

# **AECS REGULATION**

## **POST-CRASH CHECK WITH HMI METHOD**

# 01

## Context

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- **Homologation time to be consider for one new function**
  - Part I – AECD (~4 weeks)
  - Part II – AECD installation (~2 days or more)

→ **OEM aim to build harmonized and optimized testing plans**

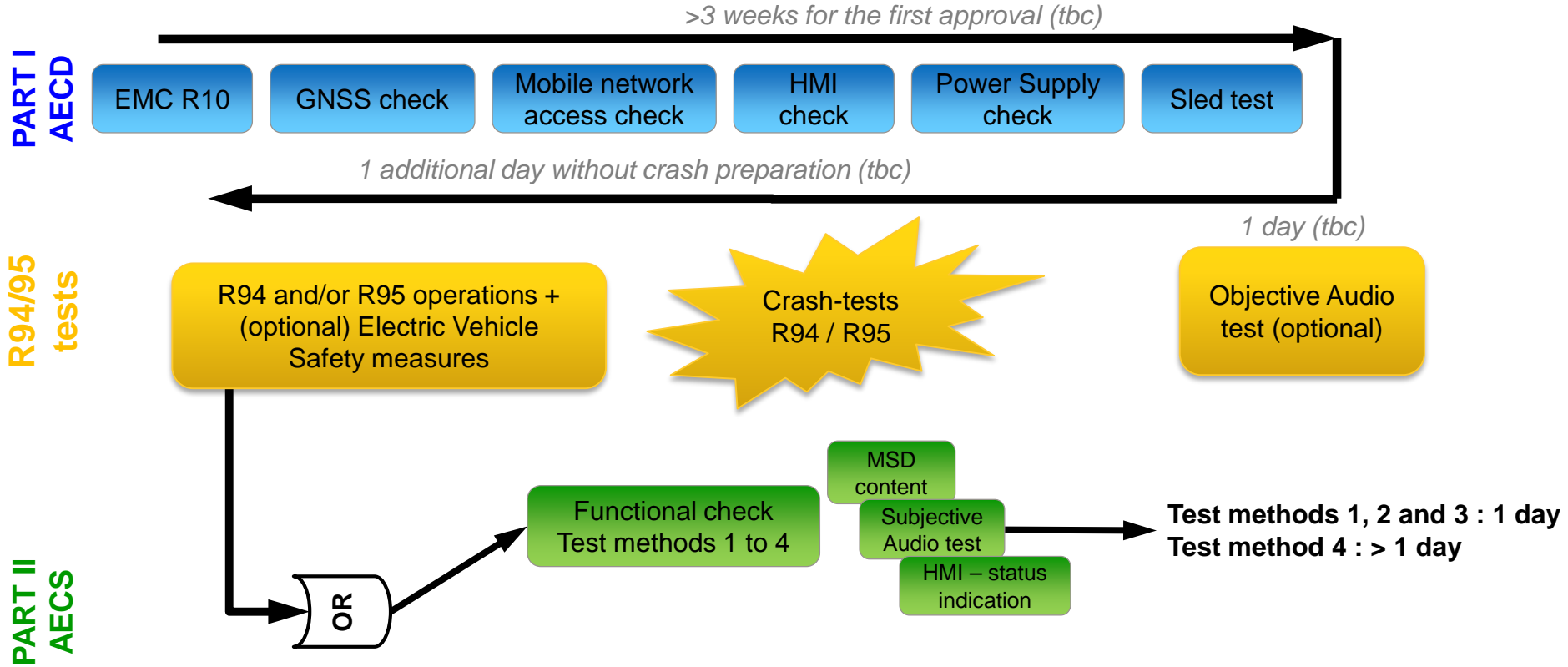
- **It exists currently 4 test methods** using the over-the-air transmission for the MSD and voice call via a real or simulated PLMN and GNSS networks, or using the wired method.
- **These test methods will interfere with R94/R95 homologation procedures because focused after each crash test**
- **It exists other approval protocols already used by technical services which uses vehicle HMI (e.g. EMC)**

