



Roadmap to UAS Operations in Norwegian Airspace



WS 10 Participants

| | | | | | | | |
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Responsible for coordinating UAS matters in the Norwegian Civil Aviation Authorities:

-Operational Department
-General Aviation section

- Thomas Hytten
 - ◆ Head of Section
- Morten Raustein
 - ◆ Flight operations inspector
 - ◆ UAS Point of contact for Norw. CAA
- Jack Farstad
 - Technical Inspector
 - UAS Technical matters



Current Situation:

- No adapted UAS regulations
- Individual treatment of applications
 - ◆ Level of safety must be assessed as acceptable
- A common wish to get regulations ASAP!!

What do we do today?

AIC N 25/09 published in June containing:

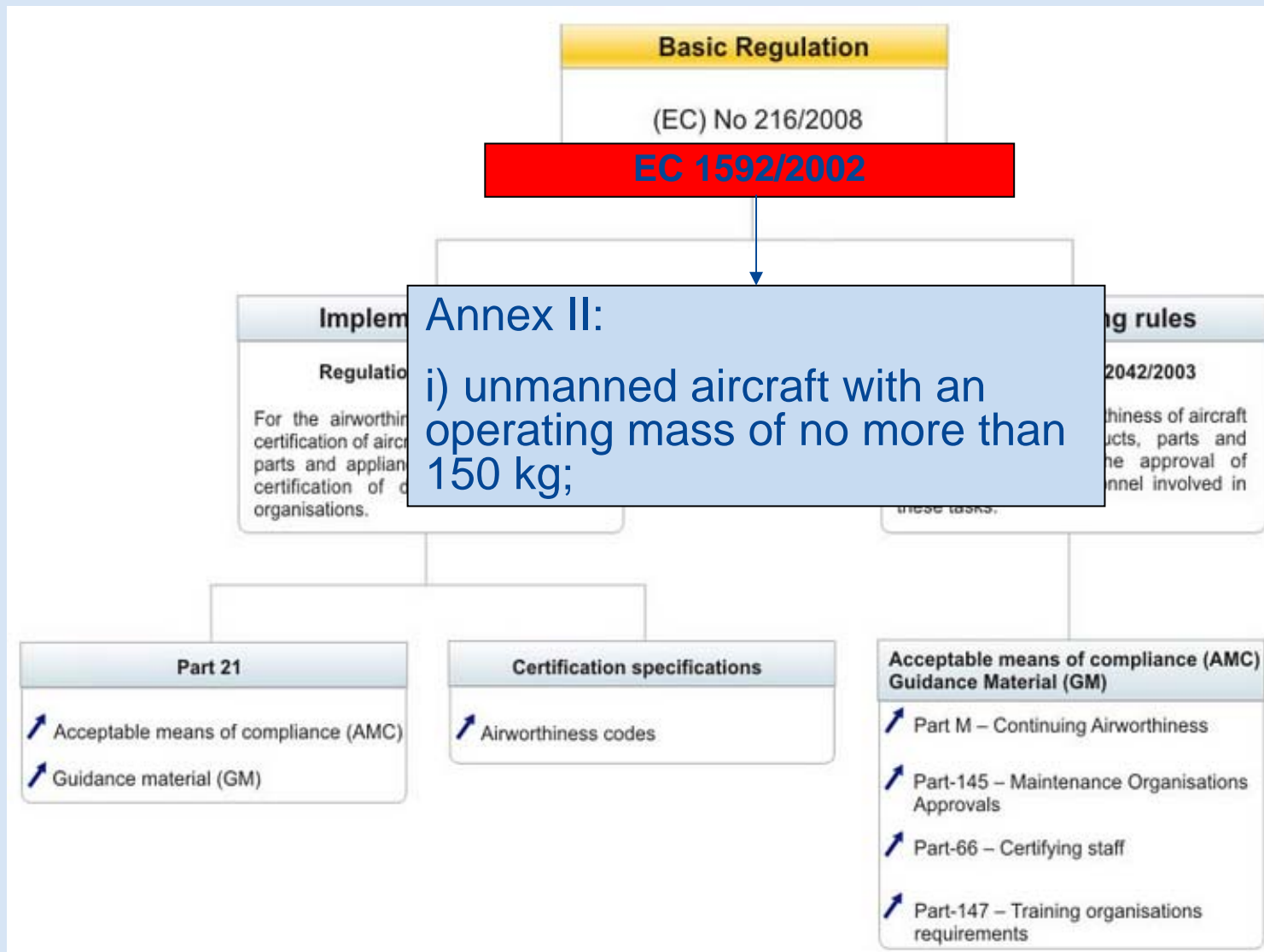
- Description of CAA's perception of current status and challenges
- Short description of the planned regulation structure
- Short description of current requirements for UAS operations in Norwegian Airspace

