



Webinar

Design Verification and update of EASA activities

EASA Drones team

16 April 2021

Your safety is our mission.

Agenda

- Experimental flights of drones
- Design verification of UAS operated in the specific category
- Update on the EASA activities and on AMC/GM on Regulation 2019/947
- Events planned for 2021

Experimental flights of drones

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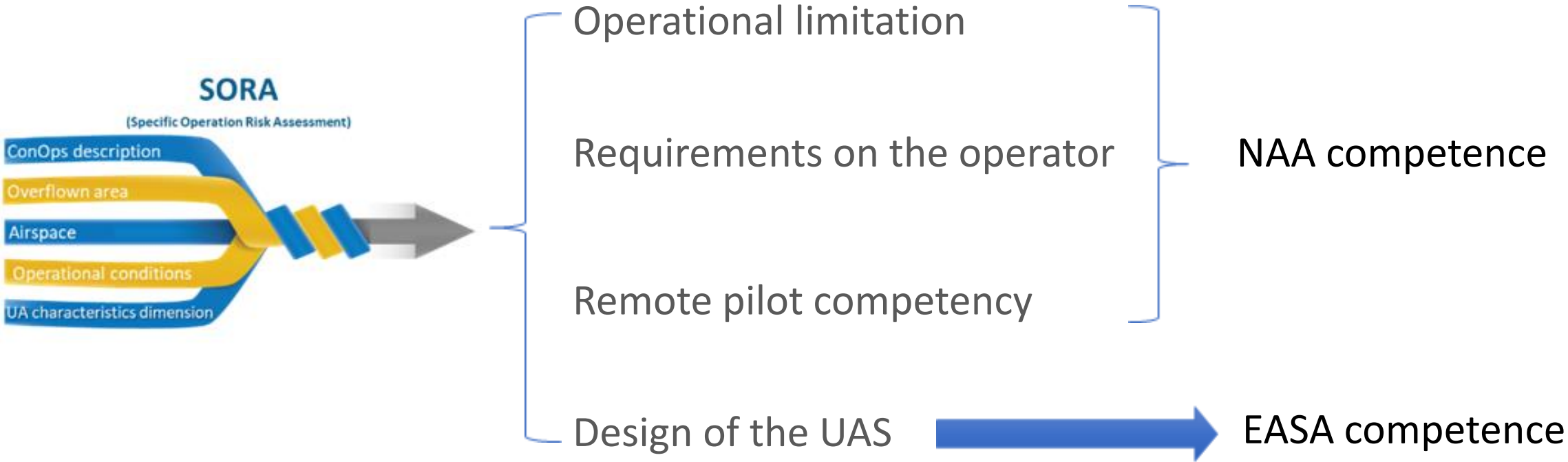
Regulation (EU) 2018/1139

