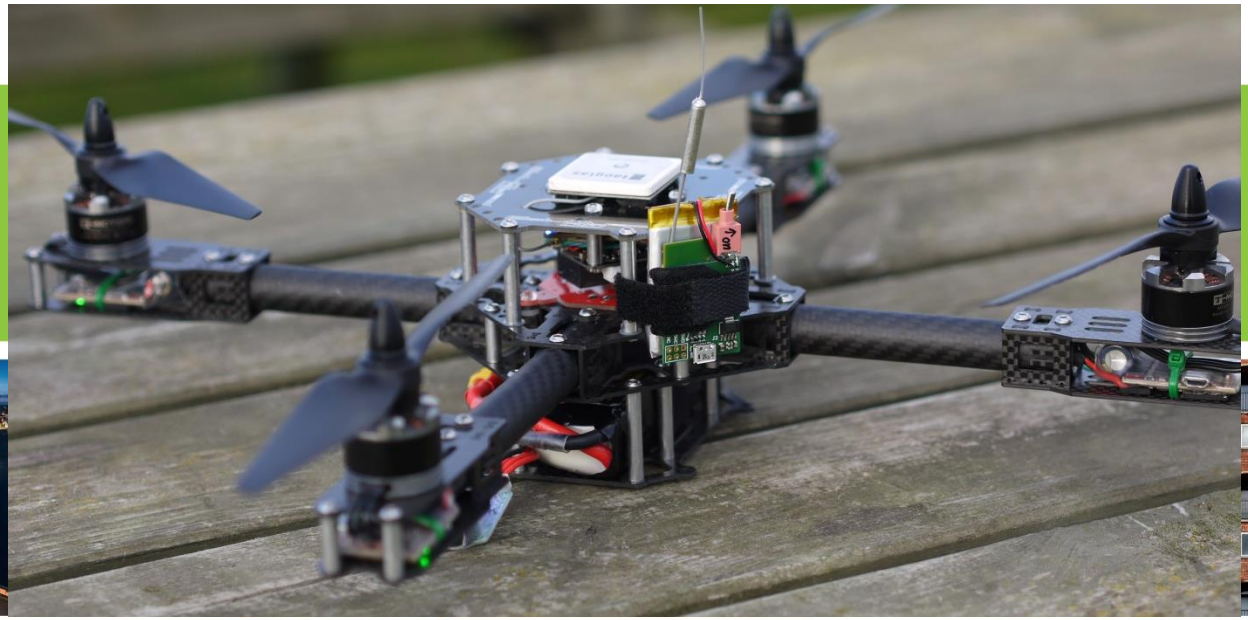
Trafik-, Bygge- og Boligstyrelsen
Danish Transport, Construction and Housing Authority

Droneforum



Skanderborg 18. marts 2019
København 20. marts 2019

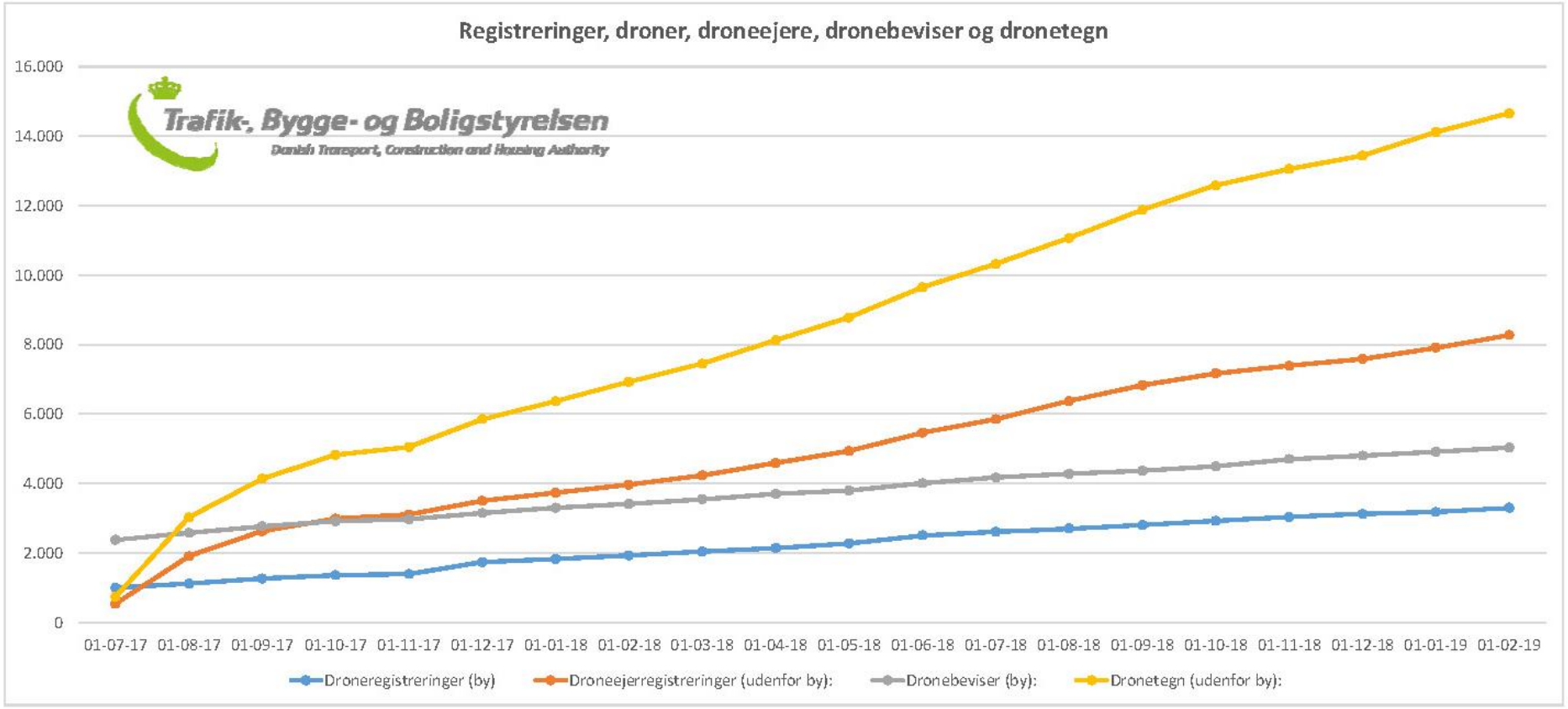
Transport-, Bygnings- og Boligministeriet

Dagsorden

- Velkomst
- Orientering om de kommende EU regler for droneflyvning generelt
- Orientering om risikovurdering om flyvning i specific category
- Orientering om dansk implementering af EU regler
- Eventuelt

- Pause ca. 1130-1200 hvor der serveres let frokost

Registreringer	01-07-17	01-08-17	01-09-17	01-10-17	01-11-17	01-12-17	01-01-18	01-02-18	01-03-18	01-04-18	01-05-18	01-06-18	01-07-18	01-08-18	01-09-18	01-10-18	01-11-18	01-12-18	01-01-19	01-02-19
Droneregistreringer (by)	1.006	1.127	1.268	1.365	1.395	1.744	1.832	1.935	2.045	2.147	2.278	2.509	2.618	2.709	2.808	2.931	3.044	3.128	3.185	3.302
Droneejerregistreringer (udenfor by):	542	1.913	2.630	2.996	3.111	3.504	3.741	3.973	4.238	4.600	4.941	5.467	5.856	6.378	6.837	7.176	7.397	7.593	7.913	8.274
Dronebeviser (by):	2.380	2.583	2.772	2.923	2.979	3.152	3.304	3.419	3.550	3.708	3.802	4.014	4.183	4.284	4.374	4.503	4.706	4.808	4.919	5.035
Dronetegn (udenfor by):	745	3.031	4.137	4.827	5.056	5.852	6.374	6.930	7.451	8.124	8.785	9.653	10.324	11.066	11.881	12.582	13.056	13.440	14.120	14.663
Registreringer i alt:	**4.673**	**8.654**	**10.807**	**12.111**	**12.541**	**14.252**	**15.251**	**16.257**	**17.284**	**18.579**	**19.806**	**21.643**	**22.981**	**24.437**	**25.900**	**27.192**	**28.203**	**28.969**	**30.137**	**31.274**



Registreringer siden 1. juli 2017, hvor reglerne trådte i kraft.

Hovedprincipper i EU-regulering vedr. droner

Forordninger

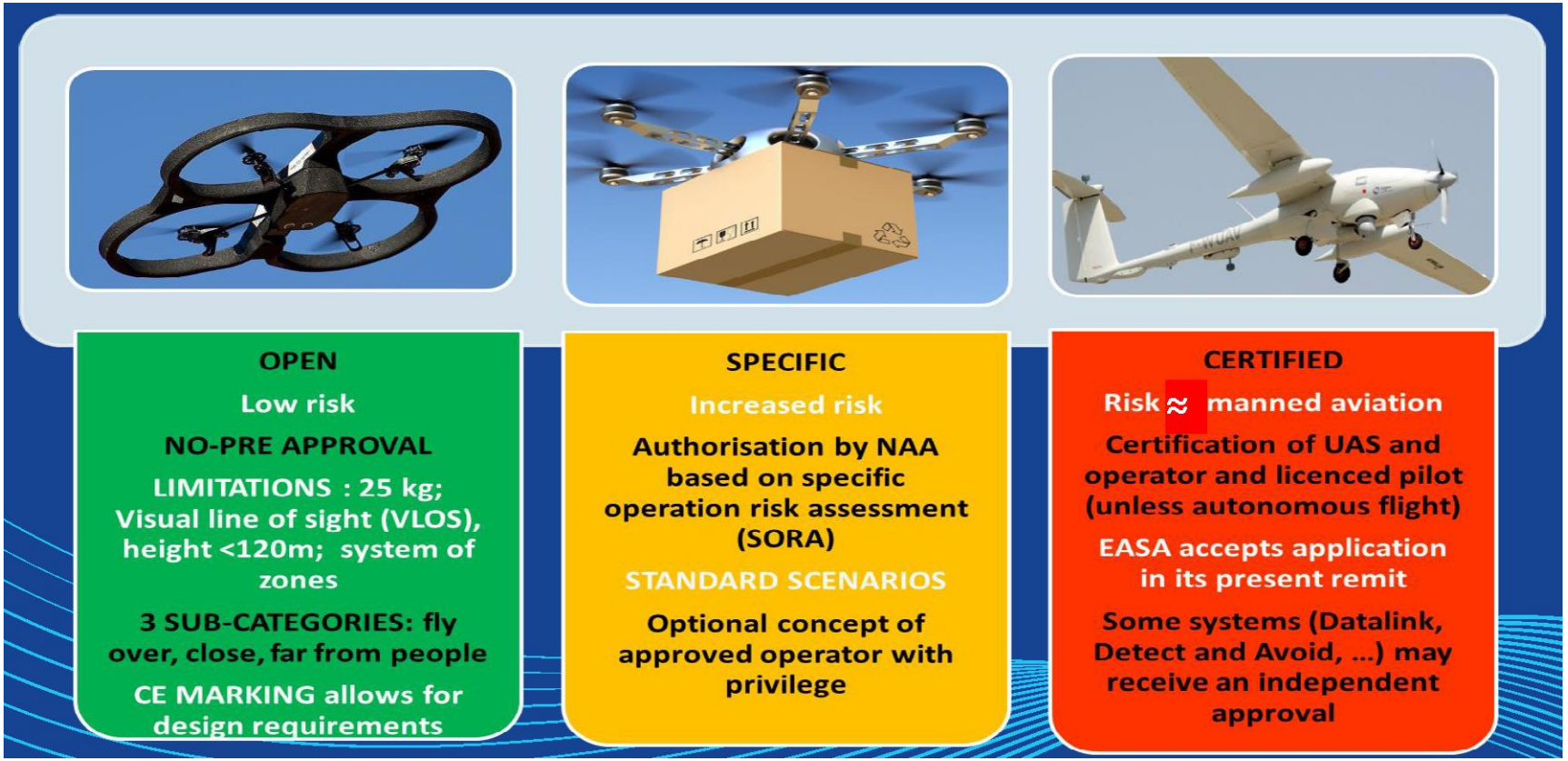
EU-regulering

- COMMISSION IMPLEMENTING REGULATION (EU) …/... of XXX on the rules and procedures for the operation of unmanned aircraft: (http://ec.europa.eu/transparency/regcomitology/index.cfm?do=search.documentdetail&Dos_ID=17242&DS_ID=58829&Version=4)
    - Fastsætter regler for flyvning (operationer) med droner

