



# VTOL - Human Factors assessment for installed systems and equipment for use by the crew

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# VTOL.2600, VTOL.2605

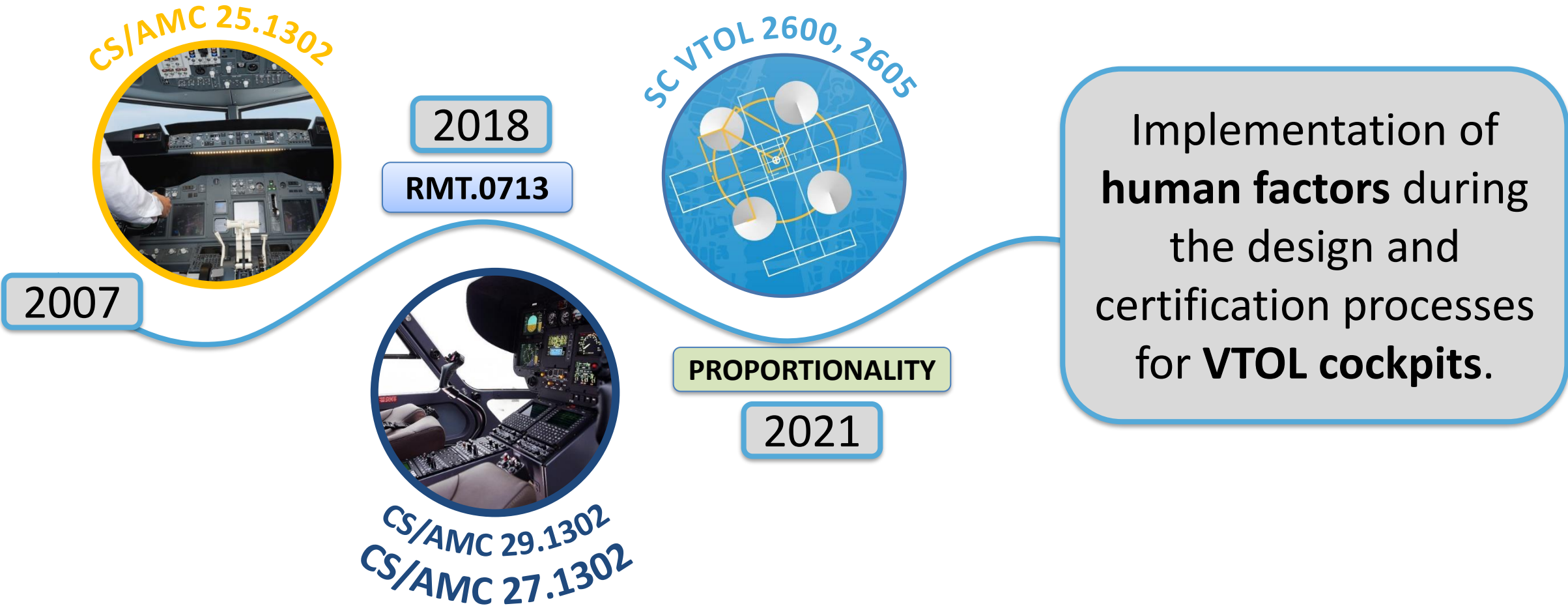
## **VTOL.2600 Flight crew compartment**

- (a) The flight crew compartment arrangement, including flight crew view, and its equipment must allow the flight crew to perform their duties within the flight envelopes of the aircraft, without excessive concentration, skill, alertness, or fatigue.
- (b) The applicant must install flight, navigation, surveillance, and lift/thrust system installation controls and displays so that a qualified flight crew can monitor and perform defined tasks associated with the intended functions of systems and equipment. The system and equipment design must account for flight crew errors, which could result in additional hazards.
- (c) For Category Enhanced, the flight crew interface design must allow for continued safe flight and landing after the loss of vision through any one of the windshield panels.

## **VTOL.2605 Installation and operation information**

- (a) Each item of installed equipment related to the flight crew interface must be labelled, if applicable, as for its identification, function, or operating limitations, or any combination of these factors.
- (b) There must be a discernible means of providing system operating parameters required to operate the aircraft including warnings, cautions, and normal indications, to the responsible crew member.
- (c) Information concerning an unsafe system operating condition must be provided in a timely manner to the crew member responsible for taking corrective action. The information must be clear enough to avoid likely crew member errors.
- (d) Information related to safety equipment must be easily identifiable and its method of operation must be clearly marked.

