



European UAS Certification Overview and Methodology



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Outline

1. 3 Risk-based Categories of Operations: Open, Specific, Certified
2. Declaration of Conformity in Open Category
3. Design Verification in Specific Category
4. Type Certification in Certified Category

Legal basis and competences

- Regulation (EU) 1139/2018 extended the EU competences to all UAS:
 - European Union Aviation Safety Agency (**EASA**) carries out on behalf of Member States (MS) the **functions and tasks of the state of design for all UAS** (Type Certificate – TC and Design Verification Report – DVR)
 - National Aviation Authorities (**NAA**s) of States of EU issue individual Certificate of Airworthiness (**CofA**) for UAS (**when required**) in compliance with TC, **operational authorisations** to UAS operators, certificates to Remote Pilots, as required
 - **Only civil drones** but possibility to **opt-in for state aircraft**



The EU «performance-based» framework

EU Legislator

- Define political objectives related to safety, security, privacy and environmental protection

European Commission (EC) supported by EASA

- **Performance-based requirements** set safety objectives including definition of processes, responsibilities and privileges

Standard Development Organisations (SDOs)

- **Industry standards** = methods to achieve the safety objectives

3 risk-based categories



OPEN

Low risk

No involvement of NAA

Limitations: VLOS, Max height 120 m, far from aerodromes and sensitive areas.

Allowed to fly near people



SPECIFIC

Medium risk

Operational authorisation required...or declaration

Design and operational requirements based on risk analysis (SORA)