- COMMISSION DELEGATED REGULATION (EU) …/... of 12.3.2019 on unmanned aircraft and on third-country operators of unmanned aircraft system: (https://webgate.ec.europa.eu/regdel/#/delegatedActs/1202)
    - Fastsætter regler for produktkrav til droner i open category samt krav om markedskontrol af disse

Hovedprincipper i EU-regulering vedr. droner

Droneflyvning inddeles efter flyvningens type (kategori)



Hovedprincipper i EU-regulering vedr. droner

Kategorier af droneflyvninger (operationer)

Droner omfattet af open category

- Droner:
  - Med en masse på under 25 kg
  - Som maksimalt flyves i en højde af 120 meter
  - Som flyves VLOS
  - Som er markedsført med en klasse (C0-C4) efter markedsovervågningsforordningen

Hovedprincipper i EU-regulering vedr. droner

Under-kate-gori	Klasse	MTOM	Afstand til mennesker	Flyvehøjde	Registrering	Droneførerkompetencer
A1	Privat-bygget	<250 g	Må ikke overflyve menneskemængder. Må overflyve ikke-involverede menneske.	120 m	Såfremt dronen er udstyret med kamera skal der registreres.	
	C0	<250 g				Manual
	C1	<900 g			Registrering	Manual samt online kursus
A2	C2	<4 kg	30 m fra mennesker. Kan reduceres til 5 m, hvis dronen har aktivt ”low speed mode function”.	120 m	Registrering	Online kursus, selvtræning, yderligere teoretisk eksamen
A3	C2	<4 kg	Flyvning i områder hvor droneføreren må antage at der ikke befinder sig mennesker. 150 m fra beboelses-, kommercielle, industri eller rekreationelle områder	120 m	Registrering	Manual samt online kursus
	C3	<25 kg				
	C4	<25 kg				
	Privat-bygget	<25 kg				

Hovedprincipper i EU-regulering vedr. droner

Alderskrav

Alderskrav for droneførere i open category

- Ingen alderskrav for droneføreren:
  - Flyver med en klasse C0 drone
  - Flyver med en privatbygget droner med MTOM på under 250 g

- Ingen alderskrav for droneføreren, hvis denne er under supervision af en person, som har de fornødne kompetencer til at udføre den pågældende droneoperation i open category

- Alderskrav på **16 år** for droneføreren for alle operationer i open category (undtaget ovenstående)

- Alderskravet for droneføreren kan national nedsættes til **12 år** (dog kun gældende nationalt)
  - Endnu ikke afklaret hvad DK gør

Hovedprincipper i EU-regulering vedr. droner

Alderskrav

Alderskrav for droneførere i specific category

- Alderskrav på **16 år** for droneføreren for alle operationer i specific category

- Alderskravet for droneføreren kan national nedsættes til **14 år** (dog kun gældende nationalt)
  - Endnu ikke afklaret hvad DK gør

Hovedprincipper i EU-regulering vedr. droner

Uddannelseskrav

Online prøve og yderligere eksamen

- Online kursus efterfulgt af online teoretisk eksamen
- Eksamen skal bestå af 40 ”multiple choice” spørgsmål vedr. emnerne:
  - Luftsikkerhed
  - Luftrumsrestriktioner
  - Luftfartsregulering
  - Human performance limitations
  - Operationelle procedurer
  - UAS generel viden
  - Beskyttelse af privatlivets fred og databeskyttelse
  - Forsikring
  - Security

- Yderligere teoretisk eksamen skal bestå af 30”multiple choice” spørgsmål rettet mod:
  - Meteorologi
  - UAS flight performance
  - Teknisk og operationel mitigation af risiko

- Prøver udbydes af myndighed eller myndighedsanerkendt organ
  - Endnu ikke afklaret i DK

Hovedprincipper i EU-regulering vedr. droner

Uddannelseskrav

Selvtræning

- Selvtræning skal udføres under betingelserne for flyvning i underkategori A3

Hovedprincipper i EU-regulering vedr. droner

Ansvar

Operatørens ansvar i open category

- Operatøren er ansvarlig for:
  - At udarbejde operationelle procedurer tilpasset den type operation som skal udføres
  - At sørge for at der ved operationerne anvender radiospektrummet på en sådan måde, at der ikke sker interferens
  - At udpege en dronefører for hver operation
  - At sørge for at droneføreren er bekendt med den anvendte drones manual, har de fornødne kompetencer det kræver for at flyve en drone samt er bekendt med den førnævnte operationelle procedure
  - At informere involverede personer i risikoen ved en operation og modtage samtykke fra disse om at deltage i operationen.

- Svarer til de ”gamle” driftshåndbøger

Hovedprincipper i EU-regulering vedr. droner

Ansvar

Droneførerens ansvar i open category

- Droneføreren er før flyvningen ansvarlig for:
  - At have de fornødne kompetencer det kræver, at for at flyve den pågældende drone, samt bære bevis herfor
  - At tilegne sig opdateret information om geografiske zoner
  - At ”holde øje” med det område som operationen udføres i
  - At sørge for at dronen er ”i orden” før den påtænkte operation

- Droneføreren er under flyvningen ansvarlig for:
  - At ikke at være påvirket af alkohol eller anden form for stoffer
  - At holde dronen VLOS og observere det omkringliggende luftrum
  - At afbryde en operation såfremt der er risiko for kollision med bemandet luftfartøj

- Svarer til de ”gamle” driftshåndbøger

Hovedprincipper i EU-regulering vedr. droner

Operationer

Flyvning om natten

- Ingen selvstændige bestemmelser om flyvning om natten
- Almindelige operationelle bestemmelser gælder for natflyvning, herunder at dronen skal være VLOS
- Krav at droner udstyres med lys, som er synligt om natten og gør det muligt at skelne dronen fra anden bemandet luftfart

Hovedprincipper i EU-regulering vedr. droner

Kategorier af droneflyvninger (operationer)

Droner omfattet af specific category

- Droneflyvning som ikke omfattes af den åbne kategori falder ind under specifik kategorien, men ikke indebærer en risiko svarende bemandet flyvning
- Droneflyvning i specifik kategorien kræver enten tilladelse fra den kompetente myndighed eller erklæring fra droneoperatøren om, at droneflyvningen overholder et prædefineret flyvescenarie

- Specific omfatter bl.a.
  - BVLOS flyvning
  - Flyvning højere end 120 m
  - Flyvning over mennesker undtagen det er tilladt i Open A1
  - Flyvning med droner på mere end 4 kg i bymæssigt område

Hovedprincipper i EU-regulering vedr. droner

Kategorier af droneflyvninger (operationer)

Hvorledes der gives lov til, at flyve i specific category

- Erklæring om at følge et prædefineret standardscenarie
  - Disse standard scenarier bliver Annex til forordning
  - Første scenarier forventes at foreligge ultimo 2019

- Operationel tilladelse
  - Anvende et standard scenarie publiceret af EASA
  - Udarbejdet på baggrund af ansøgning med risikovurdering og mitigerende foranstaltninger

- Hvis droneoperatøren er indehaver af et LUC (Light UAS operator Certificate)
  - Giver rettighed til at indehaver selv kan ”godkende” scenarier

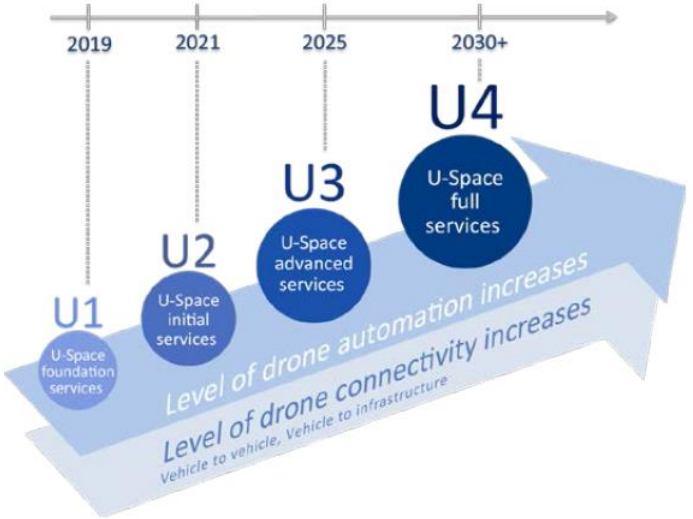
Nyt i f.t. TBST præsentation på mødet

Hovedprincipper i EU-regulering vedr. droner

Kategorier af droneflyvninger (operationer)

Risikovurdering og SORA

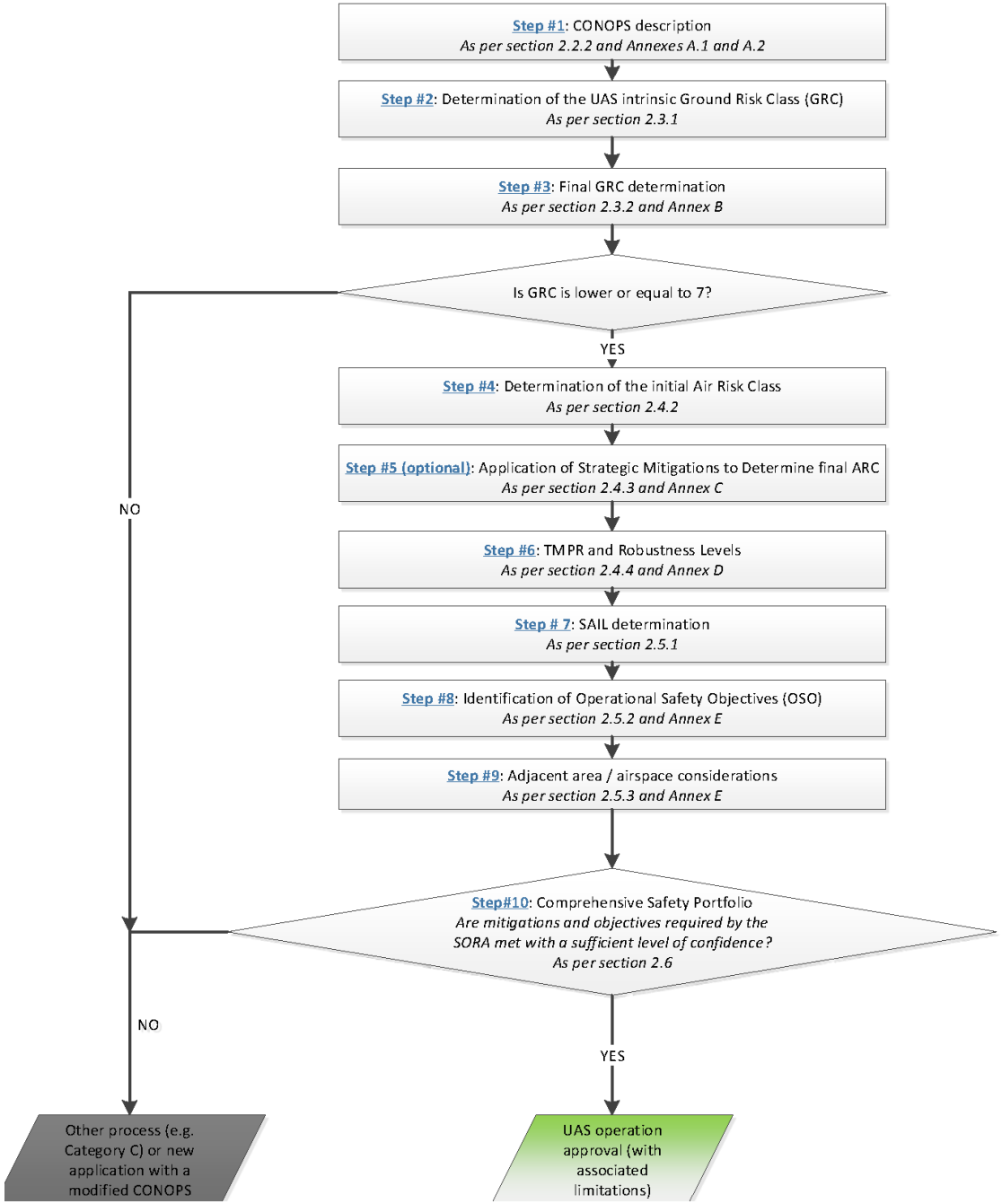
- Til udarbejdelse af risikovurderinger anvendes den såkaldte SORA-model, som er en metodik udviklet i JARUS-regi for udarbejdelse af risikovurderinger *(eller anden risikovurderingsmetodik)*
- Indebærer reelt retningslinjer for bl.a. BVLOS flyvning og flyvning over mennesker
    - Mange typer BVLOS flyvning vil dog først blive mulig når der er udviklet trafikstyringssystemer til droner (U-Space)