AIC N 25/09

Criteria for UAS operations:

Individual treatment of each application, based on:

- Thorough description of the planned operations
- Risk analysis with mitigating actions/factors
- Insurance for 3rd person damage
- If ops BLOS or above 400ft; Segregated airspace
- Applications to postmottak@caa.no /snailmail to CAA
- (..or after prior arrangement: mra@caa.no)





Some work has been done...

- CAP 722 “Unmanned Aircraft System Operations in UK Airspace—Guidance”
- Swedish regulations valid 1.Dec 09
- Several industrial and regulatory working groups

Norwegian regulations will be based on:

- Existing principles
- General procedures
- Expected developments
- Similar European regulations
- Possibility of "crossborder" operations
- Adaption to EASA regulatory structure

CAP 722: General Policy

- It is CAA policy that UAS operating in the UK must meet **at least the same safety and operational standards as manned aircraft**. Thus, **UAS operations must be as safe as manned aircraft** insofar as they must not present or create a greater hazard to persons, property, vehicles or vessels, whilst in the air or on the ground, than that attributable to the operations of manned aircraft of equivalent class or category.



Definition (ICAO)

- ♦ Aircraft:
Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

**The Norwegian
"Luftfartsloven" (Air Law)
does NOT define the term
"Aircraft".**

Challenges ahead...

- Airspace issues
- Integration with manned air traffic
- Classification of UAV's
- Allocation of frequencies
- Relevant competence/education for the operators
- Adapted demands to the organisations
- Technological development and certification issues

Tentative timeline 2009

2009

| Jan | Feb | Mar | Apr | Mai | Jun | Jul | Aug | Sep | Okt | Nov | Des |
|--------------------------|-----|-----|-----|-------------------------------|-----------|-----|-----|---------------------------|-----|-----|-----|
| Case-by-case permissions | | | | | | | | | | | |
| | | | | | AIC 25/09 | | | | | | |
| | | | | Regulation production phase 1 | | | | | | | |
| | | | | | | | | Intro of reporting system | | | |

2010

| Jan | Feb | Mar | Apr | Mai | Jun | Jul | Aug | Sep | Okt | Nov | Des |
|--|------------|-----|--|-----|-----|-----|-----|-------------------------------------|---------------------------|-----|-----|
| Case-by-case permissions | | | | | | | | | | | |
| | | | | | | | | AIC | | | |
| Reg. prod. phase 1 | | | Public hearing and assessment of answers | | | | | Regulation intro and implementation | | | |
| | Workshop 1 | | | | | | | Workshop 2 | Approval of organizations | | |
| Introduce and establish a reporting system for UAS related incidents/accidents | | | | | | | | | | | |

2011

| Jan | Feb | Mar | Apr | Mai | Jun | Jul | Aug | Sep | Okt | Nov | Des |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Enforcement of regulations | | | | | | | | | | | |
| Approval of organizations | | | | | | | | | | | |
| Utilize reports to identify trends and spesific problem areas | | | | | | | | | | | |

Tentative timeline 2010

2009

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|--------------------------|-----|-----|-----|-----------------------------|-----------|-----|-----|---------------------------|-----|-----|-----|
| Case-by-case permissions | | | | | | | | | | | |
| | | | | | AIC 25/09 | | | | | | |
| | | | | Regulation production phase | | | | | | | |
| | | | | | | | | Intro of reporting system | | | |

