# Course notes, module 7, week 44

UAS safety & risk assessment

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## 1 Agenda

- Mid-term evaluation.
- Module theory.
- Exercises.

## 2 Mid-term evaluation

It is time to perform a midterm evaluation of the IDT course. Here is the procedure that we will follow:

1. You will temporarily be divided into new teams.
2. Within the team you will discuss the topics listed below. The objective is to reach a conclusion within the team and list suggestions for improvements.
   - learning goals
   - level of difficulty
   - teaching methods
   - teaching materials
   - own performance

   One team member should be appointed as referent posting conclusions and suggestions to this document.
3. At the beginning of next module we will briefly discuss key points provided in your evaluation.

## 3 Module theory

This module deals with UAS safety & risk assessment, more specifically it deals with the Specific Operations Risk Assessment (SORA) of the EU drone regulation that came into force on January 1st 2021.

The relevance of being familiar with the EU regulation and the SORA process for a drone engineer cannot be overstated. Complex drone operations such as BVLOS flights require approval from the national state Civilian Aviation Authority (CAA) based on either the SORA or one of the Standard Scenarios, which are closely aligned with the SORA.

The theory for this module is available as the current SORA document and a sequence of short video clips in the course materials. The video clips were made in 2020 during the COVId-19 online teaching. With a few minor exceptions the information is still valid, however fortunately we also have the opportunity of discussing this in class this time. I suggest that you use the video clips as a reference source of information where relevant. The most relevant part of the SORA document is page 11-31.

`01_eu_regulation` Structure of the EU drone regulation.

`02_droneregler_dk` Information about the current rules and some material on EU drone regulation.

`03_sora_overview` provides a high level view of the sora process.

`04_sora_preapp_eval` Evaluation of the applicability of the SORA process to a given operation.

`05_sora_step1` Description of the Concept of Operation.

`06_sora_semantic_model` Presentation of the semantic model used throughout the SORA process.

`07_sora_step2` Intrinsic UAS Ground Risk Class (GRC).

`08_sora_step3` Final UAS Ground Risk Class (GRC).

`09_sora_step4` Initial Air Risk Class (ARC).

`10_sora_step5` Strategic mitigations to determine residual Air Risk Class (ARC).

`11_sora_step6` Tactical Mitigation Performance Requirements and Robustness Levels.

`12_sora_step7` Specific Assurance and Integrity Level (SAIL) determation.

`13_sora_step8` Identification of Operational Safety Objectives (OSO).

`14_sora_step9` Adjacent area/airspace considerations.

`15_sora_step10` Comprehensive safety portfolio.

After this module you should know the SORA steps 1-7 to a level where you can apply the SORA process to a given UAS application and thus determine the Specific Assurance and Integrity Level (SAIL). You should also have an understanding of the Operational Safety Objectives (OSO) in step 8 and the adjacent area/airspace considerations in step 9.

# 4 Exercises

The best way of learning the SORA is to work with it. You will therefore conduct the SORA process based on the following use case:

*For nature conservation purposes a drone is needed to provide periodical sequences of aerial images of the shoreline at the island Mandø in the Wadden Sea. The drone flight will be BVLOS, the pilot will be conducting the operation from a static position near the coast. All flights will be conducted under relatively low wind and no precipitation conditions. The drone is a hexrotor with a diameter of 80 cm and a total weight of 4 kg.*

The above information is a very limited Concept of Operation and you will likely need much more information to conduct the SORA. In those cases you should make your own choices in line with the description in order for you to be able to move on.

The process of understanding the SORA to an adequate depth and conducting the entire SORA process takes an immense amount of time, especially step 1 and 8 are very time consuming. It is therefore important to put a time limit on your work and make sure you spend time on all steps, even though this means skipping parts of step 1 and significant parts of step 8. From the point where everybody have completed the theory section, the group should spend 4 hours on this exercise.

The report of this module will be the resulting SORA document (no supporting documents). You are exempted from the 4 page limitation if needed, however remember (like in the SORA processes we conduct where we pay for the evaluation) that written words have to be read as well, so be brief and to the point, and copy only headlines from the SORA document to clearly identify the context of your written text. The reader will know the SORA document.

After having submitted the SORA document, you will receive another SORA document submitted by one of the other groups via me. You will then have one week to provide feedback to that particular group in terms of comments and questions that you believe need to be answered. You should spend maximum 1.5 hours on this task, then submit the feedback (maximum 1 page).