Hovedprincipper i EU-regulering vedr. droner

Kategorier af droneflyvninger (operationer)

SORA


Step #1: CONOPS description
As per section 2.2.2 and Annexes A.1 and A.2
Step #2: Determination of the UAS intrinsic Ground Risk Class (GRC)
As per section 2.3.1
Step #3: Final GRC determination
As per section 2.3.2 and Annex B
Is GRC is lower or equal to 7?
YES
NO
Step #4: Determination of the initial Air Risk Class
As per section 2.4.2
Step #5 (optional): Application of Strategic Mitigations to Determine final ARC
As per section 2.4.3 and Annex C
Step #6: TMPR and Robustness Levels
As per section 2.4.4 and Annex D
Step # 7: SAIL determination
As per section 2.5.1
Step #8: Identification of Operational Safety Objectives (OSO)
As per section 2.5.2 and Annex E
Step #9: Adjacent area / airspace considerations
As per section 2.5.3 and Annex E
Step#10: Comprehensive Safety Portfolio
Are mitigations and objectives required by the SORA met with a sufficient level of confidence?
As per section 2.6
NO
YES
Other process (e.g. Category C) or new application with a modified CONOPS
UAS operation approval (with associated limitations)

Hovedprincipper i EU-regulering vedr. droner

Kategorier af droneflyvninger (operationer)

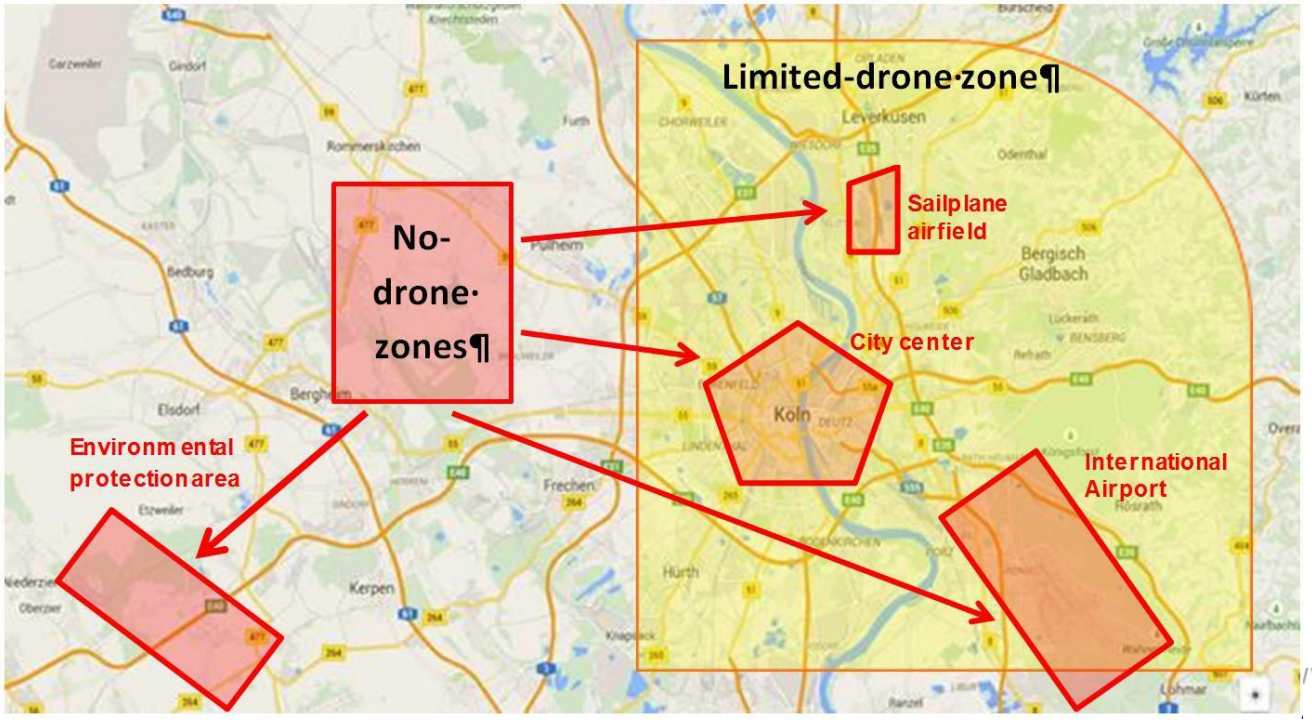
Droner omfattet af certified category

- Droner som sidestilles med bemandet luftfart (transport af passager) eller droner med høj kinetisk energi
- Særskilt regulering for disse droner vil blive udarbejdet af EASA/EU
- National regulering kan kræve, at droneoperationer certificeres pga. droneoperationens eller operationsområdets kompleksitet

Hovedprincipper i EU-regulering vedr. droner

Geografiske zoner

- Medlemsstaterne kan fastsætte geografiske zoner for droneflyvning



Hovedprincipper i EU-regulering vedr. droner

Geografiske zoner

Typer af geografiske zoner

- Medlemsstaterne kan i geografiske zoner af security-, safety-, privatlivs- eller miljømæssige grunde:
  - forbyde visse eller alle former for droneflyvning, anmode om særlige betingelser for droneflyvning eller anmode om en forudgående operationel tilladelse til droneflyvning
  - Underkaste droneflyvning specifikke miljøstandarder
  - kun tillade adgang til visse droneklasser
  - kun tillader adgang til droner udstyret med visse tekniske egenskaber, især fjernidentifikationssystemer eller geo-awareness systemer
  - på baggrund af en risikovurdering undtage droneflyvningen fra kravene i open category (positive zoner)

Hovedprincipper i EU-regulering vedr. droner

Muligheder for supplerende national regulering

National regulering

- Præamblen til forordningen åbner op for, at der nationalt kan fastsættes regler om:
  - Privatlivets fred
  - Persondata
  - Forsikring
- Rækkevidden af national regulering undersøges pt.

Hovedprincipper i EU-regulering vedr. droner

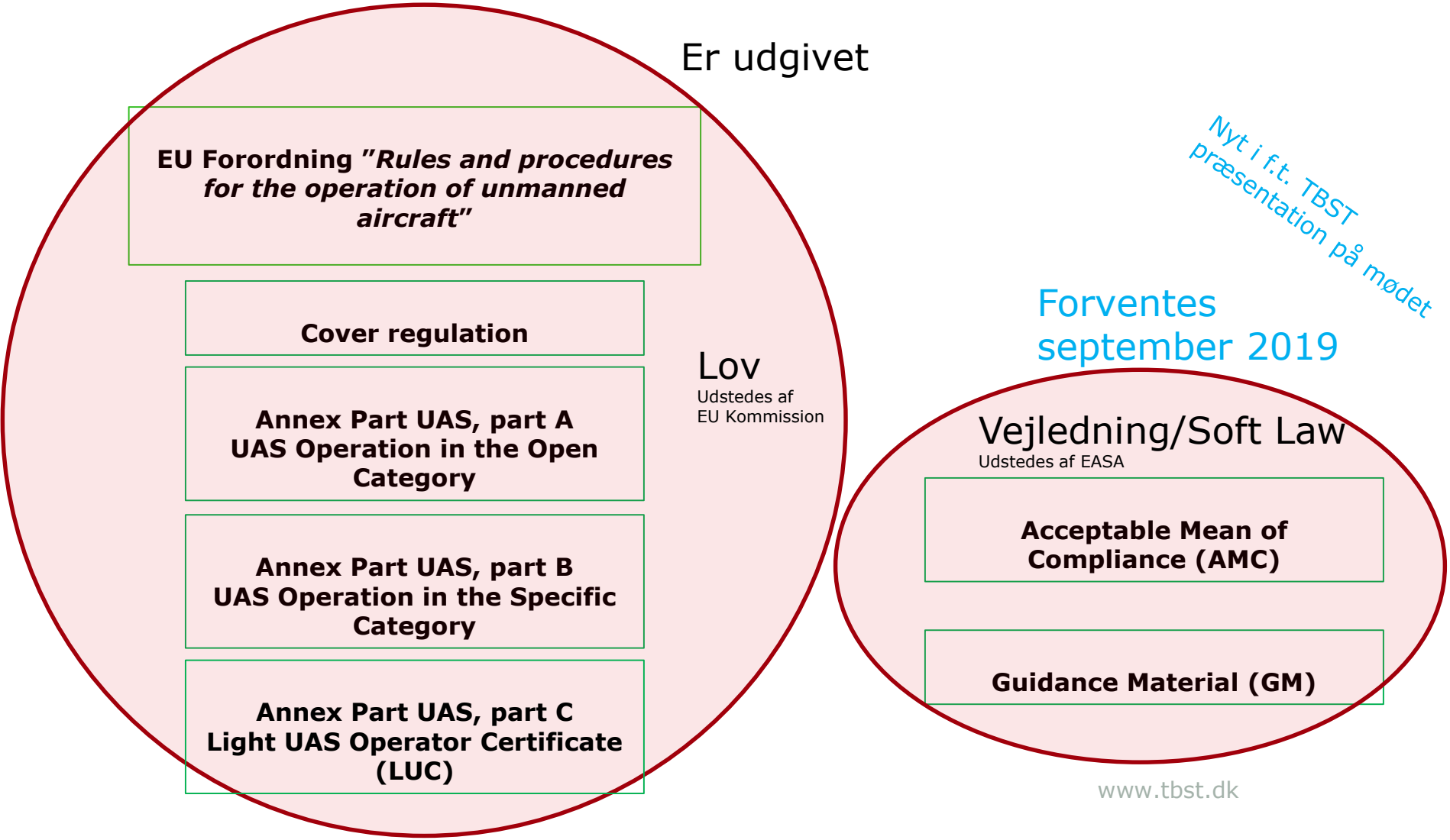
Muligheder for supplerende national regulering

Cross-border

- Rettigheder i Open category gældende på tværs af landegrænser
- Droneflyvning i specific category på tværs af landegrænser (EU) skal godkendes i hvert land
- Operationer som udføres efter et standardscenarie kan gøres på tværs af landegrænser