EASA's Mandate

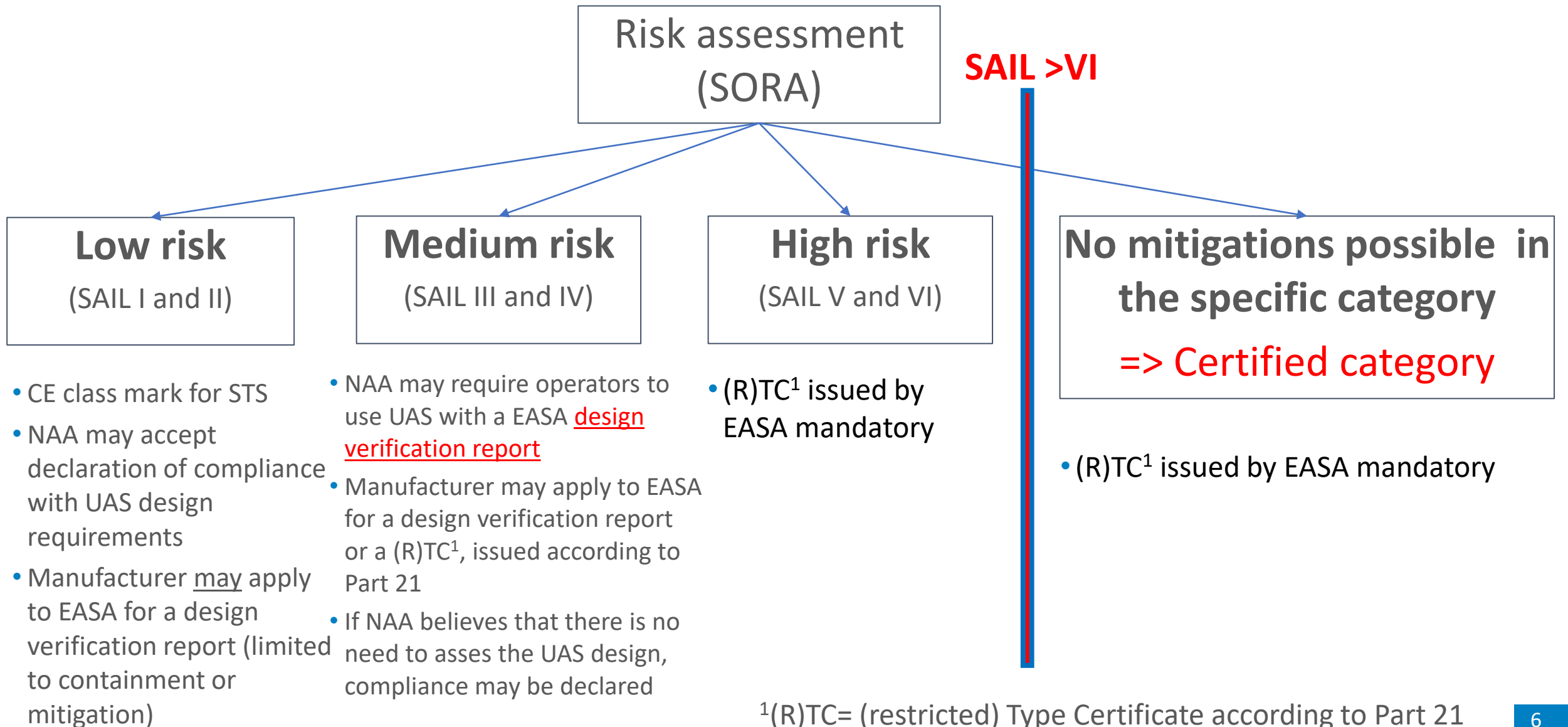
ARTICLE 77 – AIRWORTHINESS AND ENVIRONMENTAL CERTIFICATION

*With regard to the products, parts, non-installed equipment and equipment to control unmanned aircraft remotely, referred to in points (a) and (b)(i) of Article 2(1), **the Agency shall carry out on behalf of Member States the functions and tasks of the state of design, manufacture or registry**, when those functions and tasks are related to design certification and mandatory continuing airworthiness information.*

Operational authorisation in the specific category



Verification of the design of the UAS



UAS designed for research, experimental or scientific purposes

Regulation (EU) 2018/1139

ARTICLE 2(3)

This Regulation shall not apply to:

(d) the design, production, maintenance and operation of aircraft the operation of which involves low risk for aviation safety, as listed in Annex I,....

Annex I only applicable to manned aircraft



EU regulation applies to UAS specifically designed or modified for research, experimental or scientific purposes

Demo/test flights of UAS w/ or w/o passengers

- According to the EASA BR, EASA is the EU competent authority for the verification of the design of all UAS, including those *designed for research, experimental or scientific purposes*
- Also operations with UAS designed for research, experimental or scientific purposes shall follow Regulation (EU) 2019/947
 - in relation to the verification of design, following a risk assessment NAAs may:
 - for low risk operations accept a declaration,
 - for high risk operations always require a verification by EASA,
 - for medium risk operations decide if there is no need to verify the design (just accept the declaration) or an EASA verification is required.