# Constraints

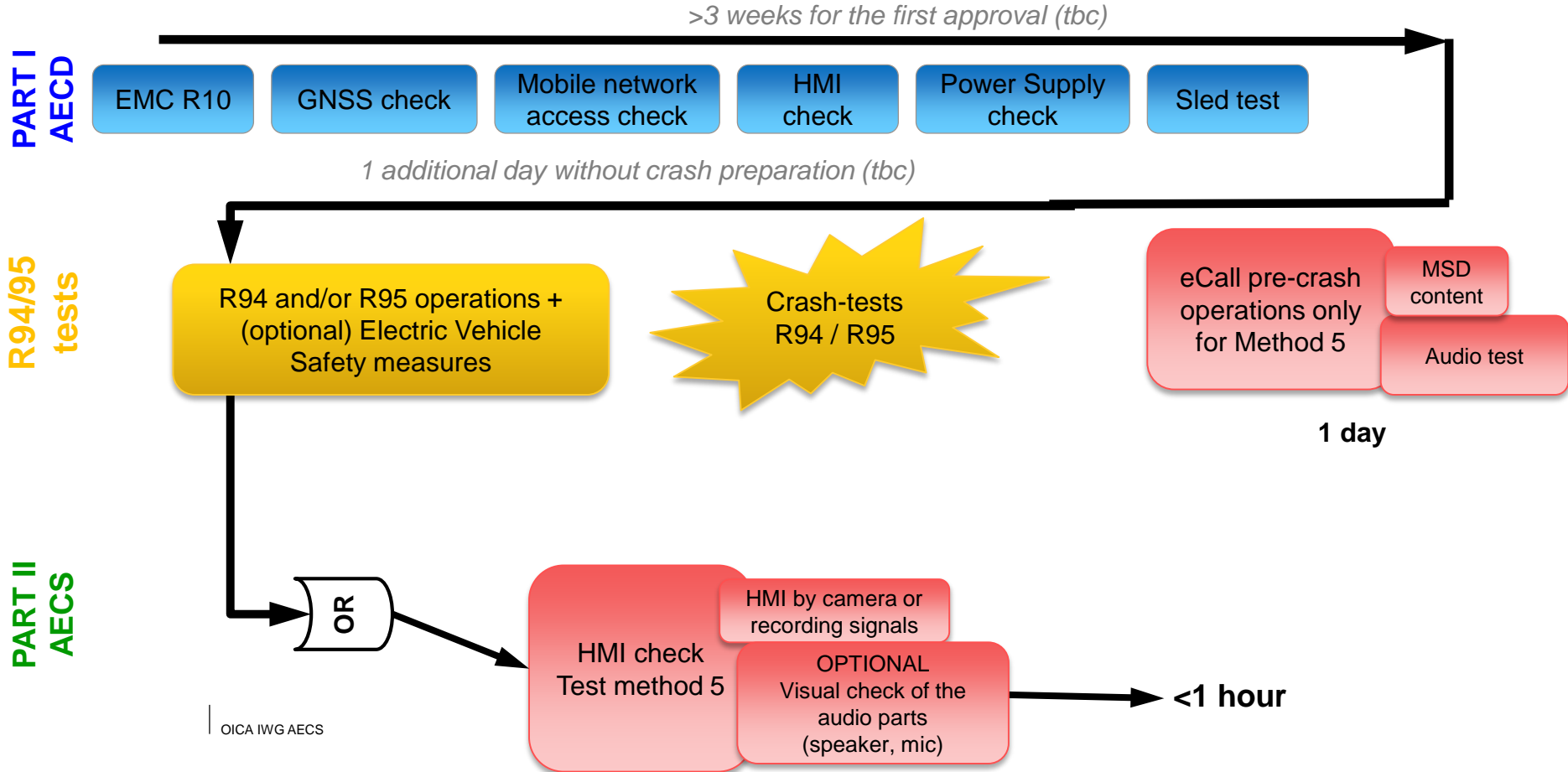
- **For methods 1 to 4, AECS post-crash approval is included within the R94/R95 protocol (after each crash test)**
- **Specificities of Electrical Vehicle which increase the verification time after crash (~30 minutes)**
- **Need a network coverage within crash facilities or a specific location to conduct the post-crash tests after the moving of the crashed car**

**Take into account the AECD power supply autonomy in the above cases (e.g. Back-up battery)**

# AECD/AECS test phases for test methods 1 to 4



# AECD/AECS test phases for test method 5 : HMI check



# Synthesis

- **Benefits**

- The main operations are now pre-crash, and can be done without time constraints just before the R94 or R95 homologation, and outside the crash area.
- Very fast post-crash check through video camera, or electrical signals recording, by checking a HMI's sequence.