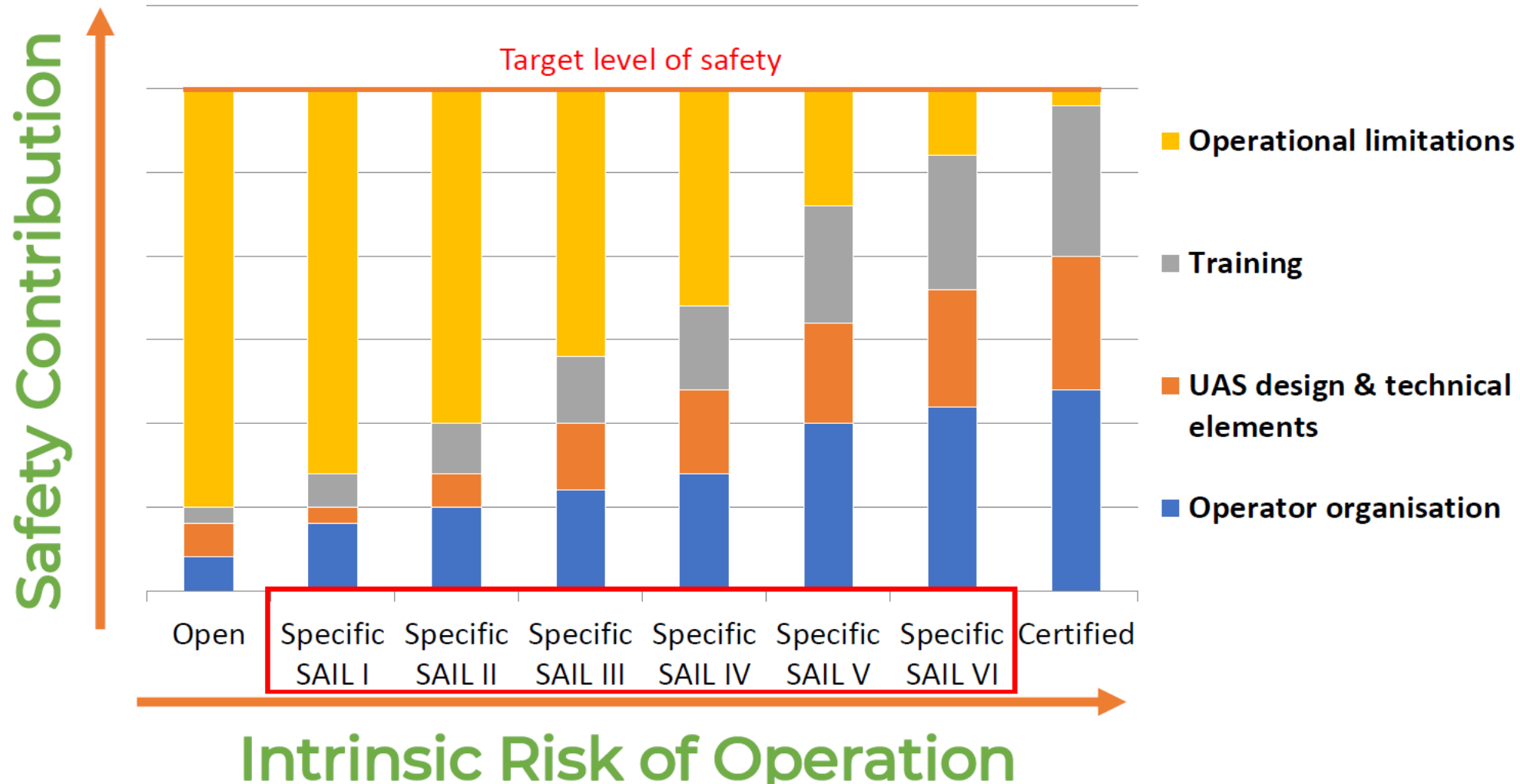
CERTIFIED

High risk

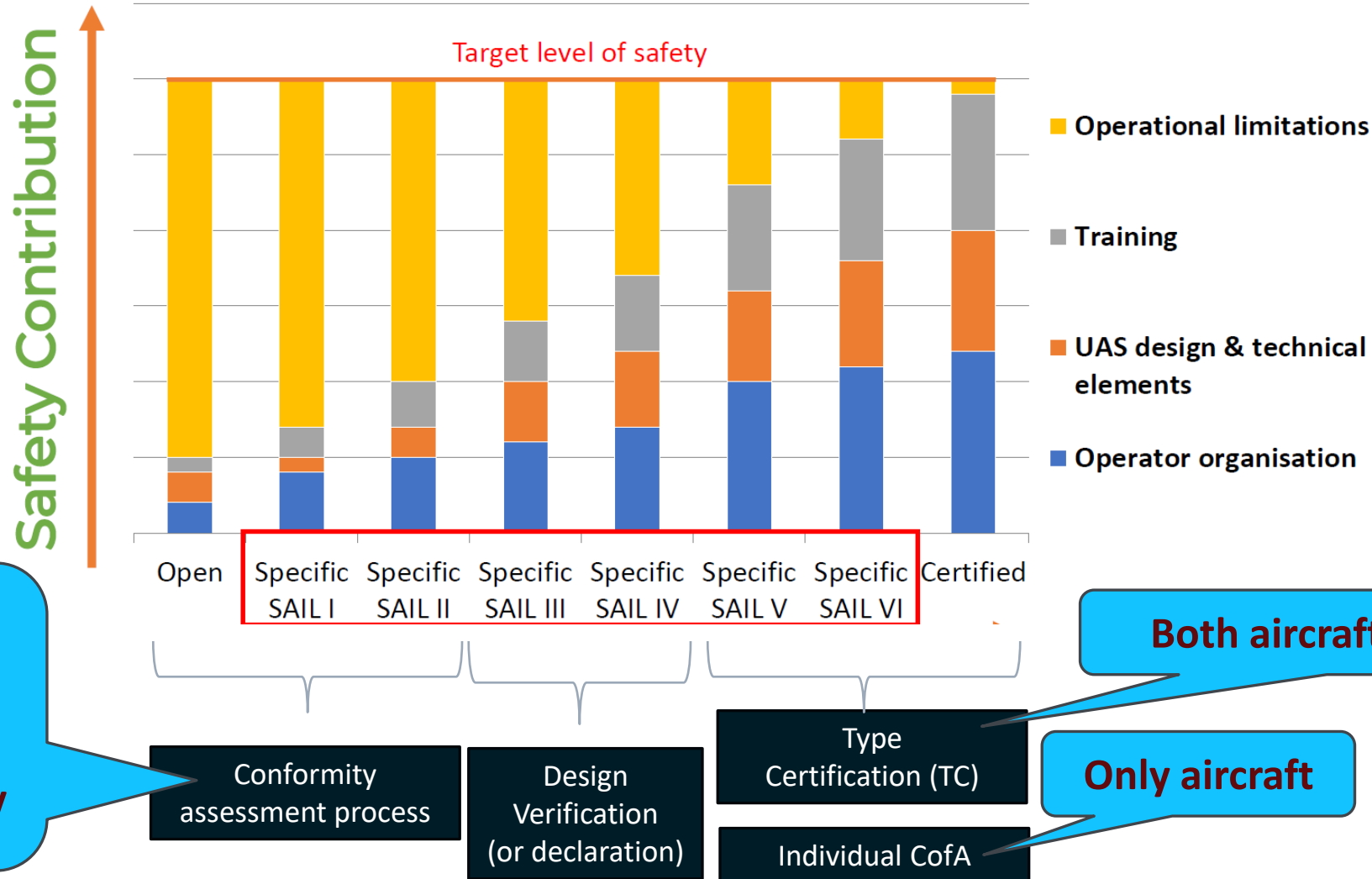
Similar to manned aviation

Type certificate
Operator Certificate
Pilot license

Risk-based approach



Risk-based initial airworthiness



Conformity assessment process

Conformity assessment: legal basis

Regulation 1139/2018 (EASA New Basic Regulation)

For some types of UA (Unmanned Aircraft), application of provisions on registration, certification, identification, oversight and enforcement, as well as of provisions regarding **EASA is not necessary** to reach adequate levels of safety

Market surveillance mechanisms provided by Union product harmonisation legislation should be made applicable to those cases

EU Product safety regulation