Hovedprincipper i EU-regulering vedr. droner

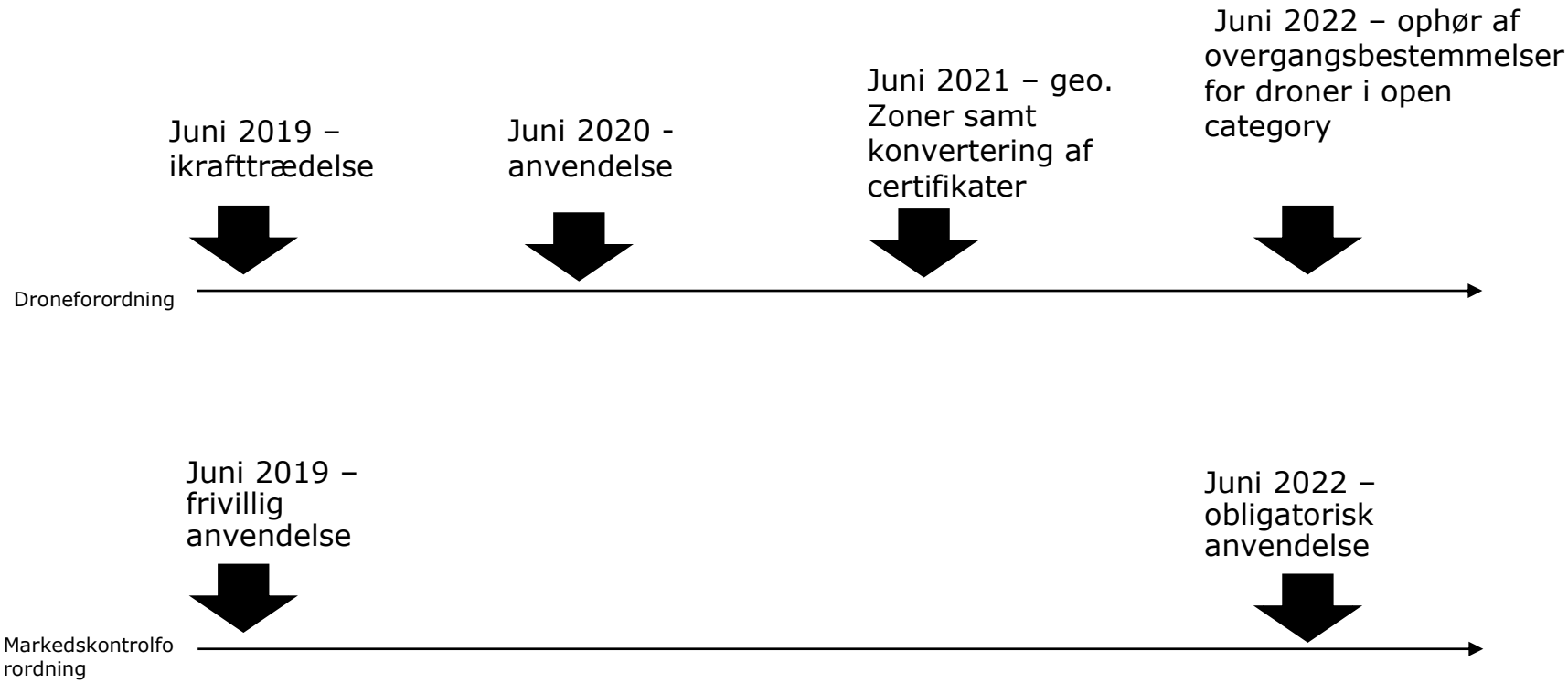
Opbygning af forordningerne



Hovedprincipper i EU-regulering vedr. droner

Muligheder for supplerende national regulering

Proces



Hovedprincipper i EU-regulering vedr. droner

Overgangsbestemmelser

Droner ikke omfattet af markedskontrolforordningen

- Dronerne kan under visse betingelser fortsat anvendes 2 år efter anvendelsestidspunktet af EU-forordning
    - Droner med en MTOM på under 500 g kan flyve efter reglerne for underkategori A1
    - Droner med en MTOM mindre end 2 kg kan flyve efter reglerne for underkategori A2 dog skal afstanden til mennesker være 50 m
    - Droner med en MTOM mellem 2 kg og 25 kg kan flyves efter reglerne i underkategori A3

Hovedprincipper i EU-regulering vedr. droner

Overgangsbestemmelser

Tilpasning af nationale tilladelser, erklæringer og certifikater mm.

- Fortsat gyldige i 2 år efter ikrafttrædelse af EU-forordning

- Skal senest 2 år efter ikrafttrædelse af EU-forordning være konverteret til tilladelser, erklæringer, certifikater som er i overensstemmelse med EU-forordningen

Hovedprincipper i EU-regulering vedr. droner

Markedsføring og markedskontrol af droner

Krav til droner i open category

- Harmoniserede produktkrav til droner i open category bl.a. klasseinddeling (C0-C4)
- CE-mærkning
- Produktkrav omhandler bl.a.
  - Vægt
  - Maksimal flyvehøjde
  - Støj
  - Designkrav der forebygger personskade ved kollision
  - Serienummer
  - Remote ID (udsende ID på Wifi frekvenser)
  - Geo-awareness
  - Brugermanual
  - Information om EU regler skal medfølge
- Andre EU forordninger gælder også, eksempelvis på frekvensområdet

Hovedprincipper i EU-regulering vedr. droner

Markedsføring og markedskontrol af droner

Droneklasser i open category

Klasse	MTOM	Max. Hastighed	Geo-awareness	Flyve-højde	Remote-ID	Lys
Privat-bygget	<250 g	19 m/s	-	120 m	-	-
C0	<250 g	19 m/s	-	120 m	-	-
C1	<900 g	19 m/s	Ja	120 m	Ja	Ja
C2	< 4 kg	-	Ja	120 m	Ja	Ja
C3	<25 kg	-	Ja	120 m	Ja	Ja
C4	<25 kg	-	-	120 m	-	-

Hovedprincipper i EU-regulering vedr. droner

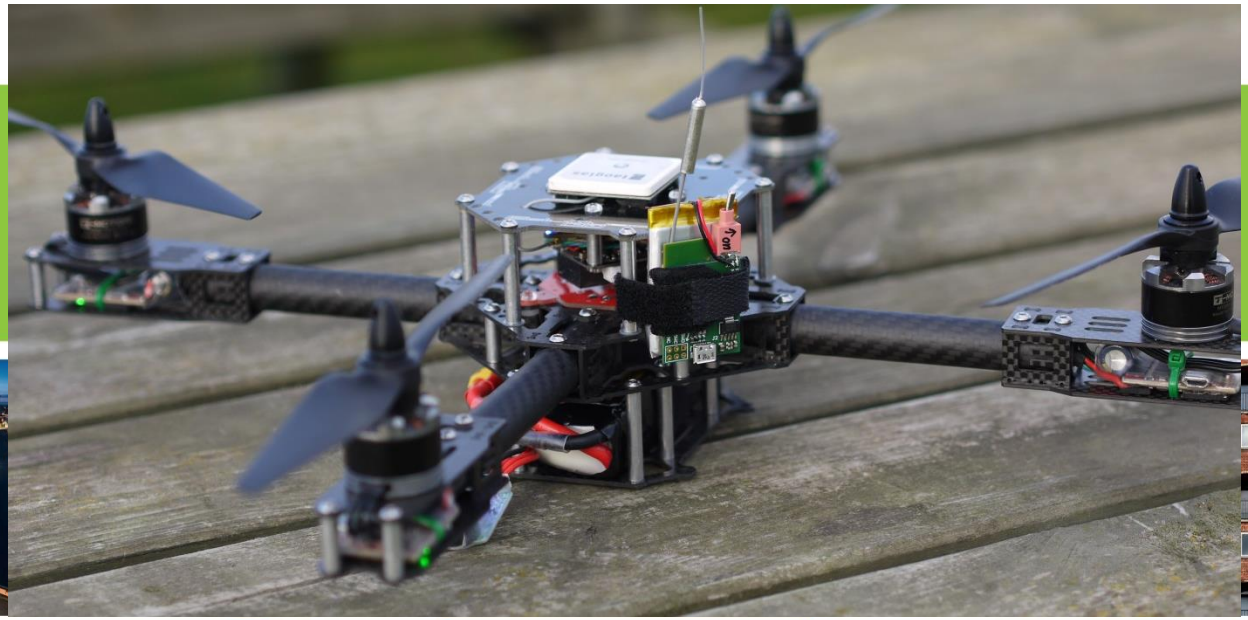
Markedsføring og markedskontrol af droner

Krav til medlemsstaterne

- Medlemsstaternes myndigheder skal udføre markedskontrol af droner, producenter, importører og distributører

Trafik-, Bygge- og Boligstyrelsen
Danish Transport, Construction and Housing Authority

FIN



Transport-, Bygnings- og Boligministeriet

Flyvning i Specific kategori

OPEN

Low risk

NO-PRE APPROVAL

LIMITATIONS : 25 kg; Visual line of sight (VLOS), height <120m; system of zones

3 SUB-CATEGORIES: fly over, close, far from people

CE MARKING allows for design requirements

SPECIFIC

Increased risk

Authorisation by NAA based on specific operation risk assessment (SORA)

STANDARD SCENARIOS

Optional concept of approved operator with privilege

CERTIFIED

Risk ≈ manned aviation

Certification of UAS and operator and licenced pilot (unless autonomous flight)

EASA accepts application in its present remit

Some systems (Datalink, Detect and Avoid, …) may receive an independent approval

Droneflyvning omfattet af Specific category

- Droneflyvning som ikke kan udføres i Open kategori -> Specifc med mindre risiko svarer bemandet flyvning
  - Følgende kan ikke udføres i Specific kategori
    - Overflyve forsamling af mennesker med droner >3 m
    - Persontransport med droner
    - Transport af farligt gods med droner som påfører 3. mand høj risiko ved ulykke
    - Hvis den kompetente myndighed finder risici ikke er tilstrækkeligt mitigeret uden certificering

- Specific omfatter bl.a.
  - BVLOS flyvning
  - Flyvning højere end 120 m
  - Flyvning over mennesker undtagen det er der tilladt i Open A1
  - Flyvning med droner på mere end 4 kg i bymæssigt område

3 måder at operere i Specific kategori

1. Erklæring om at følge et prædefineret standardscenarie
   - Disse standardscenarier bliver offentliggjort af EASA
   - Første scenarier forventes at foreligge ultimo 2019

2. Operationel tilladelse
   - Flyve efter et prædefineret standard scenarie offentliggjort af EASA i AMC til forordning
     - Risikovurderingen er lavet af EASA
   - Udarbejdet på baggrund af ansøgning med risikovurdering og mitigerende foranstaltninger

3. Hvis droneoperatøren er indehaver af et LUC (Light UAS operator Certificate)
   - Giver rettighed til at indehaver selv kan ”godkende” scenarier

Nyt i f.t. TBST præsentation på mødet

3 måder at operere i Specific kategori

1. Erklæring om at følge et prædefineret standard scenarie
   - Disse standard scenarier bliver offentliggjort af EASA
   - Første scenarier forventes at foreligge ultimo 2019

2. Operationel tilladelse
   - Udarbejdet på baggrund af ansøgning med risikovurdering og mitigerende foranstaltninger

3. Hvis droneoperatøren er indehaver af et LUC (Light UAS operator Certificate)
   - Giver rettighed til at indehaver selv kan ”godkende” operationer

Standard scenarier

- Hvad er et standardscenarie
  - En beskrivelse, karakteristik, begrænsninger og vilkår og for en type af flyvninger
  - Ikke bundet til
    - Operatør
    - Specifik lokation
    - normalt ikke en specifik type drone
    - Formål
  - Risikovurderingen (SORA) er lavet, skal ikke laves af operatør
- For at flyve efter et standardscenarie:
  - Man skal opfylde vilkår i scenarie
  - Man skal indsende erklæring til TBST
    - Navn, adresse m.v. på operatør
    - Erklære de påtænkte operationer falder indenfor scenariets karakteristika
    - Erklære at man vil opfylde vilkår for pågældende scenarie
    - Bekræftelse at man har lovbetingede forsikringer
  - Når TBST har bekræftet at alle relevante oplysninger er modtaget, kan man starte flyvninger
    - Ingen godkendelse krævet

1. standard scenarier, eksempel

Beskrivelse, karakteristik, begrænsninger

STS Characterisation and Provisions	
1. Operational characterisation (scope and limitations)	
Level of human intervention	• No autonomous operations: the remote pilot shall always be able to intervene in normal operation. • The remote pilot should operate only one UA at a time. • The remote pilot may not operate from a moving surface vehicle. • Hand-over between RPS may not be performed

Range limit from remote flight crew	• Launch / recovery: **VLOS from the remote pilot**
	• In flight:
	  ○ If no VOs are used: UA is **not operated at more than 1 Km** (or other distance defined by the competent authority) **from the remote pilot**.
	  ○ If VOs are used: **range is not limited** as long as the UA is **not operated at more than 1 Km** (or other distance defined by the competent authority) **from the VO who is nearest to the UA.**

Overflown areas	**Sparsely populated** areas[1]
UA limitations	• Max. characteristic dimension (e.g. wingspan or rotor diameter/area): **3 m** • Typical kinetic energy (as defined in SORA at §2.3.1) **up to 34 kJ**
Flight height limit	The maximum height of the **operation volume** should **not be higher than 150m (500 ft) above the overflown surface** (or any other altitude reference defined by the state). *NOTE: In addition to the vertical limit for the operation volume, an air risk buffer is to be considered (see "Air Risk" under point 3 of the table)*
Airspace	Operations should be conducted only in **F or G airspace class** (uncontrolled airspace) **over rural areas**. *NOTE: The criteria for its determination and location of some types of "atypical" airspace can be expected to be defined by the Member State of operation.*
Others	The use of the UA to drop material or **carry dangerous goods[2] is forbidden, except** for dropping items in connection with **agricultural, horticultural or forestry** activities in which the carriage of the items does not contravene any other applicable regulations.

