www.sdu.dk/uas

Brad Beach
Center Leader
SDU UAS Center
brbe@mmmi.sdu.dk

SDU

SDU UAS Center

Vision: "By 2020, the SDU UAS Center is a premier location for maximizing societal benefit through excellence in UAS education, research, and innovation."

- Established in 2015
- Focus on **education, research and innovation** in the UAS domain.
- Brings together experts in robotics, computer vision, physics, software engineering, cyber-physical systems, industrial design and mechanical engineering.
- Master degree specialization in drone technology.

SDU

Collaboration partners

UAS DENMARK
INTERNATIONALT TESTCENTER & KLYNGE

- Developing potential and possibilities for the Danish drone industry.
- Laboratory & test flight facilities.

Trafik- og Byggestyrelsen
Danish Transport and Construction Agency

- DK & EU drone legislation
- Beyond Visual Line of Sight (BVLOS) drone flights
- UAS Traffic Management (DroneID project)

SDU

SDU UAS Center
Research

- BVLOS (beyond visual line of sight)

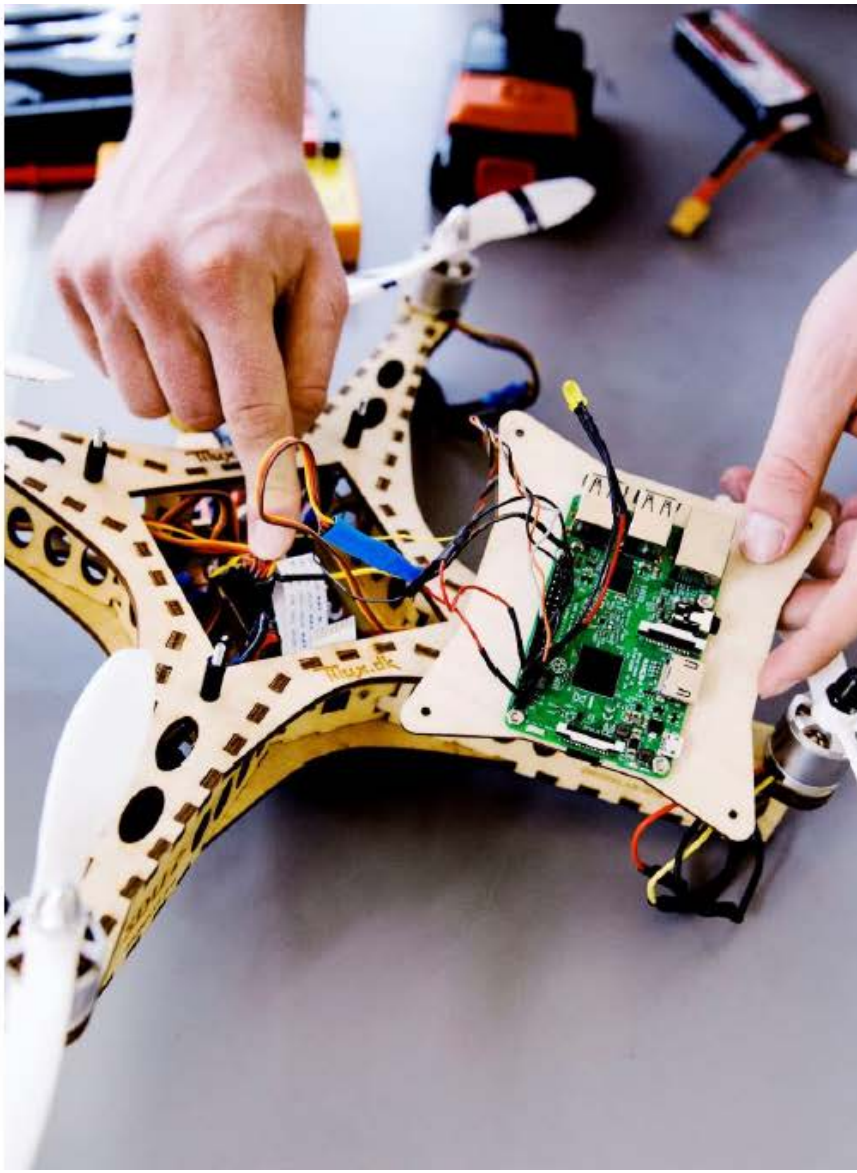
Development of BVLOS-technologies is essential for the use of drones within agriculture, inspections, the environment etc.