- **Drawback**

- Need to have an extended self-test strategy within AECD/AECS

# 02

## HMI check procedure proposal

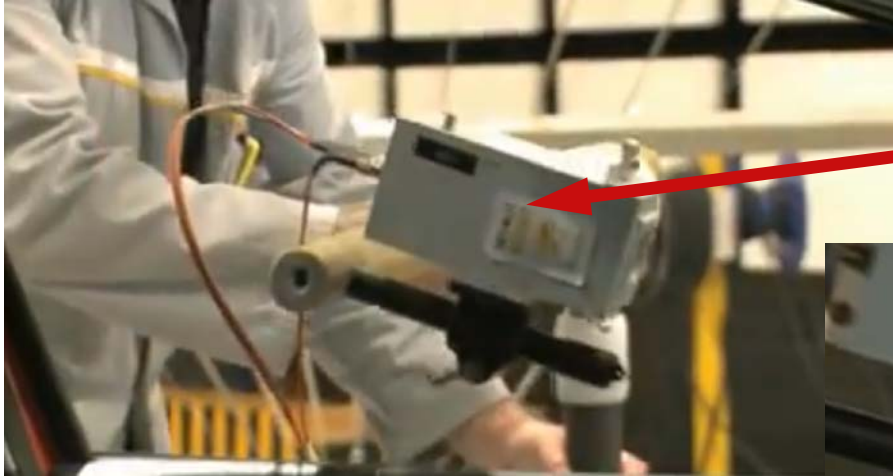


# Requirements

**HMI check / Test method 5 can be only used if the in-vehicle AECD/AECS is capable :**

- 1-** to check and diagnose the electrical connections between all of the following devices :
  - AECD control module
  - PLMN communication module + antenna
  - GNSS receiver + antenna
  - Power source (from vehicle or back-up source)
  - Warning/Information device (HMI)
  - Hand free audio equipment (microphone, speaker)
  
- 2-** to discriminate a network failure from an internal failure of the AECD Unit, the communication with GNSS and mobile networks and PSAP is deemed to be compliant if no internal failure warning is indicated by the vehicle HMI.

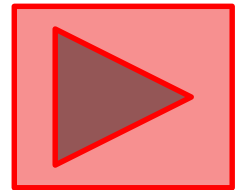
# Pre-crash procedure



**Cameras which records the Dashboard (tell-tales) during EMC tests**



# Pre-crash procedure



# Pre-crash procedure

These operations are to be done before the R94 (frontal) and/or the R95 (Lateral) crash tests :

1- Functional check by test methods 1 to 4 following a manual call :  
- Conformity of the content of the MSD (location, time stamp, vehicle identification)

- Hands-free voice communication assessment.

For this specific procedure, the possibility to use the subjective voice intelligibility test method should be allowed, as in European eCall with the rated performance at least “3” (*appendix 3 to Annex 9*), the objective test could also be chosen at the demand of applicant.

2- *Installation in the vehicle of the video camera needed to check all HMI involved during an emergency call, or a recorder for all HMI signals.*

## Post-crash procedure : HMI check

**After the R94 or R95 crash, the technical service will check the recording of the video camera or the recorded HMI signals, to verify if the HMI sequence defined by the manufacturer is conform.**