2010

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| Regulation production phase | | | | | | | | Public hearing and assessment of answers | | | |
| | Workshop 1 | | | | | | | | | | |
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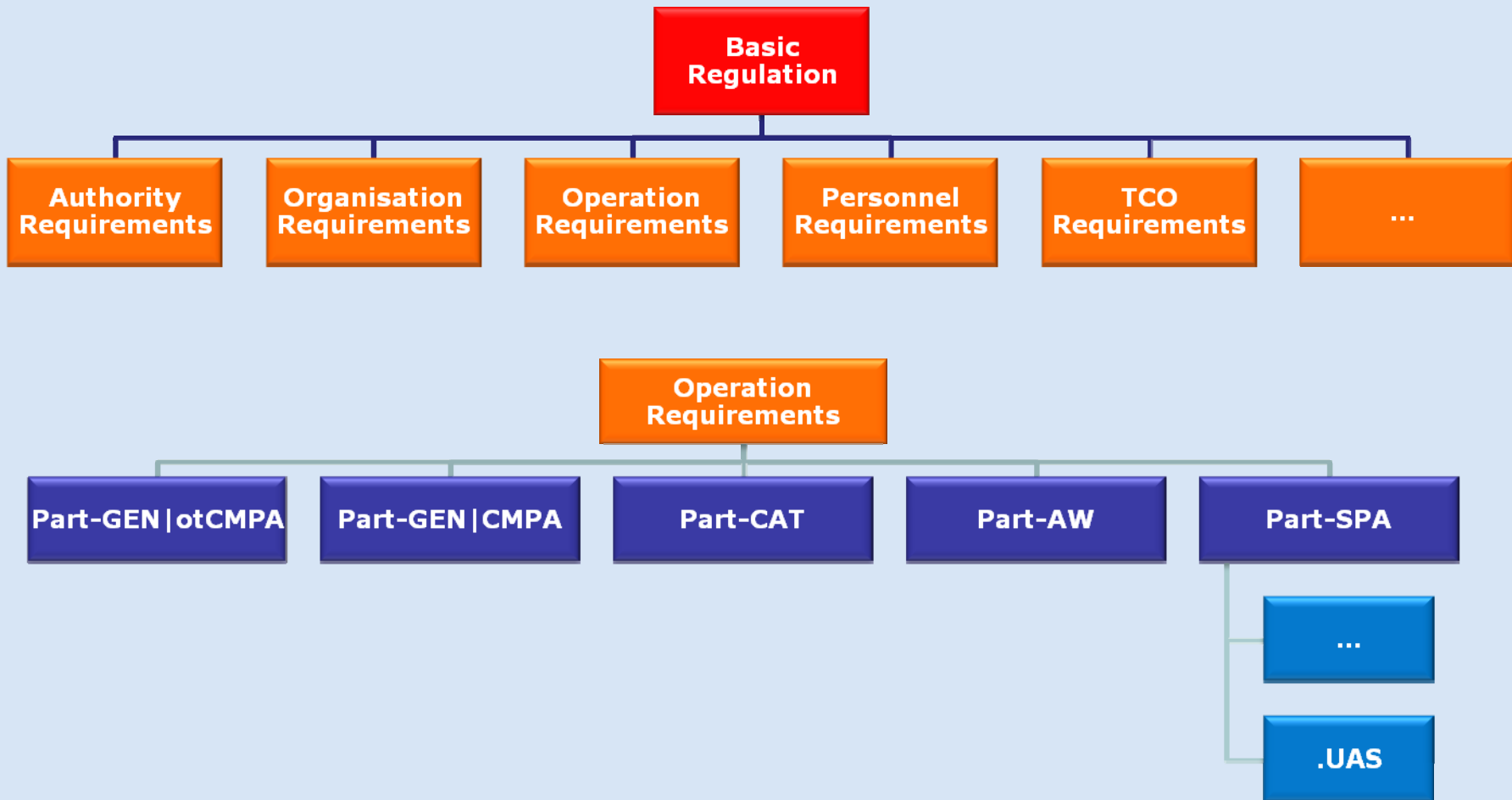
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| Utilize reports to identify trends and spesific problem areas | | | | | | | | | | | |

Norwegian UAS regulation Draft

- Structure based on EU-Ops
- EU-Ops requirements adapted to UAS conditions
- General overarching requirements; -valid for all UAS ops
- Long list of specific requirements
 - Simpler operations; - shorter list of valid req's, and vice versa
 - GAT/"file & fly" operations; - All requirements valid!