1. standard scenarier, eksempel

Beskrivelse, karakteristik, begrænsninger

Visibility	At no time shall the UA be operated in an area where minimum flight visibility is less than 5km.				
2. Operational risk classification (SORA)					
Final Ground Risk Class (GRC)	**3**	Final Air Risk Class (ARC)	**ARC-b**	SAIL	**II**
3. Operational mitigations					
Operation volume	The operational volume is composed of the flight geography and the contingency volume. To determine the operational volume the applicant should consider the position keeping capabilities of the UAS in 4D space (latitude, longitude, height and time). In particular the accuracy of the navigation solution, the flight technical error of the UAS and the path definition error (e.g. map error) and latencies should be considered and addressed in this determination If the UA leaves the operation volume, emergency procedures must be activated immediately				
Ground risk	• A **ground risk buffer** should be established to protect third parties on the ground outside the operation volume. • The **minimum criterion should be the use of the "1 to 1 rule"** (e.g. if the UA is planned to operate at 150m height, the ground risk buffer should at least be 150m). • The operation volume, and the ground risk buffer shall be in sparsely populated environment. • The applicant shall evaluate the area of operations by typically means of on-site inspections or appraisals and can justify a lower density of people at risk •				
Air risk	An **air risk buffer** shall be defined. This air risk buffer shall be in **F or G airspace class** (uncontrolled airspace) **over rural areas.** Operation volume shall be out of an **airport environment**, as defined by the State of operations Prior to flight, the proximity of the planned operation to manned A/C activity shall be assessed.				

1. standard scenarier, eksempel

Beskrivelse, karakteristik, begrænsninger

Visual Observers	• The remote pilot shall determine the correct placement and number of VOs along the intended flight path. Prior to each flight, the operator shall perform following assessment: ○ Check the compliance between visibility and planned range for VOs. ○ The potential terrain obstruction for VOs shall be assessed. ○ Confirm there are no gaps between the zones covered by each of the VOs • The VO(s) necessary for the safe conduct of the operation must be in place during flight operations. Note: remote pilot may perform the role of a VO provided that workload is is adequate to perform his/her duties.
4. Operator provisions	
Operator competency	• The operator should have: ○ knowledge of the UAS being used, and ○ relevant procedures, including at least: operational procedures (at least checklists), maintenance, training, responsibilities, and duties. • Abovementioned aspect should be addressed in the Concept of Operations (CONOPS)

1. standard scenarier, eksempel

Beskrivelse, karakteristik, begrænsninger

UAS operations	• The following should be defined and **documented** in an **Operations Manual**:
	  ○ **Operational procedures** and **Emergency Response Plan (ERP)**
	  ○ **Limitations of the external systems** supporting UAS for safe operations.
	  ○ **Environmental conditions** required for a safe operation
	• Operational procedures should be **validated against standards recognised by the competent authority**.
	• The **adequacy** of the **contingency and emergency procedures** should be proved through:
	  ○ Dedicated **flight tests**, or
	  ○ **Simulations**, provided that the representativeness of the simulation means is proven for the intended purpose with positive results, or
	  ○ Any other means acceptable to the competent authority.
	• The **remote crew** should be **competent** and be **authorised by the operator** to carry out the intended operations.
	• A **list of remote crew members** authorised to carry out UAS operations is established and kept up to date.
	• A **record of all relevant qualifications**, experience and/or trainings completed by the remote crew is established and kept up to date.
	• The applicant should have a **policy** defining how the **remote crew can declare themselves fit to operate** before conducting any operation.

UAS maintenance	• The **UAS maintenance instructions** should be defined, documented and cover the UAS manufacturer instructions and requirements when applicable. • The **maintenance staff** should be **competent** and should have received an **authorisation** to carry out maintenance. • The **maintenance staff** should use the UAS maintenance instructions while performing maintenance. • The maintenance instructions should be documented. • The maintenance conducted on the UAS should be recorded in a **maintenance log system**. • A **list of maintenance staff** authorised to carry out maintenance is established and kept up to date. • A **record of all relevant qualifications**, experience and/or trainings completed by the maintenance staff is established and kept up to date. The maintenance log may be requested for inspection/audit by the approving authority or an authorized representative.

1. standard scenarier,

eksempel

Beskrivelse,

karakteristik,

begrænsninger

External services	• The applicant should ensure that the **level of performance** for any externally provided service necessary for the safety of the flight is **adequate for the intended operation**. The applicant should be requested to **declare** that this adequate level of performance is achieved. • **Roles and responsibilities** between the applicant and the external service provider should be defined.
5. Training provisions	
Remote crew	• Before performing UAS operations the remote crew should have received competency-based theoretical and practical training consisting in the elements indicated in Appendix E. • The training programme should be documented (at least the training syllabus should be available)
Maintenance staff	TBD (SORA OSOs do not address this training)
6. Technical provisions	
General	• The UAS is designed in accordance with design standards recognised by the competent authority for a low level of "integrity" and the intended operation. • **Means to monitor critical parameters** for a safe flight should be available, in particular: ○ UA position, height or altitude, ground speed or airspeed, attitude and trajectory); ○ UAS energy status (fuel, batteries …); ○ status of critical functions and systems (e.g. C2 Link, GNSS …); as a minimum, for services based on RF signals (e.g. C2 Link, GNSS …) means should be provided to monitor the adequate performance and triggering an alert if level is becoming too low. • The UA should have the performance capability to descend from its operating altitude to the **'safe altitude' in less than a minute or have a descend rate of ≥ 2.5 m/s (500 fpm)**

1. standard scenarier, eksempel

Beskrivelse, karakteristik, begrænsninger

Human machine Interface	• The UAS information and control interfaces should be clearly and succinctly presented and should not confuse, cause unreasonable fatigue, or contribute to remote flight crew error that could adversely affect the safety of the operation. • If an electronic means is used to support Visual Observers in their role to maintain awareness of the position of the unmanned aircraft, its HMI should: ○ be sufficient to allow the Visual Observers to determine the position of the UA during operation; ○ not degrade the Visual Observer's ability to: ▪ scan the airspace visually where the UA is operating for any potential collision hazard; and ▪ maintain effective communication with the remote pilot at all times. • The applicant should conduct an evaluation of the UAS considering and addressing human factors to determine the HMI is appropriate for the mission.
Command, Control links (C2) and communication	• The UAS should **comply with the requirements for radio equipment** and the **use of RF spectrum**. • **Protection mechanisms against interference should be used,** especially if unlicensed bands (e.g. ISM) are used for C2 Link (mechanisms like Frequency Hopping Spread Spectrum – FHSS, technology or frequency de-confliction by procedure) • Communication between remote pilot and VO shall allow for the remote pilot to maneuver the UA with sufficient time to yield right-of-way in accordance with the following provisions: ○ The unmanned aircraft must yield the right of way to all aircraft and airborne vehicles in accordance with applicable regulations. ○ No person may operate an unmanned aircraft so close to another aircraft as to create a collision hazard.
Tactical mitigation	• The **UAS design** should be adequate to ensure that the **time required** between a command is given by the remote pilot and the UA executes it **does not exceed 5 seconds.** (TBC) • Where an **electronic means is used to assist the remote pilot and/or VOs in being aware of UA position in relation to potential "airspace intruders"**, the information is provided with a latency and update rate for intruder data (e.g. position, speed, altitude, track) that support the decision criteria. For an assumed 3 NM threshold, a 5 second update rate and a latency of 10 seconds is considered adequate (TBC)

1. standard scenarier, eksempel

Beskrivelse, karakteristik, begrænsninger

Containment	To ensure a safety recovery from a technical issue involving the UAS or external system supporting the operation, the operator shall ensure: • No probable failure of the UAS or any external system supporting the operation shall lead to operation outside of the operation volume. • It shall be reasonably expected that a fatality will not occur from any probable failure of the UAS or any external system supporting the operation. Vertical extension of operation volume shall be 500ft AGL (or any other altitude reference defined by the state). Note: The term "probable" needs to be understood in its qualitative interpretation, i.e. "anticipated to occur one or more times during the entire system/operational life of an item." • A design and installation appraisal highlighting shall be made available and shall minimally include: ○ design and installation features (independence, separation and redundancy); ○ particular risks (e.g. hail, ice, snow, electro-magnetic interference…) relevant to the ConOps. Following additional requirements shall additionally apply if adjacent area/airspace are gathering of people or ARC-d: • The probability of leaving the operational volume shall be less than 10-4/FH. • No single failure of the UAS or any external system supporting the operation shall lead to operation outside of the ground risk buffer. • Compliance with the requirements above shall be substantiated by analysis and/or test data with supporting evidence. • Software (SW) and Airborne Electronic Hardware (AEH) whose development error(s) could directly lead to operations outside of the ground risk buffer shall be developed to an industry standard or methodology recognized as adequate by the competent authority.

1. Standard scenarier, eksempel vilkår

- Til det omtalte scenarie hører
  - Krav til driftshåndbog

- Krav til træning af personel
- Den ”bagvedliggende” SORA risikoanalyse vil også blive offentliggjort
  - Men den skal man ikke forholde sig til for at anvende scenariet

1. Standard scenarier, eksempel

- Eksempel på standardscenarie
  - TBST har offentliggjort standardscenarie til begrænset BVLOS flyvning med droner i redningsberedskab på Droneregler.dk (se link)
  - Der accepteres ved denne type flyvning en forhøjet risiko, hvorfor der er set bort fra visse af SORA risiko mitigerende krav

  - Operatører som udfører droneflyvning i redningsberedskab kan anvendes disse scenarier
    - Redningsberedskaberne selv
    - Operatører som har en aftale med et redningsberedskab om at levere droneydelser
    - Redningsberedskab som defineret i Beredskabsloven

3 måder at operere i Specific kategori

1. Erklæring om at følge et prædefineret standard scenarie
   - Disse standard scenarier bliver offentliggjort af EASA
   - Første scenarier forventes at foreligge ultimo 2019

Nyt i f.t. TBST præsentation på mødet

2. Operationel tilladelse
   a) Flyve efter et prædefineret standard scenarie offentliggjort af EASA i AMC til forordning
      - Risikovurderingen er lavet af EASA
   b) Udarbejdet på baggrund af ansøgning med ansøgers risikovurdering og mitigerende foranstaltninger

3. Hvis droneoperatøren er indehaver af et LUC (Light UAS operator Certificate)
   - Giver rettighed til at indehaver selv kan ”godkende” scenarier

Flyvning efter operationel tilladelse a)

- Hvis der findes et standard scenarie der passer til behovet
  - Sende ansøgning om tilladelse, skal indeholde
    - Navn, adresse m.v. på operatør
    - En risikovurdering for operationen (SORA)
    - Beskrivelse af mitigerende foranstaltninger med passende dokumentation herfor (det anviser SORA)
    - En driftshåndbog hvis kompleksiteten og risici påkræver det
    - Bekræftelse at man har lovbetingede forsikringer
  - TBST vil vurdere ansøgningen og vurdere om ansøger opfylder alle krav i standard scenarie
    - I givet fald udstedes tilladelse

Nyt i f.t. TBST præsentation på mødet

Flyvning efter operationel tilladelse b)