Demo/test flights of UAS w/ or w/o passengers

→ Example:

- Any flight with persons on board with an *EHang* or equivalent platform requires EASA's involvement in initial airworthiness (=certified category)
- Test flights without persons on board with an UAS of a size similar to *EHang 216* in populated areas is at least 'medium' risk
- Unless a MS NAA duly justifies that the risk is 'Low' (SAIL I-II, for which a self-declaration by the operator for the design may be deemed sufficient), prior EASA design verification should be mandated
- Otherwise, MS only accept a self-declaration for the design and bear full responsibility for their operational authorization
- MS NAAs are generally advised to involve EASA and require EASA design verification *prior* to issuing operational authorization




Design verification of UAS operated in the specific category


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RMT.0230 - Original planning

2020		2021				2022				2023				2024
Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1



Specific category
Medium risk



Opinion #1

This was assessed as not proportionate. It will be replaced by *Guidelines on Design verification of UAS operated in the 'specific' category and classified in SAIL III and IV*





Specific category
High risk






NPA #2




Opinion #2


Certified category
Type#3 operations
Manned UAM

Certified category
Type#1 operations
IFR cargo



NPA #3



Opinion #3

Certified category
Type#2 operations
Unmanned UAM

Scope: Design elements



- Technical mitigations
- Design related OSOs

Enhanced Containment (SORA step 9)

OSO number		SAII					
		I	II	III	IV	V	VI
	Technical issue with the UAS						
OSO#02	UAS manufactured by competent and/or proven entity (design)	O	O	L	M	H	H
OSO#04	UAS developed to authority recognised design standards	O	O	L	L	M	H
OSO#05	UAS is designed considering system safety and reliability	O	O	L	M	H	H
OSO#06	C3 link performance	O	L	L	M	H	H
OSO#10	Safe recovery from a technical issue	L	L	M	M	H	H
OSO#12	UAS designed to manage the deterioration of external systems supporting UAS operations	L	L	M	M	H	H
OSO#13	External services supporting UAS operations	L	L	M	H	H	H
OSO#18	Automatic protection of the flight envelope	O	O	L	M	H	H
OSO#19	Safe recovery from human error	O	O	L	M	M	H
OSO#20	A human factors evaluation	O	L	L	M	M	H
OSO#24	adverse environmental conditions	O	O	M	H	H	H

Technical mitigations

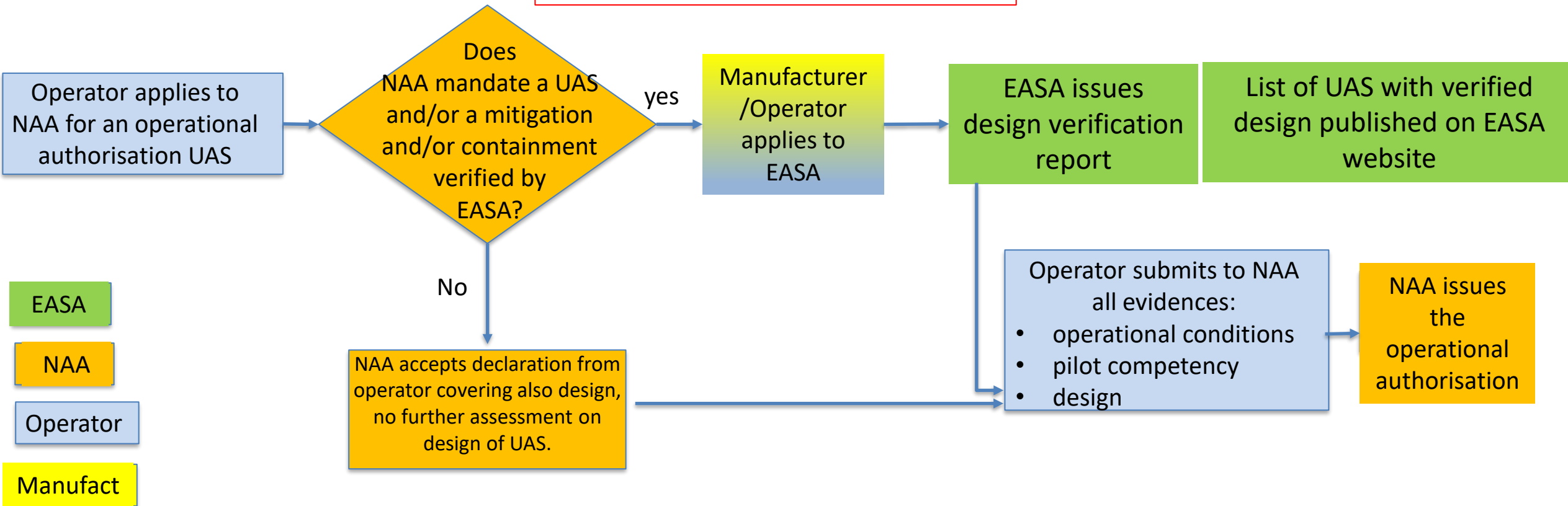
M2	M2 — Effects of ground impact are reduced	Level of robustness M, H
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Step #9 – Adjacent area/airspace considerations