EASA rule structure



Guiding principles

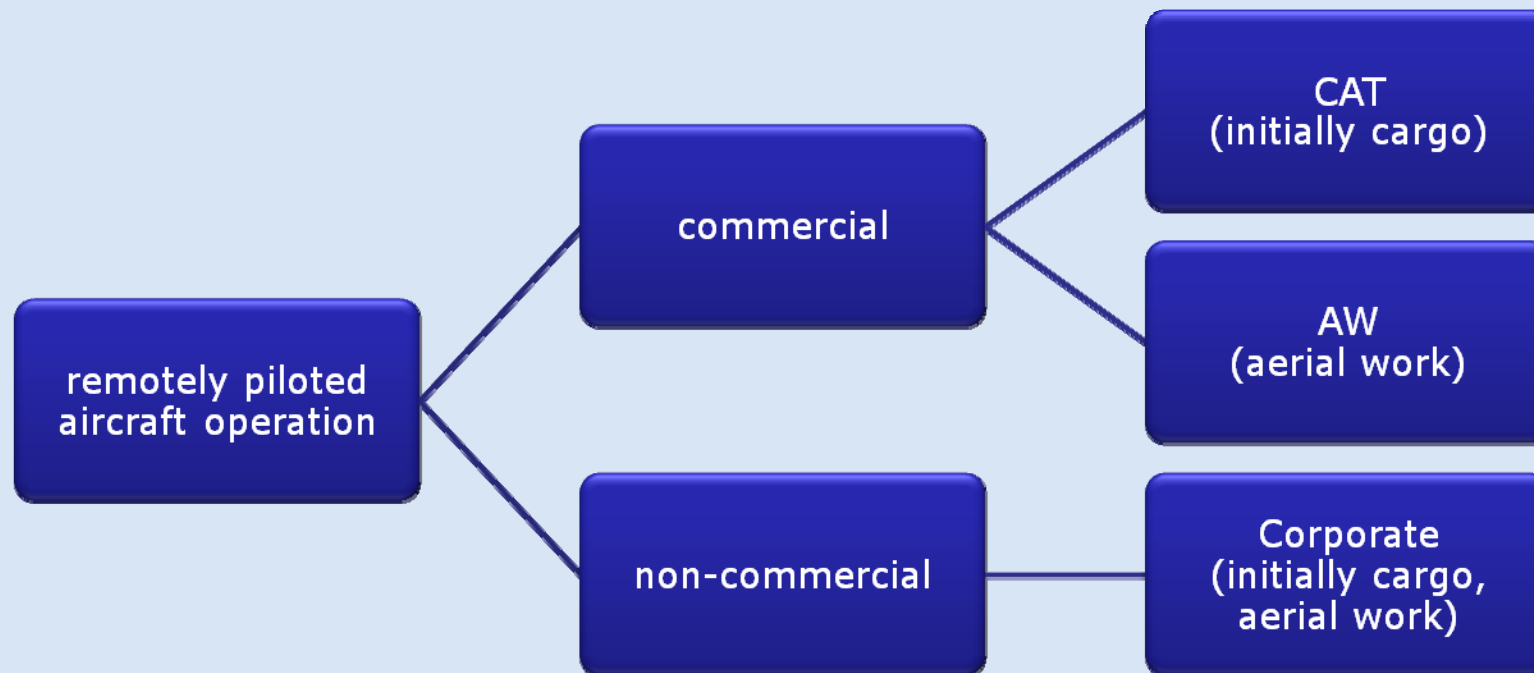
Operational rules | initial concept

- ▶ Guiding principles
 - ▶ attain the same level of safety as aircraft with a pilot on board
 - ▶ not negatively affect the efficiency of aircraft operations with a pilot on board
 - ▶ be interoperable with existing operational requirements
 - ▶ be predictable to other airspace users and ATC
 - ▶ Current PIC needs to be attained
 - ▶ be integrated into non-segregated airspace in a phased approach

OPS

Operational rules | types of operations

- ▶ Initial considerations



Operational rules | initial concept

- ▶ Adapted rules for operating procedures (OP)
 - ▶ Pre-flight checks, in-flight checks, post-flight checks
 - ▶ Single pilot station operations
(in the future: multi pilot stations operations)
 - ▶ PIC responsibilities
(in the future: handover of PIC responsibilities for multi pilot stations operations)
 - ▶ Communication between PIC and ATC
 - ▶ Interception requirements

Operational rules | initial concept

- ▶ Adapted rules for instruments, data, equipment (IDE)
 - ▶ Sense and avoid capability
 - ▶ Adequate replacement of the on board pilot sensation
 - ▶ Equipment of pilot station
 - ▶ C2 (Command and control) link
 - ▶ Communication architecture with ATC
 - ▶ Forced landing capabilities
 - ▶ Emergency recovery capabilities
 - ▶ FDR

Operational rules | initial concept

- ▶ Adapted rules for operators (OR.OPS)
 - ▶ OPS manual
 - ▶ Operator training requirements for the crew
 - ▶ Flight crew composition
 - ▶ Flight time limitations



Presentation of the UAS regulation draft...