# Introduction



# VTOL - Human Factors assessment

1. CS 27.1302
2. AMC 27.1302
  - a) Why Human Factors findings?
  - b) Human Factors Methodology
  - c) Key aspects and best practices
3. VTOL Proportionality



# 1. CS 27.1302



## CS 27.1302 Installed systems and equipment for use by the crew

(See AMC 27.1302, GM No 1 and No 2 to 27.1302)

This point applies to installed equipment intended for use by crew members in the operation of the rotorcraft from their normal seating positions in the cockpit or operating positions in the cabin. This installed equipment must be shown, individually and in combination with other such equipment, to be designed so that trained crew members can safely perform their tasks associated with the intended function of the equipment by meeting the following requirements:

- (a) All the controls and information necessary to accomplish these tasks must be provided;
- (b) All the controls and information required by paragraph (a), which are intended for use by the crew, must:
  - (1) be presented in a clear and unambiguous form, at a resolution and with a precision appropriate to the task;
  - (2) be accessible and usable by the crew in a manner consistent with the urgency, frequency, and duration of their tasks; and
  - (3) make the crew aware of the effects that their actions may have on the rotorcraft or systems, if they need awareness for safe operation.
- (c) Operationally relevant behaviour of the installed equipment must be:
  - (1) predictable and unambiguous; and
  - (2) designed to enable the crew to intervene in a manner appropriate to accomplish the task.
- (d) Installed equipment must enable the crew to manage the errors resulting from the kinds of crew interactions with the equipment that can be reasonably expected in service, assuming the crew is acting in good faith. Paragraph (d) does not apply to skill-related errors associated with the manual control of the rotorcraft.

CS 27.1302

REDUCE DESIGN  
CONTRIBUTION TO HUMAN  
ERROR

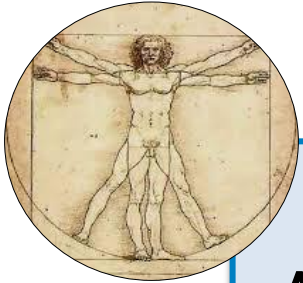
SUPPORT ERROR  
MANAGEMENT

IMPROVEMENT OF HUMAN MACHINE INTERFACE

# VTOL - Human Factors assessment

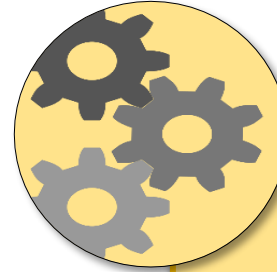
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## 2. AMC 27.1302: Two categories of human factors issues



### PHYSICAL ERGONOMICS & ANTHROPOMETRIC CRITERIA

- Criteria for controls so that they are located, designed and arranged in the right way.
- External view



### COGNITIVE ERGONOMICS

- Workload issue
- Usability issue
- Error management

# VTOL - Human Factors assessment

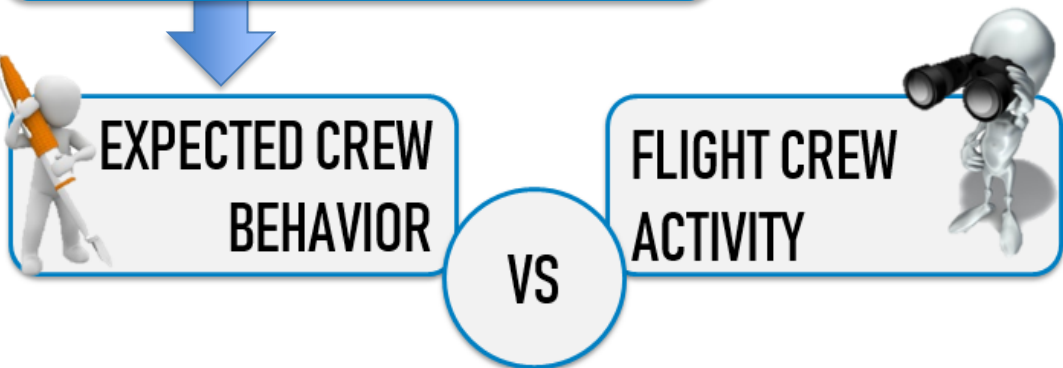
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# 2.a. Why Human Factors findings?