- Autonomy

Development of autonomous drones which can navigate safely and autonomously in the air and divert obstacles.

- Sense and Avoid Systems

Explore and avoid challenges in the air by means of bio-inspired echolocation from bats and optic flow from insects.



SDU

UAS DENMARK
INTERNATIONALT TESTCENTER & KLYNGE

SDU

Test Center Mission

- Organize, Plan, Execute, Collect, Analyse, and Report tests for a diverse array of unmanned systems
  - Fixed-wing
  - Multi-rotor
  - Swarm

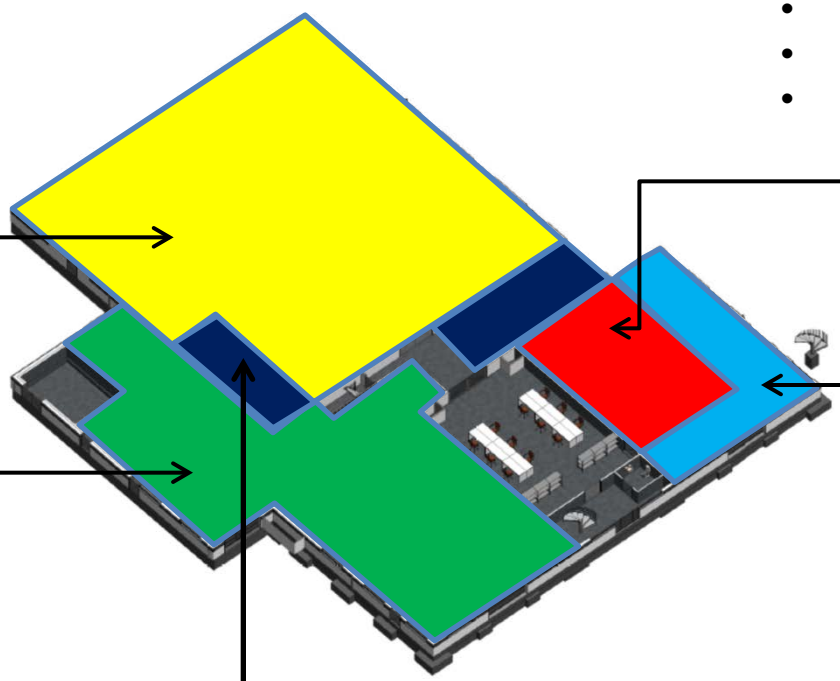
- Support national and International customers to advance the drone industry

Aerial Systems Laboratory

- *Located at Hans Christian Andersen Airport, 15km from SDU*
- *2200 m^2*
- *Access to designated airspace*

Indoor visual and acoustic control field – Aerial and ground robotics

Systems Integration Lab
- Simulation
- Software in the loop (SIL)
- Hardware in the loop (HIL)
- Functional Testing