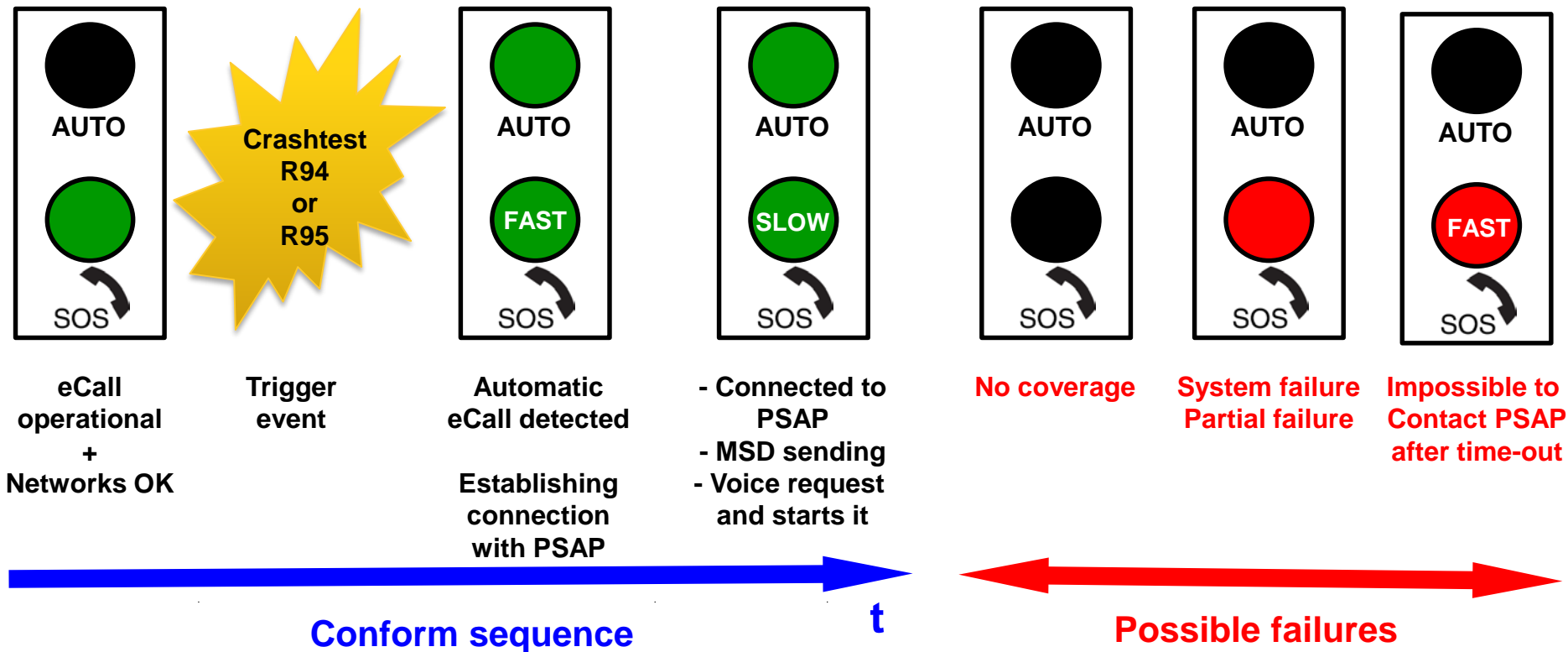
**[optional]**

**A visual check could be done to verify the damage on the audio parts (loud-speaker and the microphone).**

# Post-crash procedure : HMI check

# EXAMPLE

Example of a sequence of HMI during a crash test, and possible failures.



# 03

## Visual inspection of audio parts

# Post-crash procedure : Visual inspection of audio parts

## **STATEMENT :**

From point of view of functioning principle, a microphone and a loud-speaker are based on the same electrical, mechanical and physical principles.

## **EXPERIMENT :**

What is the behaviour of a loud-speaker in function of its mechanical damage ?



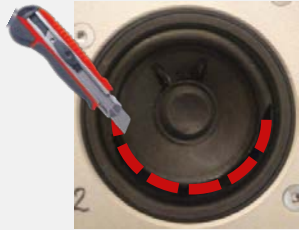
**Let's listen and compare the effects of different damages on a loud-speaker**



# Post-crash procedure : Visual inspection of audio parts



**Loud Speaker 1**  
in good condition



**Loud Speaker 2**  
half of the membran  
is cutted



**Loud Speaker 3**  
membran and frame  
are cutted in 2 locations

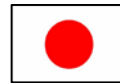
## Tests sentences from ITU website



Male



Female



# Post-crash procedure : Visual inspection of audio parts

**What is your opinion regarding the intelligibility of these different sentences in several language ?**

- Have you had some trouble to understand the sentence in your native language ? For each damaged loud-speaker ?
- Only a « severe mechanical damage » of the loud speaker or the microphone, or the impossibility to visually check these parts, could lead a complementary audio subjectif test, at the demand of technical service.