- Impose a **minimum set of essential safety requirements** on the products
- Regulates the placing on the market
- **Concerns manufacturers, importers, vendors, etc.**
- **Does not concern operators**
- **Compliance through market surveillance authorities**
- Compliance proved by the manufacturer/importer
- Based on harmonized standards
- **Impose instructions**
- Allows the use of CE marking

i.e. through mandatory industry standards defining methods to comply with regulatory requirements

**Manufacturers
anywhere in the world**

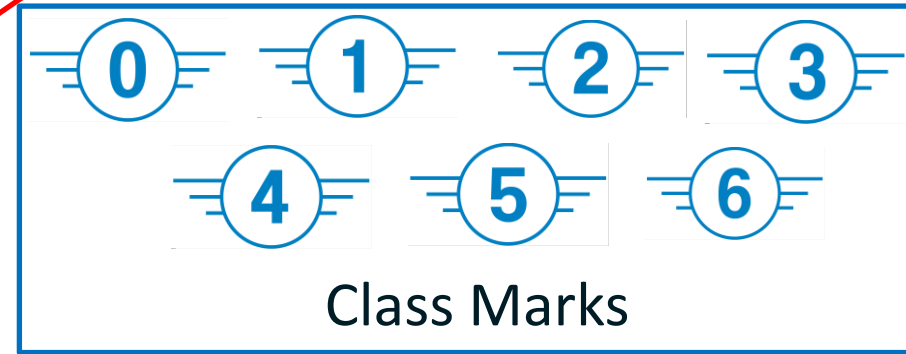
E.g. Leaflet with “do’s” and “don’t” in the box

CE mark and Class mark



Applicable EU directives:

- Electrical Safety;
- Electro-magnetic compatibility (EMC);
- Hazardous substances (RoHS);
- Etc.