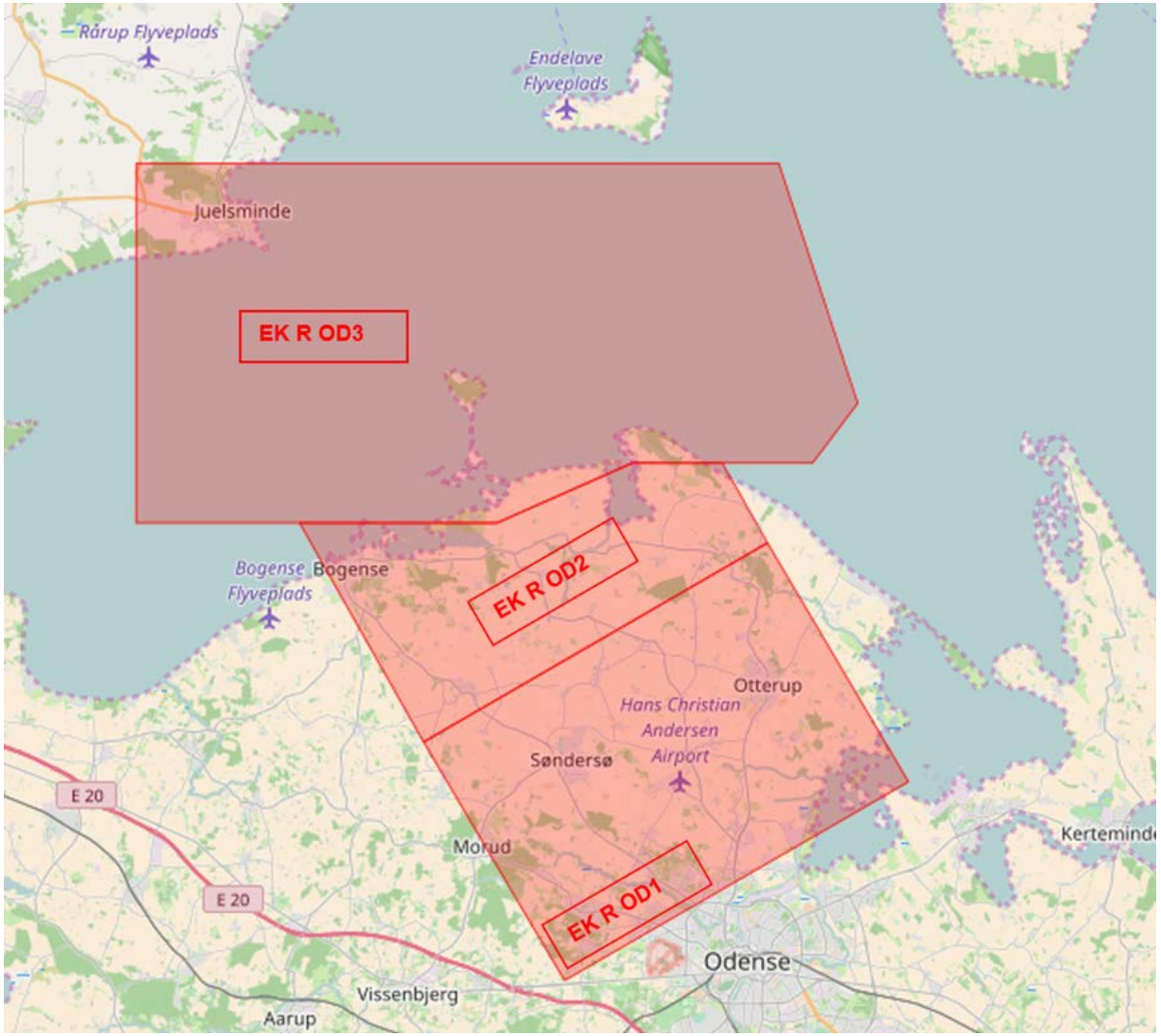
Composite Lab
- Development
- Prototype
- Manufacturing

”The Zoo”
- Mutli-rotor & fixed-wing
- Payloads
- Software

Dedicated Office Space
- Researchers
- Co-developers
- Start-ups/incubator

SDU

Drone Operating Airspace



OPEN:

Low risk

Without involvement of Aviation Authority

Limitations (Visual line of sight, Maximum Altitude, distance from airport and sensitive zones)

Flight over Populated area is possible if:

No overflying of crowds

Industry standards (Case of toy of less than 500 g)

SPECIFIC

Increased risk

Safety risk assessment

Approved by NAA possibly supported by Qualified Entities unless approved operator with privilege

Operation Authorisation with operations manual

Concept of accredited body

Airworthiness of drone and competence of staff based on risk assessment

CERTIFIED

Comparable to manned aviation

Limit between specific and certified is not yet defined

Pending criteria are defined, EASA accept application in its present remit

TC, C of A, Noise certificate, Approved Organisations, licences (Case of small drones)

Command and Control and Detect & Avoid can receive an independent approval

SDU

JARUS guidelines on Specific Operations Risk Assessment (SORA)