Nyt i f.t. TBST præsentation på mødet

- Hvis ikke der findes et standard scenarie der passer til behovet
  - Sende ansøgning om tilladelse, skal indeholde
    - Navn, adresse m.v. på operatør
    - En risikovurdering for operationen (SORA)
    - Beskrivelse af mitigerende foranstaltninger med passende dokumentation herfor (det anviser SORA)
    - En driftshåndbog hvis kompleksiteten og risici påkræver det
    - Bekræftelse at man har lovbetingede forsikringer

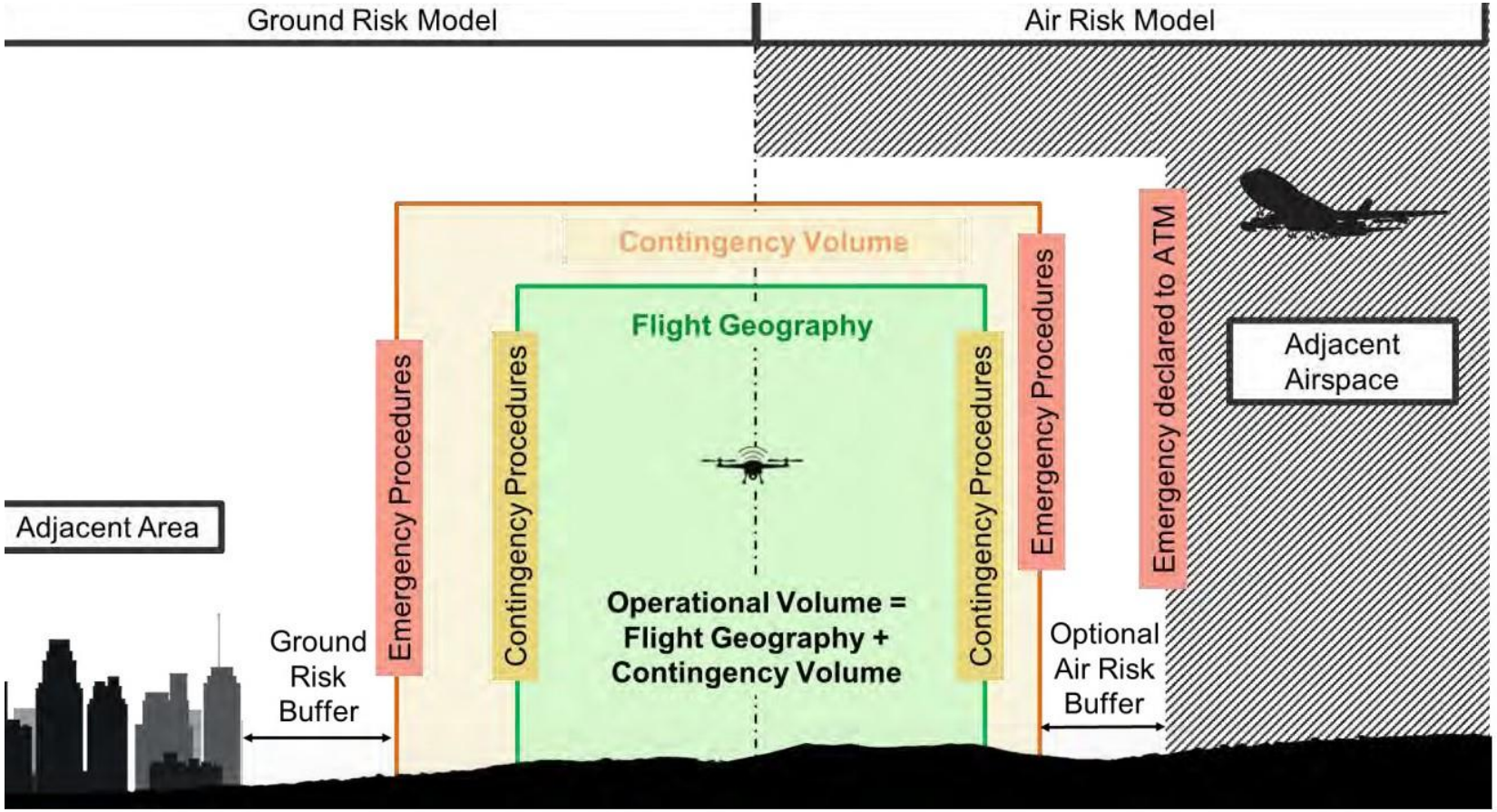
2. Flyvning efter operationel tilladelse

SORA, hvad er det

- Specific Operations Risk Assessment (SORA)
  - Udviklet i Joint Authorities for Rulemaking on Unmanned System (JARUS)
    - Mere end 60 landes luftfartsmyndigheder, EASA, FAA
    - Branchesupportpanel
  - Bowtie risikovurderingsmodel specielt tilpasset droneflyvning
    - Håndterer Ground Risk og Air Risk
    - Håndterer ikke privatlivets fred, security, cybersecurity
    - Anvendes på flyvninger i Specific kategori, ikke Open og Certified

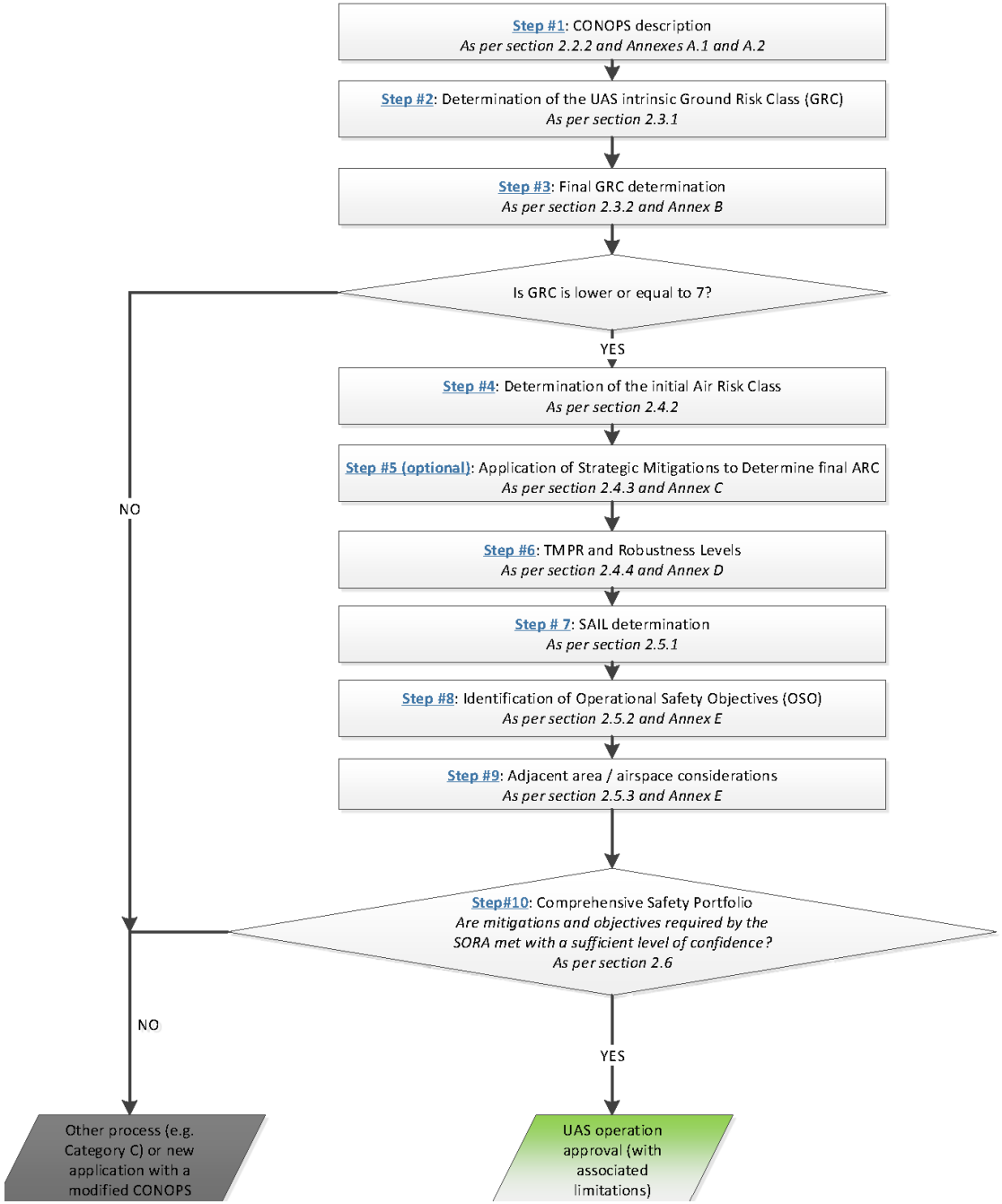
- Første komplette version af SORA netop udgivet
  - Vi kalder den version 2.0
  - Alle de ”operative” dele udgivet
  - Forklaring Annex udestår til dels
  - Planer for version 3.0 drøftes allerede
  - http://jarus-rpas.org/content/jar-doc-06-sora-package

SORA model


Ground Risk Model
Air Risk Model
Contingency Volume
Flight Geography
Emergency Procedures
Contingency Procedures
Contingency Procedures
Emergency Procedures
Emergency declared to ATM
Adjacent Airspace
Adjacent Area
Operational Volume =
Flight Geography +
Contingency Volume
Ground
Risk
Buffer
Optional
Air Risk
Buffer

SORA

10 trin i proces



SORA, step #1

- Beskriv in operation i en CONOPS
- Saml relevant teknisk, operationen og systeminformation som muliggøre at vurdere risikoen
  - SORA Annex A giver retningslinjer for hvad en CONOPS bør adressere

CONTENTS 2

SORA,

step #1, CONOPS

SORA, step #2

- Bestemme Intricsic (egentlige) Ground Risk Class (GRC)

Intrinsic UAS Ground Risk Class				
Max UAS characteristics dimension	1 m / approx. 3ft	3 m / approx. 10ft	8 m / approx. 25ft	>8 m / approx. 25ft
Typical kinetic energy expected	*< 700 J (approx. 529 Ft Lb)*	*< 34 KJ (approx. 25000 Ft Lb)*	*< 1084 KJ (approx. 800000 Ft Lb)*	*> 1084 KJ (approx. 800000 Ft Lb)*
Operational scenarios				
VLOS/BVLOS over controlled ground area	1	2	3	4
VLOS in sparsely populated environment	2	3	4	5
BVLOS in sparsely populated environment	3	4	5	6
VLOS in populated environment	4	5	6	8
BVLOS in populated environment	5	6	8	10
VLOS over gathering of people	7			
BVLOS over gathering of people	8			

Table 2 – Intrinsic Ground Risk Classes (GRC) Determination

- Kinetisk energi
  - Fixed wing droner, anvend cruise speed
  - Alle andre droner, terminal velocity (frit fald uden motor)
- Ved stor forskel mellem kinetisk energi og dimension, underbyg valg af class
- EVLOS flyvning anses som BVLOS for Ground Risk
- Man kan ikke vælge lavere risiko klasse hvis en operation foregår i eksempelvis befolket område men udelukkende over industri område, her vil klassen være befolket område
- Controlled area, område hvor kun aktive deltagere befinder sig

SORA, step #3

- Bestemme Final GRC
  - Man kan med M1, M2 og M3 mitigere risici for personer på jorden

		Robustness		
Mitigation Sequence	**Mitigations for ground risk**	Low/None	Medium	High
1	M1 - Strategic mitigations for ground risk[e]	**0: None -1: Low**	**-2**	**-4**
2	M2 - Effects of ground impact are reduced[f]	**0**	**-1**	**-2**
3	M3 - An Emergency Response Plan (ERP) is in place, operator validated and effective	**1**	**0**	**-1**

- Final GRC=Intrinsic + M1 + M2 +M2 (ex.: 5 -2 -1 +1=3)
- Man kan ikke reduce GRC lavere end VLOS/BVLOS over controlled area for pågældende størrelse drone
- Hvis Final GRC >7 understøttes ikke af SORA, operationen vil sandsynligvis falde i Certified kategori