Regulation (EU) 2019/945
(Relevant parts)

Market Regulation

Compliance with Class mark Requirements

| | Open | | | | | Specific | | Remote id module |
|---|------|-------------|-------------|-------------|---|--|--|------------------|
| Class | 0 | 1 | 2 | 3 | 4 | 5 | 6 | // |
| Module A Self-declaration by manufacturer | ✓ | Not allowed | Not allowed | Not allowed | ✓ | ✓ Declaration to be provided to the MSA | ✓ Declaration to be provided to the MSA | ✓ |
| Module B+C third party verification of the design + declaration for production | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Module H third party verification of the quality system of the manufacturer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Drones with a Class mark

Number of drone models with class label available on the EU market ([EASA website](#) consulted 20240915):

- 3 C0 drones
- 2 C1 drones
- 3 C2 drones
- 4 C3 drones
- 9 C5 drones
- 4 C6 drones

25

| CLASS | DESIGNED BY | TYPE CATEGORY | MODEL | COMMERCIAL NAME | LOW SPEED MODE | NOISE LEVEL (db) |
|-------|----------------------|---------------|---------------------------------|-----------------|----------------|------------------|
| C2 | DJI | Multi-rotor | M3E-EU | DJI MAVIC 3E EU | Yes | 82 |
| | | | M3T-EU | DJI MAVIC 3T EU | | |
| | | | M3M-EU | DJI MAVIC 3M EU | | |
| C2 | AgEagle | Fixed-wing | SENSEFLY EBEE X | Sensefly eBee | No | N/A |
| | | | SENSEFLY EBEE GEO | | | |
| | | | SENSEFLY EBEE AG | | | |
| | | | SENSEFLY EBEE TAC PUBLIC SAFETY | | | |
| C3 | Quantum-Systems GmbH | Fixed-wing | R10 | Trinity F90+ | N/A | N/A |
| C3 | DJI | Multi-rotor | M350 RTK | Matrice 350 RTK | N/A | 97 |
| C3 | Wingtra | Fixed-wing | Wingtraone Gen II | WingtraOne | N/A | N/A |
| C5 | Objectifdrone | Multi-rotor | CHRONOS | Chronos | N/A | 109 |
| C5 | Objectifdrone | Multi-rotor | CHRONOS MINI+ | Chronos Mini+ | N/A | 104 |
| C5 | Aerobotic | Multi-rotor | Agry X | Agry X | N/A | 83 |
| C5 | Aerobotic | Multi-rotor | Spray - L | Spray - L | N/A | 78 |