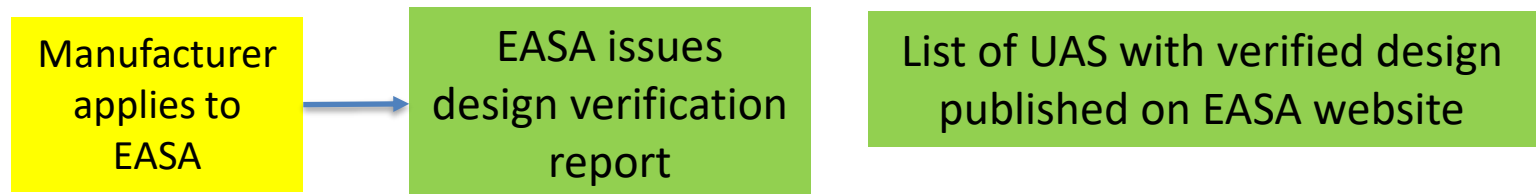
enhanced containment		
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Process

Verification report required by NAA



Manufacturer voluntary applies for a verification report



Application

Who can apply

- Any natural or legal person capable to demonstrate design compliance of the UAS, mitigation means, containment (as applicable)
- Conditions for eligibility:
 - UAS operated up to SAIL IV
 - General acceptability of design in relation to the conops

How to apply

- EASA will publish an application form
- The form will indicate the documents to be provided with the application:
 - detailed description of the design, including all the configurations to be verified;
 - risk assessment, according to SORA and CONOPS
 - the design verification basis;
 - a design verification programme for the demonstration of compliance, including a proposal for the means of compliance (MoC) and the related compliance documents.
 - project schedule, including the major milestones

Design verification basis

- The design verification basis should be developed starting from the SC Light UAS
 - identifying applicable requirements according to scope of the CONOPS and risk assessment
- Design verification basis may cover one or more of the following:
 - mitigation means linked with the design;
 - enhanced containment function
 - full design of the UAS;

Design verification process

- 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
- Organizational measures (design process, configuration control, etc.) may be checked
- EASA might witness parts of the tests, perform design inspections and compliance reviews
- Verification scope set to ensure consistency with the CONOPS and related safety considerations (UAS design, containment performance, integrity of mitigation means, ...)

Content of the design verification report

Following the design assessment EASA will issue a design verification report including:

- Reference to applicable documents from the manufacturer
- Suitable SAIL, Ground and Air Risk class, operational environment
- Conditions / limitations under which the design is expected to perform adequately including as applicable e.g.
 - minimum ground/air buffers
 - Limits for density of population
 - RF environment
 - ...
 - Specific elements regarding CAW

- Design Verification Report is not a certificate – recognition only inside EASA MSs

Who can use the design verification report

- EASA will publish the list of design verification reports (with main data, similar to STC list)
- Design verification report can be shared by the holder
- Verified designs can be used and, if the UAS is operated within the conditions defined by EASA, no additional EASA involvement is needed
- UAS operator responsible to demonstrate to NAA compliance with all remaining OSOs, including production (OSO#1) and continuing AW (OSO#3)

Type certificate according to Part 21

- According to Art 40 of regulation 2019/947, NAA may mandate in the operational authorization to use a UAS compliant with Part 21 and Regulation (EU) 1321/2014 (continuing AW)
 - Considered not proportionate for UAS operated in SAIL III and IV
 - NAA should require a TC or RTC only for UAS operated in SAIL V and VI
- Manufacturer may voluntary apply for a TC or RTC for UAS intended to be operated in SAIL III or higher
 - It may help business strategy to have a design recognized outside of EU civil system
 - Regulation (EU) 1321/2014 (continuing AW) will not be applicable, unless required by the NAA in the operational authorization
 - DOA and POA is required