SORA, step #3

- Bestemme Final GRC
  - Man kan med M1, M2 og M3 mitigere risici for personer på jorden
    - M1 handler om at reducere risikoen for personer ved buffer zone, tekniske krav til drone, tøjret drone o.l.
    - M2 handler om at reducere effekten af crash mod mennesker, eksempelvis faldskærm
    - M3 handler om handleplan for ulykke
    - Nærmere definition af M1, M2 og M3 findes i Annex B

		Robustness		
Mitigation Sequence	**Mitigations for ground risk**	Low/None	Medium	High
1	M1 - Strategic mitigations for ground risk[e]	**0: None -1: Low**	**-2**	**-4**
2	M2 - Effects of ground impact are reduced[f]	**0**	**-1**	**-2**
3	M3 - An Emergency Response Plan (ERP) is in place, operator validated and effective	**1**	**0**	**-1**

- Final GRC=Intrinsic + M1 + M2 +M2 (eks.: 5 -2 -1 +1=3)
- Ikke reducere GRC lavere end VLOS/BVLOS over controlled area
- Hvis Final GRC >7 understøttes ikke af SORA

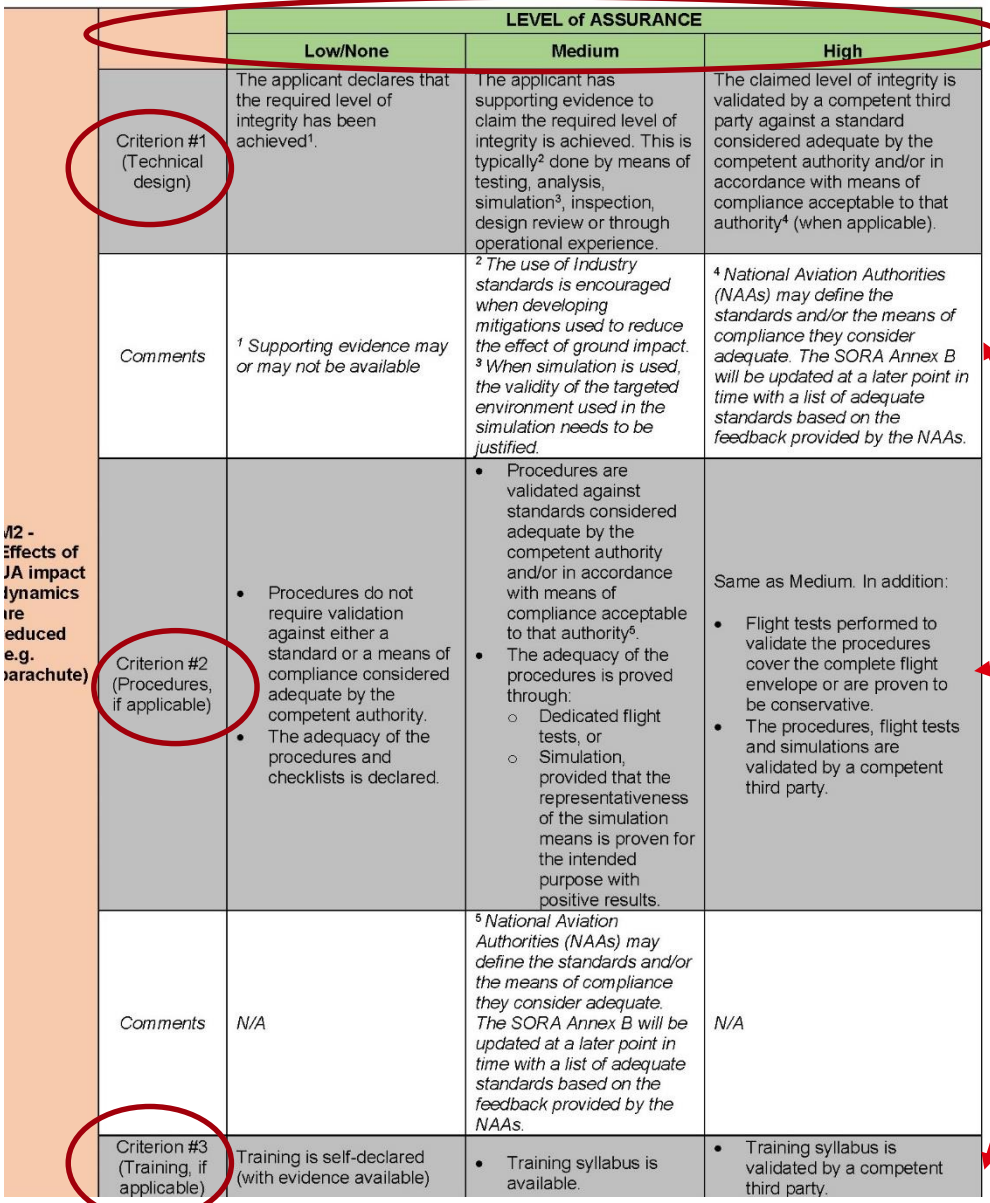
SORA, step #3, Annex B M2 eksempel

		LEVEL of INTEGRITY		
		Low/None	**Medium**	**High**
M2 - Effects of UA impact dynamics are reduced (e.g. parachute)	Criterion #1 (Technical design)	Does not meet the "Medium" level criterion	• Effects of impact dynamics and post impact hazards[1] are significantly reduced although it can be assumed that a fatality may still occur. • When applicable, in case of malfunctions, failures or any combinations thereof that may lead to a crash, the UAS contains all elements required for the activation of the mitigation. • When applicable, any failure or malfunction of the proposed mitigation itself (e.g. inadvertent activation) does not adversely affect the safety of the operation.	Same as medium. In addition: • When applicable, the activation of the mitigation, is automated[2]. • The effects of impact dynamics and post impact hazards are reduced to a level where it can be reasonably assumed that a fatality will not occur[3].
	Comments	*N/A*	*[1] Examples of post impact hazards include fires, release of high energy parts.*	*[2] The applicant retains the discretion to implement an additional manual activation function.* *[3] Emerging research and upcoming industry standards will help applicants to substantiate compliance with this integrity criterion.*
	Criterion #2 (Procedures, if applicable)	Any equipment used to reduce the effect of the UA impact dynamics are installed and maintained in accordance with manufacturer instructions.[4]		
	~~Comments~~ / Notes	*[4] The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (Table 7 below).*		
	Criterion #3 (Training, if applicable)	Personnel responsible for the installation and maintenance of the measures proposed to reduce the effect of the UA impact dynamics are identified and trained by the applicant.[5]		
	~~Comments~~ / Notes	*[5] The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (Table 7 below).*		

Niveau af forbedring

Alle anførte kriterier skal opfyldes for at opnå pågældende forbedring

SORA, step #3, Annex B M2 eksempel



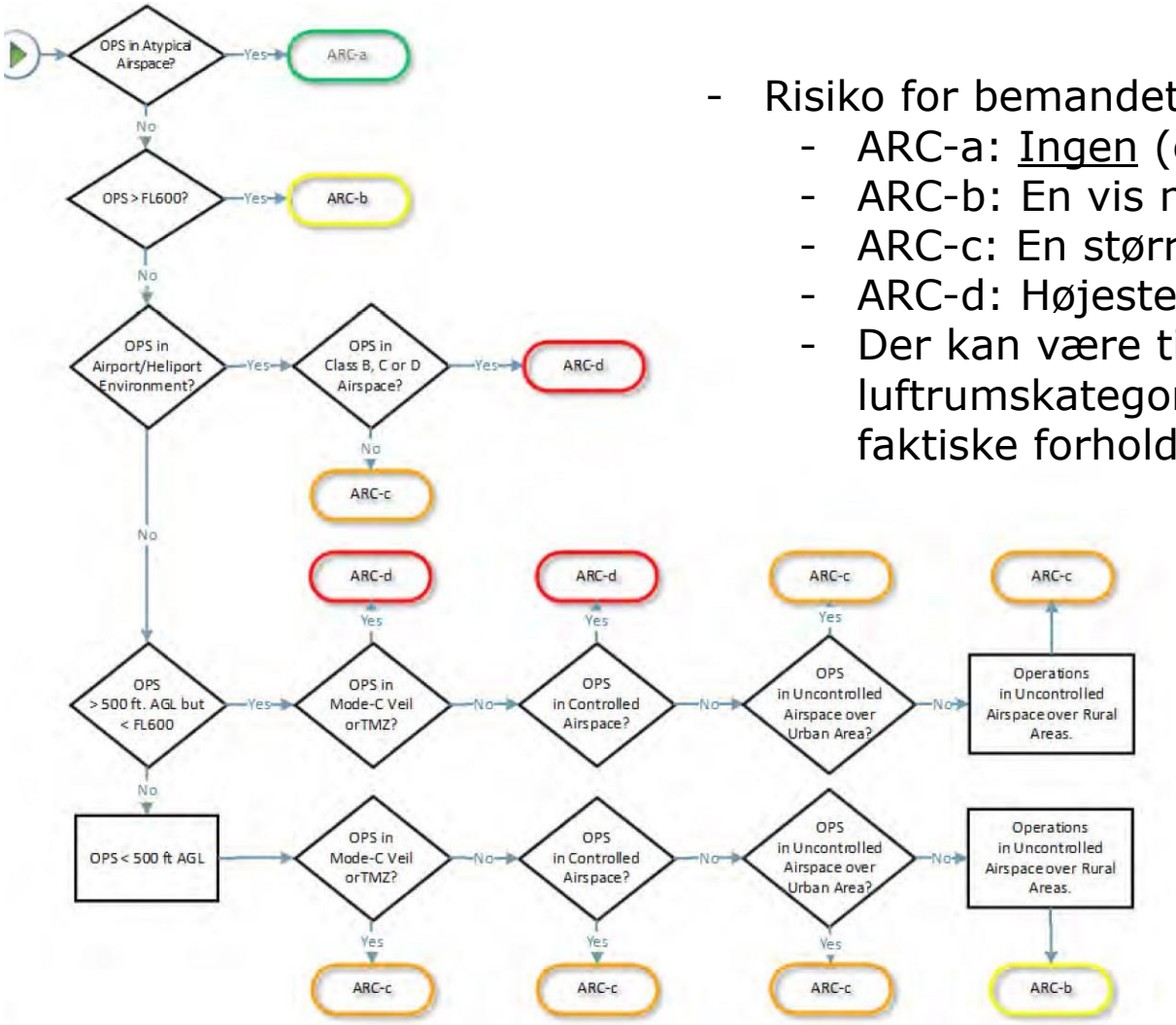
		LEVEL of ASSURANCE		
		Low/None	**Medium**	**High**
M2 - Effects of UA impact dynamics are reduced e.g. parachute)	Criterion #1 (Technical design)	The applicant declares that the required level of integrity has been achieved[1].	The applicant has supporting evidence to claim the required level of integrity is achieved. This is typically[2] done by means of testing, analysis, simulation[3], inspection, design review or through operational experience.	The claimed level of integrity is validated by a competent third party against a standard considered adequate by the competent authority and/or in accordance with means of compliance acceptable to that authority[4] (when applicable).
	Comments	*[1] Supporting evidence may or may not be available*	*[2] The use of Industry standards is encouraged when developing mitigations used to reduce the effect of ground impact. [3] When simulation is used, the validity of the targeted environment used in the simulation needs to be justified.*	*[4] National Aviation Authorities (NAAs) may define the standards and/or the means of compliance they consider adequate. The SORA Annex B will be updated at a later point in time with a list of adequate standards based on the feedback provided by the NAAs.*
	Criterion #2 (Procedures, if applicable)	• Procedures do not require validation against either a standard or a means of compliance considered adequate by the competent authority. • The adequacy of the procedures and checklists is declared.	• Procedures are validated against standards considered adequate by the competent authority and/or in accordance with means of compliance acceptable to that authority[5]. • The adequacy of the procedures is proved through: ○ Dedicated flight tests, or ○ Simulation, provided that the representativeness of the simulation means is proven for the intended purpose with positive results.	Same as Medium. In addition: • Flight tests performed to validate the procedures cover the complete flight envelope or are proven to be conservative. • The procedures, flight tests and simulations are validated by a competent third party.
	Comments	*N/A*	*[5] National Aviation Authorities (NAAs) may define the standards and/or the means of compliance they consider adequate. The SORA Annex B will be updated at a later point in time with a list of adequate standards based on the feedback provided by the NAAs.*	*N/A*
	Criterion #3 (Training, if applicable)	Training is self-declared (with evidence available)	• Training syllabus is available.	• Training syllabus is validated by a competent third party.