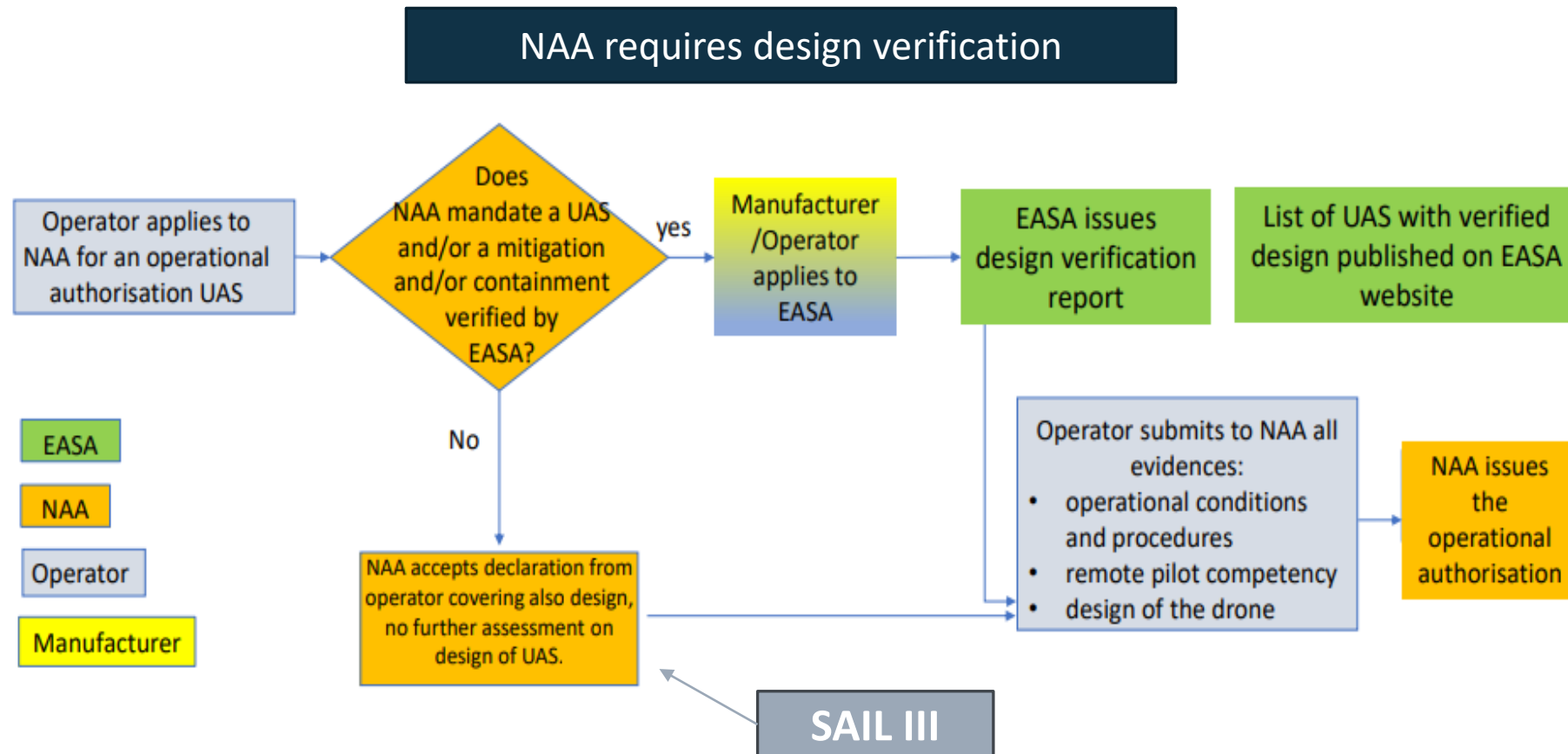
Design Verification process

Design Verification highlights

- Process **lighter** than TC or RTC
- Maximum **1 year time**
- Could be limited to **specific systems** necessary to implement mitigations (e.g. FTS or parachute)
- Organisational measures (design process, configuration control, etc.) may be checked during the process → but **Desing Organisation Approval (DOA) or AP-DOA not required**
- **Special Condition Light-UAS** contains the main set of technical requirements to comply with

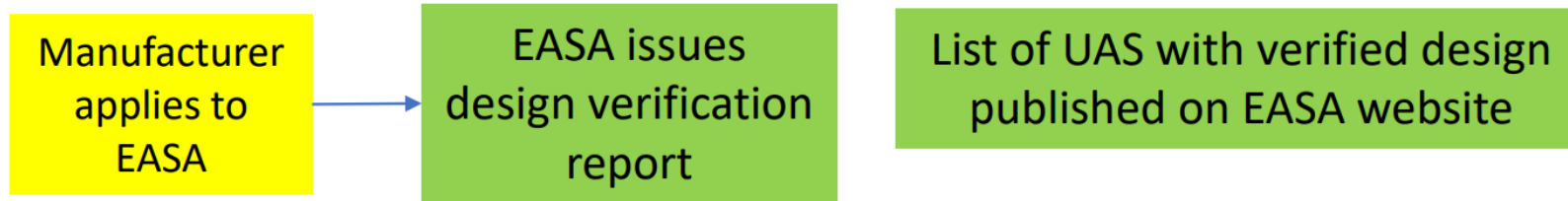


Design Verification Process (1)