Cost of the design verification report

Depending on the CONOPS and SAIL the scope of the EASA verification may be very different

- Limited assessments expected to trigger lower ceiling
- More complex projects require dedicated assessment
- Charged by hourly fees, but it is expected to not exceed ~~generally limited to~~ 180hrs (except for complex projects)
- EASA efforts highly dependent on the completeness and adequateness of information from the applicant

Update on the EASA activities and on AMC/GM on Regulation 2019/947

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Activities on drones in Q4 2020 and Q1 2021

- 11/2020: Launch of *EASA study on societal acceptance of UAM operations*
- 11/2020: Launch of AMC/GM development for future U-Space Regulation
- 12/2020: Published Special Condition (Light UAS – medium risk)
- 12/2020: Public livestreamed events (UAM, leisure & commercial drones)
- 12/2020: EASA Decision (ground risk class, UAS operator registration, PDRAs)
- 01/2021: Revised *EasyAccess Rules* for Drones, updating AMC/GM
- 03/2021: Publication of EASA manual ***Drone Incident Management by Aerodromes***
- 04/2021: Adoption of U-Space regulation
- 04/2021: Publication of guidelines on design verification of UAS operated in the specific category and classified in SAIL III and IV
- 04/2021: Standardisation on Regulation 2019/947. first survey issued on 14 April, answer by 12 May

Outlook: EASA deliverables on drones in 2021

- **Q2:** Publication of **guidance** on the evaluation of the ground population density in support of determining ground risk classes
- **Q2: NPA** to align Part-21 with the EASA BR, including rules required to ensure environmental compatibility for manned and unmanned aviation (RMT.0727)
- **Q2: NPA** on continuing airworthiness requirements for electric and hybrid propulsion for all types of aircraft (RMT.0731)
- **Q2: NPA** including two new PDRAs, AMC on geographical zones and general update of AMC/GM to Regulation 2019/947
- **Q2:** publication of study on societal acceptance
- **Q4: NPA** on AMC/GM to support the upcoming U-space Regulation

Content of NPA 2021 on AMC/GM Reg 2019/947

- new AMC and GM for the definition of geographical zones;
- new AMC and GM for the standard scenarios (STS);
- new AMC to comply with the mitigations and operational safety objectives defined in SORA;
- new AMC providing the syllabus for training modules for remote pilots operating in the specific category.
- General update based on feedback received from MS

Future activities on Reg 2019/947

- Consultation of 2 PDRA's via JARUS
 - PDRA-G03 (routine and automated surveillance and inspections of facilities and infrastructures)
 - over sparsely populated areas
 - in airspace reserved for the operation
 - BVLOS
 - using unmanned aircraft up to 3m dimension
 - within the range of the direct C2 link
 - operated routinely for regular inspections of facilities and infrastructure
 - PDRA-G04 (BVLOS, in non-segregated airspace, without using airspace observers, with greater range and larger UAS)
 - over sparsely populated areas
 - in uncontrolled airspace, with a low probability of encounter with manned aircraft and in which at least 50% manned aircraft are cooperative in the sense of being detectable by the UAS operator
 - BVLOS
 - using unmanned aircraft up to 3m dimension
 - within the range of the direct C2 link

Future activities on Reg 2019/947

- Standardisation of Regulation 2019/947 (2nd survey planned for June, 3rd survey for september)
- Guidelines for operational authorisations and LUC
- SORA update (via JARUS WG6)
 - quantitative assessment of ground risk
 - Air risk
 - Cybersecurity
 - Revision of main body
- Development of training material on SORA (via JARUS WG6)

Events planned for 2021

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Events planned for 2021

- **7 May:** Youtube streaming. The new design verification process for authorising drone operations in the “specific” category - SAIL III and IV: 19 may
- **19 May:** Webinar. Results of study on societal acceptance
- **Q2:** Webinar on U-space
- **Q2:** Webinar on geozone
- **Q2:** Webinars on authorisation in the specific category and LUC
- **July:** Amsterdam drone week organized by RAI Amsterdam
- **January 2022** High Level conference in Amsterdam

Questions

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