Niveau af ”bevis-førelse”

Alle anførte kriterier skal opfyldes for at opnå pågældende forbedring

SORA, step #4

- Bestemme Initial Air Risk



- Risiko for bemandet trafik
  - ARC-a: Ingen (eks.: lukket luftrum)
  - ARC-b: En vis mindre risiko
  - ARC-c: En større risiko
  - ARC-d: Højeste risiko
  - Der kan være tilfælde hvor denne luftrumskategorisering må tilpasses faktiske forhold

SORA, step #5

- Strategic Mitigation er mitigering som ikke kræver en løbende feedback
  - Når den er implementeret ”virker” automatisk indenfor de givne rammer
- Strategic mitigation of Air Risk, reduktion af Air Risk, to typer
  - Mitigering ved operative begrænsninger som er under kontrol af droneoperatør, eks.:
    - Flyve i en del af luftrum som reelt ikke udnyttes, det er implementeret i DK rundt større lufthavne
    - Flyve på et tidspunkt hvor luftrummet ikke udnyttes, udnyttes i vid udstrækning ved CPH
  - Mitigering ved luftrums struktur og regler som ikke er under kontrol af droneoperatør
    - Eksempelvis ved at TBST kræver alle luftfartøjer og droner i givet luftrum har noget specifikt udstyr der gør at alle kan se hinanden
- Annex C beskriver om og hvorledes man kan reducere Air Risk
  - Maximum et niveaureduktion

SORA, step #6

- Tactical Mitigation er mitigering som kræver en løbende feedback
  - Operatøren skal hele tiden være opmærksom på de output som mitigering giver
- Hvis man under eksempelvis BVLOS anvender et DAA system som strategic mitigation stilles følgende krav

Residual ARC	Tactical Mitigation Performance Requirements (TMPR)	TMPR Level of Robustness
ARC-d	High	High
ARC-c	Medium	Medium
ARC-b	Low	Low
ARC-a	No requirement	No requirement

- Annex D specificerer hvad disse krav indebærer

SORA, step #6

- Annex D specificerer hvad Low, Medium og High indebærer

	Function	TMPR Level				
		VLOS	No Requirement (ARC-a)	Low (ARC-b)	Medium (ARC-c)	High (ARC-d)
Tactical Mitigation Performance Requirements (TMPR)	Detect[1]	No Requirement	No Requirement	The expectation is for the applicant's DAA Plan to **enable the operator to detect approximately 50%** of all aircraft in the detection volume[2]. This is the performance requirement in absence of failures and defaults. It is required that the applicant has awareness of most of the traffic operating in the area in which the operator intends to fly, by relying on one or more of the following: • Use of (web-based) real time aircraft tracking services • Use Low Cost ADS-B In /UAT/FLARM[3]/Pilot Aware[3] aircraft trackers • Use of UTM Dynamic Geofencing[4] • Monitoring aeronautical radio communication (i.e. use of a scanner)[5]	The expectation is for the applicant's DAA Plan to **enable the operator to detect approximately 90%** of all aircraft in the detection volume[2]. To accomplish this, the applicant will have to rely on one or a combination of the following systems or services: • Ground based DAA /RADAR • FLARM [3/6] • Pilot Aware [3/6] • ADS-B In/ UAT In Receiver[6] • ATC Separation Services[7] • UTM Surveillance Service[4] • UTM Early Conflict Detection and Resolution Service[4] • Active communication with ATC and other airspace users[5]. The operator provides an assessment of the effectiveness of the detection tools/methods chosen.	A system meeting RTCA SC-228 or EUROCAE WG-105 MOPS/MASPS (or similar) and installed in accordance with applicable requirements.

SORA, step #7

- Final Specific Assurance and Integrity Levels (SAIL)= endelig risiko
  - Final GRC og Residual ARC bestemt i foregående steps, leder til SAIL

SAIL Determination				
	Residual ARC			
Final GRC	a	b	c	d
≤2	I	II	IV	VI
3	II	II	IV	VI
4	III	III	IV	VI
5	IV	IV	IV	VI
6	V	V	V	VI
7	VI	VI	VI	VI
>7	Category C operation			

SORA, step #8

- Med den endelige risiko fastlagt (SAIL), foreskriver SORA hvilken risikomitigering man skal have i form af Operational Safety Objectives (OSOs) #01 til #24
  - OSO #1 til #10 stiller tekniske krav til dronen og personellets træning i at anvende, vedligeholde dronen
  - OSO #11 til #13 handler om de eksterne systemer man anvender i operationen
  - OSO #14 til #20 handler om de menneskelige faktorer
  - OSO #21 til #24 handler det miljø/vejr som operationen foregår i
  - Eksempelvis OSO #1 og #2:

OSO Number (in line with Annex E)		SAIL					
		I	II	III	IV	V	VI
	Technical issue with the UAS						
OSO#01	Ensure the operator is competent and/or proven	O	L	M	H	H	H
OSO#02	UAS manufactured by competent and/or proven entity	O	O	L	M	H	H

SORA, step #8,

Annex E beskriver kravene til de enkelte OSO, her OSO #1:

TECHNICAL ISSUE WITH THE UAS		LEVEL of INTEGRITY		
		Low	**Medium**	**High**
OSO #01 Ensure the operator is competent and/or proven	Criteria	The applicant is knowledgeable of the UAS being used and as a minimum has the following relevant operational procedures: checklists, maintenance, training, responsibilities, and associated duties.	Same as Low. In addition, the applicant has an organization appropriate[1] for the intended operation. Also the applicant has a method to identify, assess, and mitigate risks associated with flight operations. These should be consistent with the nature and extent of the operations specified.	Same as Medium.
	Comments	*N/A*	*[1] For the purpose of this assessment appropriate should be interpreted as commensurate/proportionate with the size of the organization and the complexity of the operation.*	*N/A*

TECHNICAL ISSUE WITH THE UAS		LEVEL of ASSURANCE		
		Low	**Medium**	**High**
OSO #01 Ensure the operator is competent and/or proven	Criteria	The elements delineated in the level of integrity are addressed in the ConOps.	Prior to the first operation, a competent third party performs an audit of the organization	The applicant holds an Organizational Operating Certificate or has a recognized flight test organization. In addition, a competent third party recurrently verifies the operator competences.
	Comments	*N/A*	*N/A*	*N/A*

SORA, step #9

- Adjacent Area/Airspace consideration (omgivende område/luftrum)
  - Generelle krav til containment (blive i det tilsigtede område), gælder altid:

> 1. No probable[I] failure[J] of the UAS or any external system supporting the operation shall lead to operation outside of the operational volume.
>
> *Compliance with the requirement above shall be substantiated by a design and installation appraisal and shall minimally include:*
>
> *- design and installation features (independence, separation and redundancy);*
>
> *- any relevant particular risk (e.g. hail, ice, snow, electro-magnetic interference…) associated with the ConOps.*

SORA, step #9

- Adjacent Area/Airspace consideration, yderligere krav hvis en af følgende konditioner er tilstede
    - Omgivende område/luftrum
        - Omgivende område er forsamling af mennesker, med mindre godkendt til operere over forsamlinger eller
        - Omgivende luftrum er ARC-d med mindre godkendt til at operere i ARC-d
    - I befolket (bymæssigt) område
        - M1 anvendt til at reducere initial GRC
        - Operationen foregår over controlled area

1. The probability of leaving the operational volume shall be less than 10^{-4}/FH.

2. No single failure[k] of the UAS or any external system supporting the operation shall lead to operation outside of the ground risk buffer.

Compliance with the requirements above shall be substantiated by analysis and/or test data with supporting evidence.

3. Software (SW) and Airborne Electronic Hardware (AEH) whose development error(s) could directly lead to operations outside of the ground risk buffer shall be developed to an industry standard or methodology recognized as adequate by the competent authority.

SORA, step #10

- Samle alle mitigationer fra de forskellige steps:
  - Mitigering til at reducere initial GRC (M1, M2, M3)
  - Strategic Mitigations for initial ARC
  - Tactical Mitigations for ARC
  - Operational Safety Objectives (OSOs)
  - Adjacent Area/Airspace
- Ansøger vurdere om man samlet set kan ”leve med” disse mitigeringer
  - Hvis ikke må man overveje at gennemføre operationen på en anden måde
- Fremsende ansøgning til myndighed med relevant underbygning
  - CONOPS
  - Risikovurdering
  - Hvorledes man opfylder de identificerede mitigeringer

3 måder at operere i Specific kategori

1. Erklæring om at følge et prædefineret standard scenarie
   - Disse standard scenarier bliver offentliggjort af EASA
   - Første scenarier forventes at foreligge ultimo 2019

2. Operationel tilladelse
   - Udarbejdet på baggrund af ansøgning med risikovurdering og mitigerende foranstaltninger

3. Hvis droneoperatøren er indehaver af et LUC (Light UAS operator Certificate)
   - Giver rettighed til at indehaver selv kan ”godkende” operationer

Flyvning med LUC

- For at få et LUC skal man have
  - Et management system, herunder et Safety Management System (SMS) som bl.a. skal sikre
    - Safety rapporter og interne undersøgelser
    - Kontrol med operationer
    - Kommunikation om safety
  - Have Compliance monitor funktion
  - Have en driftshåndbog for organisationen
  - Have ekspertise i risikovurdering (SORA)
  - Have logs i minimum 3 år af
    - de SORA analyser man har gennemgået
    - De mitigerende foranstaltninger man tager
    - Kvalifikationer for de personel der har været involveret i operationerne
- Når TBST udsteder et LUC vil det specificere rettigheder
  - Det kunne eksempelvis være at LUC må egengodkende operationer op til et SAIL niveau e.l.
- En LUC operatører vil være underkastet fast tilsyn af TBST

Krav svarende til eksempelvis helikopter operatør der udfører special operationer

Implementering af EU-regulering vedr. droner

Forordninger

EU-regulering

- COMMISSION IMPLEMENTING REGULATION (EU) …/… of XXX on the rules and procedures for the operation of unmanned aircraft:
    - Fastsætter regler for flyvning (operationer) med droner

- COMMISSION DELEGATED REGULATION (EU) …/… of XXX on unmanned aircraft and on third-country operators of unmanned aircraft system:
    - Fastsætter regler for produktkrav til droner i open category samt krav om markedskontrol af disse

Implementering af EU-regulering vedr. droner

Dansk lov

Luftfartsloven

- Loven skal ændres. Bestemmelser som er i modstrid med EU-forordningerne skal ophæves

Implementering af EU-regulering vedr. droner

Dansk lov

Dronebekendtgørelserne

- Landdronebekendtgørelsen og bydronebekendtgørelsen skal ophæves

- Udstedelse af ny dronebekendtgørelse som samler alle supplerende nationale bestemmelser for alle droneoperationer

Implementering af EU-regulering vedr. droner

Hvad gør vi?

Tværministeriel koordinationsgruppe

- Branchen inddrages
- Udarbejdelse af national supplerende regulering, herunder vedr. privatlivets fred, sikkerhed, databeskyttelse mv
- Lovprocessen

Implementering af EU-regulering vedr. droner

Hvad gør vi?

Lovprocessen

- Ændring af luftfartsloven – juni 2020
- Udarbejdelse af ny dronebekendtgørelse – juni 2020

Implementering af EU-regulering vedr. droner

Overgangsbestemmelser

Nuværende praksisser som berøres af EU-regulering

- Ingen skelnen mellem professionelt øjemed/ikke professionelt formål
- Anmeldelse 24 timer før operation til politi
- Flyvehøjde fastsættes til 120 m over hele landet
- Regler vedr. overflyvning af afgrænset ejendom
- Afstandskrav til veje, jernbaner m.v.
- Flyvning i naturfølsomme områder