Design Verification Process (2)

Manufacturer voluntary applies for design verification



Design Verification Basis

- Design Verification Basis is built starting from **Special Condition Light-UAS** (Medium Risk)
- For each element of the design verification basis applicant needs to provide a **Means of Compliance (MoC)**
- MoC might be based on **traditional means** (as analysis, lab test etc..) or on **extensive functional tests**
- EASA **might witness** parts of the tests, perform design inspections and compliance reviews
- Verification **scope** set to ensure **consistency with the Concept of Operations (CONOPS)** and related safety considerations (UAS design, containment performance, integrity of mitigation means, ...)

Means of Compliance

- Existing technical specifications or **industry standards** or their relevant sections

SHEPHERD project:

<https://www.easa.europa.eu/en/research-projects/shepherd-uas-standards>

- New Means of Compliance (MoC) if no adequate specifications / standards can be identified.
- Extensive product tests complemented by design criteria, depending on the safety objectives and the operational risk.

For verification of products based on COTS with limited evidence of development standards

Design Verification Report

- Design Verification Report is not a type certificate – **recognition only inside EASA Member States**
- Design verification report can be **shared** by the holder
- Verified designs can be used by any operator in EASA Member States and, if the UAS is operated within the conditions defined, no additional EASA involvement is needed
- **No privilege to implement design changes**

The screenshot shows the EASA Pro website interface. The top navigation bar includes the EASA logo, 'EASA Pro' dropdown, a search bar, and 'Login' and 'Register' buttons. The main menu has links for Home, The Agency, Newsroom & Events, Domains, Regulations, and Document Library. The 'Domains' section is active, showing a list of design verification reports for UAS. The table below lists two reports:

| Holder | SAIL | Max population density | Arc | other |
|--------------|------|-------------------------|-----|-------|
| Arionics inc | III | Sparsely populated area | B | |
| Helts gmbh | IV | Populated area | C | |