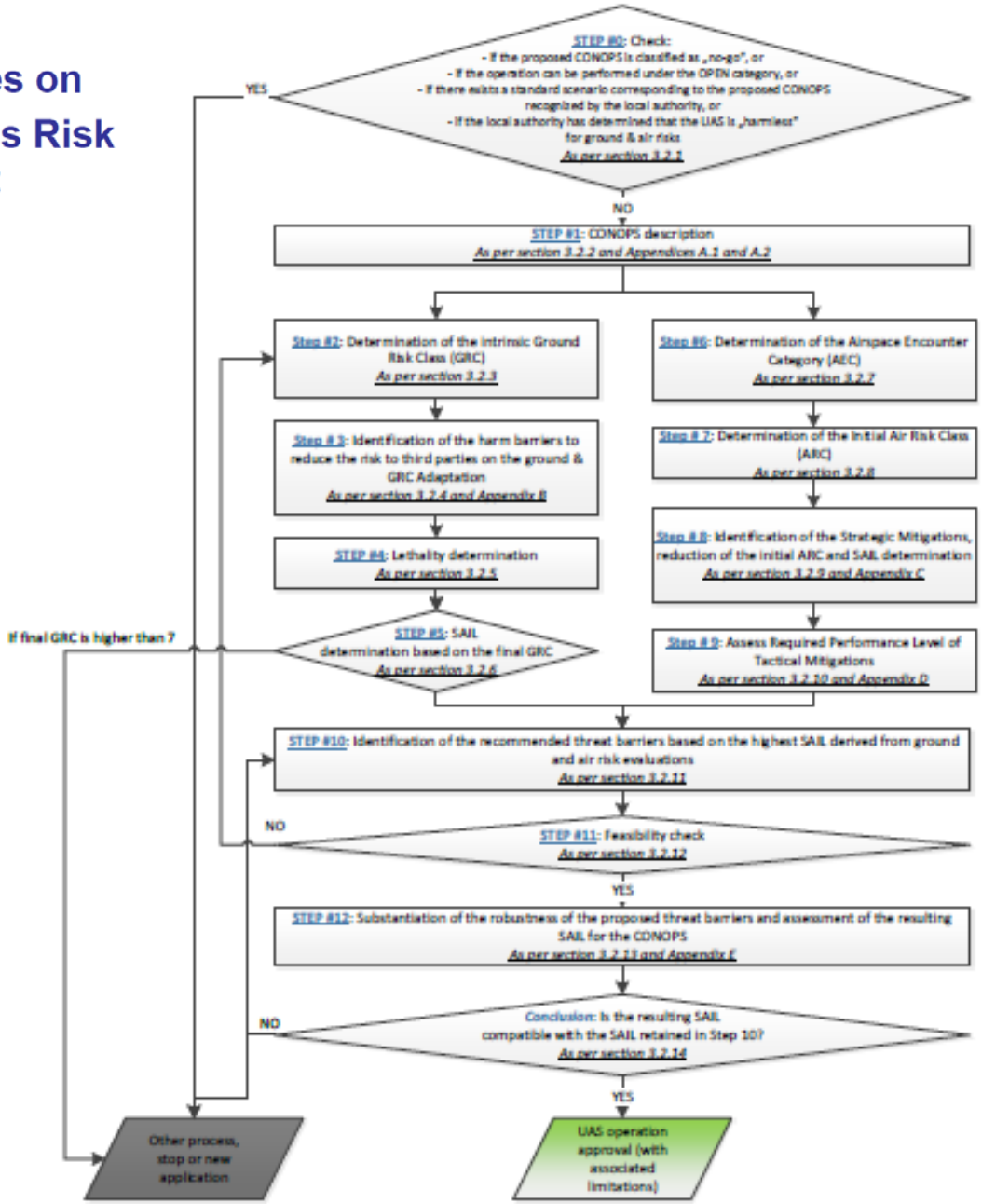
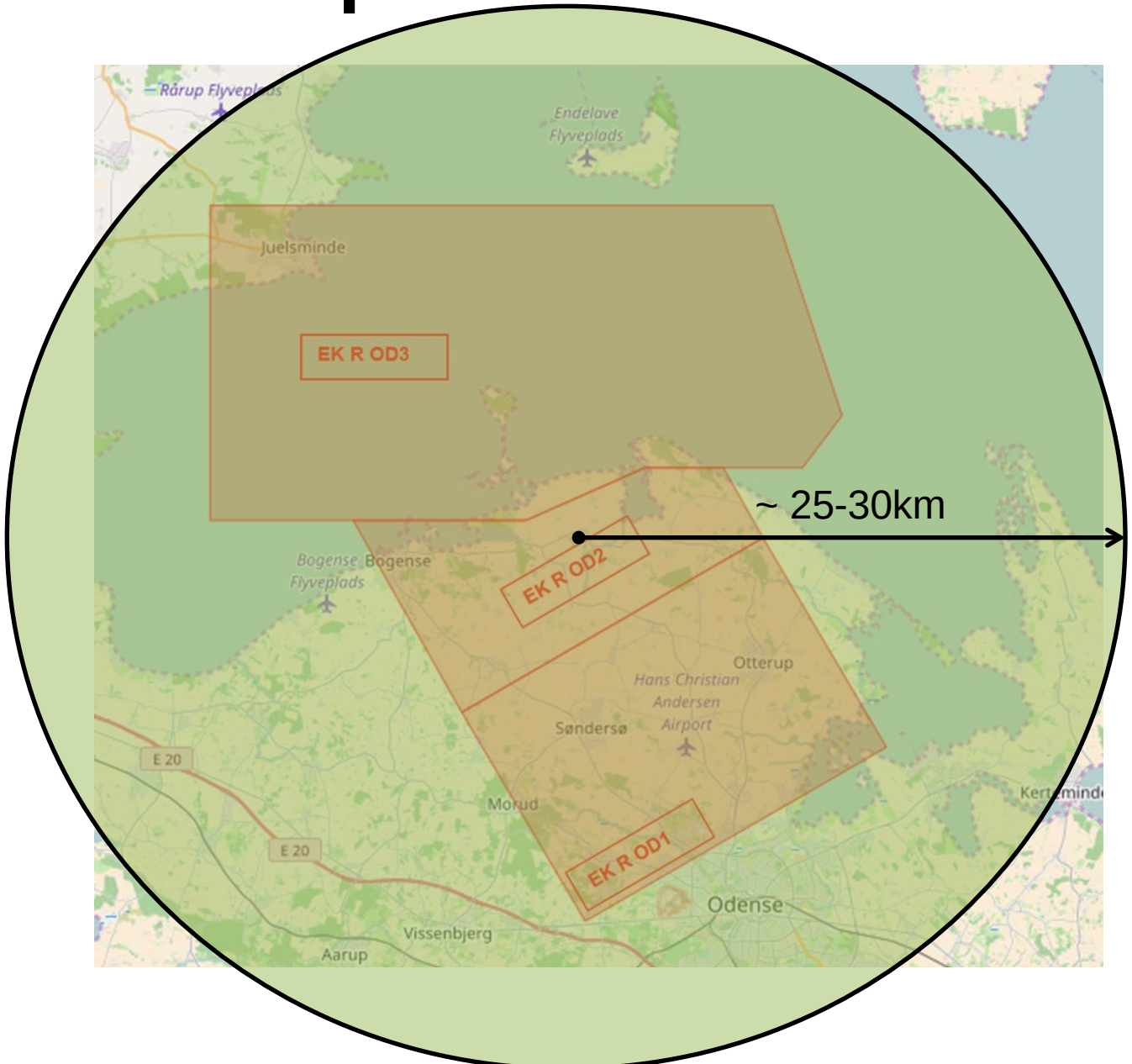


Figure 7 – The SORA process

SDU

RADAR Requirement



SDU


ping
ping 2020
ping 1090
uAvionix
ping
FY
FY
FCC Approved ADS-B
UK CAP 1391 ECD
FCC Approved Mode S Transponder
TSO Certified GPS

SDU

UAS DENMARK
INTERNATIONAL TEST CENTER & CLUSTER

LARGE SCALE EU DEMONSTRATION

HOW WILL THE AIRSPACE OF THE FUTURE BE CONTROLLED

- Project manager: Eurocontrol
- Great number of test flights in The Netherlands, France – and in Odense in 2018-19
- Other project members. E.g.:

AIRBUS GROUP
DRONES PARIS REGION
integra Aerial Services
NAVIAIR
orange™
UNIFLY

Thank you

Brad Beach
Center Leader
SDU UAS Center
brbe@mmmi.sdu.dk