UAS classes, Suggestion 1

| Klasse | Vekt Kg | Anslags energi | VLOS | BLOS | > 400 | > 500 | Bebygde | Ikke bebygde /Sjø | LT Tillatelse | Sertifisert | Segregert | Ikke segregert |
|--------|---------|----------------|------|------|-------|-------|---------|-------------------|---------------|-------------|-----------|----------------|
| 1 | <1,5 | 150J | x | x | x | x | x | x | (*) | | x | x |
| 1A | 1,5-7 | 1000J | x | | | | | x | (*) | | | x |
| 1B | 1,5-7 | 1000J | x | | x | x | x | x | x | | x | x |
| 1C | 1,5-7 | 1000J | | x | x | x | x | x | x | | x | (x*) |
| 2A | 7-12 | ? | x | | | | | x | (*) | | | x |
| 2B | 7-12 | ? | x | | x | x | x | x | x | | x | x |
| 2C | 7-12 | ? | | x | x | x | x | x | x | | x | (x*) |
| 3A | 12-70 | ? | x | | | | | x | (*) | | | x |
| 3B | 12-70 | ? | x | | x | x | x | x | x | x | x | x |
| 3C | 12-70 | ? | | x | x | x | x | x | x | x | x | (x*) |
| 4A | 70-150 | ? | x | | x | x | | x | x | | | x |
| 4B | 70-150 | >95KJ/>70 kt | | x | x | x | x | x | x | x | x | |
| 4C | 70-150 | >95KJ/>70 kt | x | x | x | x | x | x | x | x | x | (x*) |

UAS classes, Suggestion 1, (continued)

**Class is determined by the highest value of either of the criteria.
(Relevant values must be determined)**

(*) All commercial UAS activity needs an initial “approval” (“~AOC”), but each operation does not need special approval unless other specific requirements deem it necessary (e.g. ops IVO airports, etc.)

(x*) Operations possible in segregated and/or controlled airspace, but in uncontrolled and/or non-segregated airspace only if “detect & avoid” capable

UAS specially built or modified for research, experimenting or scientific purposes, meant to be built in small numbers and state, but not military operations, is subject to CAA approval if not covered by these regulations.. (This will be valid for all suggestions.)

UAS classes, Suggestion 2

| | |
|------------------|--|
| Klasse 1 | "Inherently unarmful" BLOS and VLOS (Values for weight and energy to be decided.) |
| Klasse 1A | VLOS, Below 400ft, within 500m radius |
| Klasse 1B | As 1A, but "certified" to overfly populated areas |
| Klasse 2A | BLOS in segregated and specifically approved controlled airspace |
| Klasse 2B | As 2A, but "certified" to overfly populated areas |
| Klasse 3 | Fully integrated with certification and detect & avoid capability |

UAS – FCL Suggestion 1

(Based on UAS Norway documentation)

- **Basic :** VLOS, Less than ?kg, 400ft, 500m
Rules & Reg's, basic knowledge
- **Standard :** VLOS, Segregated,
~PPL
- **Advanced:** BLOS, Segregated,
~PPL +IR
- **Professional:** BLOS, Non-segregated, GAT/OAT
~CPL +IR
- **Instructor:** For each type, class, or for all classes?

UAS – FCL Suggestion 2

(Based on JARUS documentation)

- **Student**
Training incl. Solo
- **UAV VLOS**
VLOS, Non-pop, within 400ft, 500m
- **UAS BLOS-VFR**
BLOS, Segregated airspace
- **UAS BLOS-IFR**
BLOS, Non-Segregated airspace
- **UAS Type rating**
For ops of a specific UA
- **Instructor rating**
For instruction to type/class
- **Examiner**
Issue certificates

UAS – Medical Suggestions

- Suggestion 1
 - ◆ VLOS – Car/Bus/Truck or Micro
 - ◆ BLOS – ATC Controller
- Suggestion 2
 - ◆ VLOS – PPL (Class 2)
 - ◆ BLOS – CPL (Class 1)
- CAA medical expertise has the final word!



QUESTIONS?