Type certification

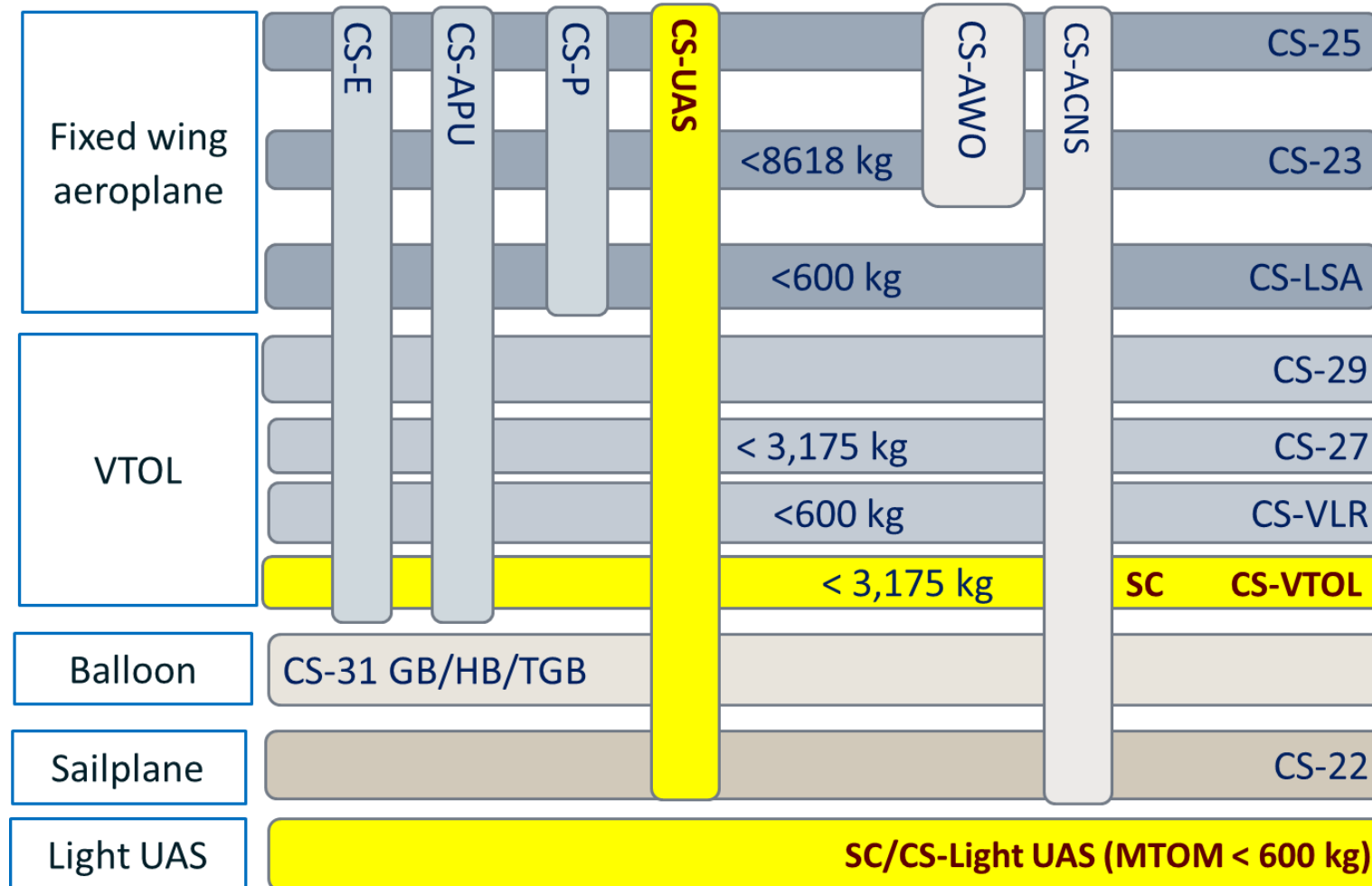
Type-Certification procedures

- Part 21 applies (21A.14): Demonstration of Capability
 - Normal approach (Design Organisation Approval/Production Organisation Approval, Part M)
 - Deviation from Essential Requirements must be compensated for by operational restrictions
 - **Use of Special Conditions (e.g. Special Conditions Light UAS – High Risk)**
 - **Leads to (full) Type Certificate (TC) or Restricted TC** and Certificate of airworthiness or restricted Certificate of Airworthiness (CofA)
- **Alternative Approach (AP-DOA)**
 - Allowed under 1139/2018 Article 15(1)
 - **Possibility for AP-DOA for “non-complex” UAS**

Cerification basis: UAS Policy E.Y013-01

- Objectives
 - To facilitate UAS applications by establishing general principles for type-certification
 - Provides **Guidance to Part 21 Sub-part B**
 - To ensure the Level of safety/environmental protection remains at least **equivalent to comparable manned aircraft**
- Policy Scope
 - Neither military nor state a/c (Article 2.3 1139)
 - Neither research nor experimental a/c (Annex I (1b))
 - Not ex-military (Annex I (1d))
 - when TC applicable
 - No Detect and Avoid

Building Certification Basis for UAS



Who is developing the standards?



EUROCAE **WG 105** mainly focusing on standards at equipment level



MOPS for C2 link (terrestrial), Detect and Avoid and air-to-air radar available



TC 20/SC 16 is producing several standards ... including UTM
<https://www.iso.org/committee/5336224.html>



Standards applicable to small UAS in Committee F38



Standards for small UAS (< 25 kg) in D5 WG 8



Questions



Thank you.