## FLIGHT DECK DESIGN

THEORETICAL TASK MODEL



DEVIATIONS



HUMAN FACTORS FINDINGS

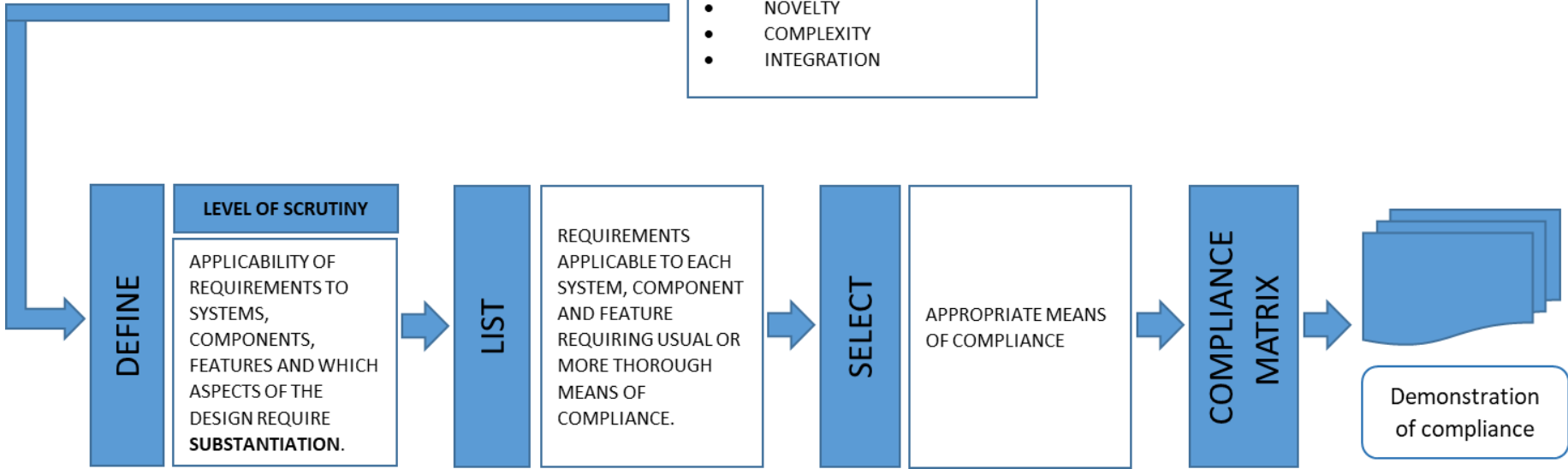
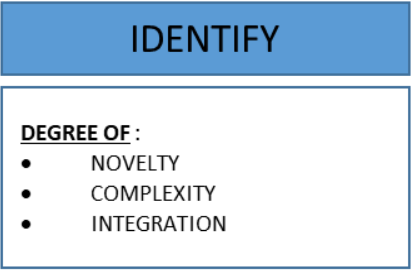
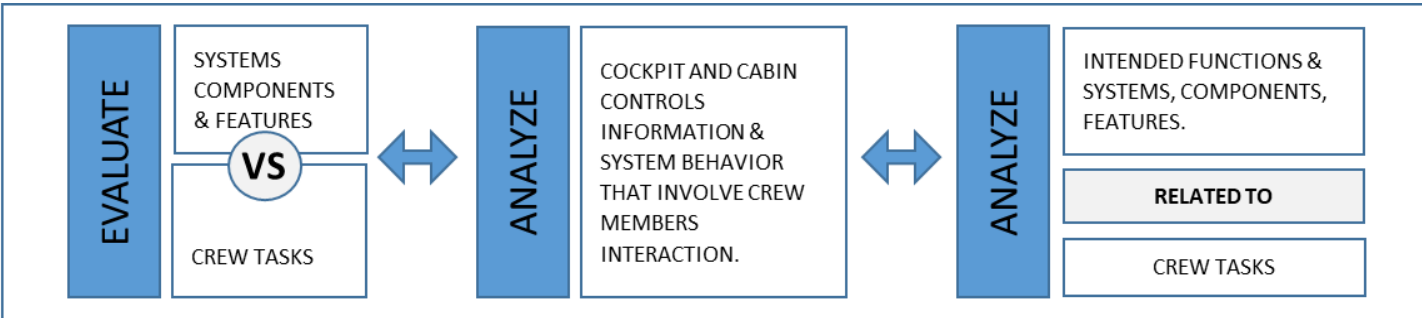
MITIGATIONS

- Re-design
- Training
- Procedure

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# 2.b. Human Factors Methodology



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# 2.c. Key aspects and best practices!



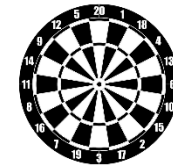
Iterative process



Early involvement



Focus on usability matters



Scenario based approach



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Maximum  
Passenger  
Seating  
Configuration

# 3. PROPORTIONALITY

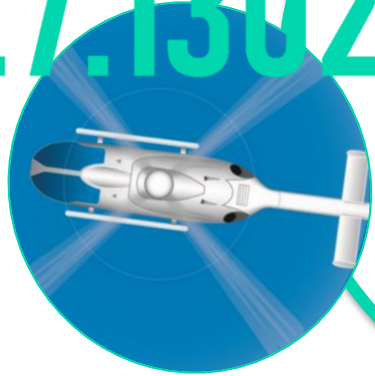
Category Enhanced	-	Applicants for a VTOL aircraft should follow all the material.
Category Basic	7 to 9 passengers	Applicants for a VTOL aircraft should follow all the material.
	2 to 6 passengers	Applicants for a VTOL aircraft: <ul style="list-style-type: none"> <li>i. are not required to develop a dedicated <b>HFs test programme</b> and</li> <li>ii. Are allowed to <b>apply individual tests</b> to confirm that the design assumptions are valid.</li> </ul>
	0 to 1 passenger	Applicants for a VTOL aircraft: <ul style="list-style-type: none"> <li>iii. are not required to develop a dedicated <b>HFs test programme</b> and</li> <li>i. are allowed to <b>apply individual tests</b> to confirm that the design assumptions are valid and</li> <li>ii. are allowed to <b>use a single crew member</b> to demonstrate the HFs scenario based assessments.</li> </ul>

**CS/AMC 27.1302**

**Proportionality**

# Status of the activity / Next step

27.1302



## Delivery:

Final version of the CS27.1302 planned for 2021 Q1.

VTOL



## MoC:

First draft ready including provisions of this presentation.



# Thank you for your attention

Feel free to submit your questions on our live event platform....

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