g. for fatigue detection, other functions)
  - Automatic recovery from unusual attitudes / “Get me home” systems (Lost situational awareness)

Future Applications

- Some applications evolve from combinations of, or extrapolations from others:
  - E.g. Full internet connectivity is just a small step away from telephone, text messaging & satellite weather data downlink.
  - Smartphones and 3G tablets already provide capability.

Future Applications

- Safer or less safe?
  - New features are most often introduced with a genuine intent to reduce workload ⇨ improve safety.
  - Studies on automobile driver distraction however provide a wake-up call: Cars did not become safer. Rather the contrary.
  - Results appear similar for hands-on vs. hands-free systems.
  - But is driving comparable with flying?
    - Would you check your *facebook updates* while flying?

Future Applications

- Regulate or Educate?
  - We have regulations in force, for instance CS 23.1301(a) and (d):
    - Be of a kind and design appropriate to its intended function
    - Function properly when installed.
  - Focus on intended function: Is it enough?
  - Overregulation may lead to contrarily results: Pilots use App on smartphone or tablet instead.
  - Educate? See EGAST leaflet on NAV.

    https://easa.europa.eu/essi/ehest/wp-content/uploads/2013/09/GA7.pdf

Future Applications

- EASA Experts WG (Informal):
  - A small, informal avionics, human factors expert working group has been formed to discuss these concerns/issues and answer the following questions:
    - What are the benefits of the introduction of new technologies and applications?
    - What are the risks associated with them?
    - Are there features which we should actively support because of the benefits they provide?
    - Are there features that should be discouraged because of the associated risks?

Future Applications

- WG questions (cont'd):
  - Would we be able to proactively and sensibly provide guidance on the acceptability and use of new technologies or features?
  - Could a ban on certain features have detrimental effects as pilots may bring their own devices on board?
  - Would publication of guidance support operators, industry and others? ("Educate")

Future Applications

- EASA Experts WG (Informal):
  - These working methods aren't new, or..?
    - Not necessarily. What is new however is our attempt to consider new technologies and applications <u>before</u> someone first applies for approval.
    - This may reduce the burden on the first applicants.
    - Additionally, guidance may be provided to industry and regulators sooner, to the benefit of all.

Comments, Suggestions or Questions?

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