

Autonomous Service Drones for Safety-Compliant European Operations

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Background

The scientific and industrial focus within Unmanned Aerial Systems (UASs) is currently moving towards autonomous Beyond Visual Line of Sight (BVLOS) operations, such as service drones, for instance in the healthcare industry [1].

A research project which is currently pushing the envelope for autonomous service drones is the HealthDrone project [2]. The map below shows some of the planned operations on Funen, Denmark.

In July 2020, the European Union will unify the drone legislation [3]. Under this legislation, BVLOS operations will be put in the Specific category, in which a Specific Operations Risk Assessment (SORA), approved by the local Civil Aviation Authority (CAA), is required. Concerning technology, the SORA imposes a long list of requirements, some for the UAS, such as hardware and software robustness and failsafe capabilities, and some for external systems supporting the operation, such as Unmanned Traffic Management (UTM), similar to the generic Aerial Traffic Management (ATM) [4]. Several companies are developing autonomous service drones. However, they will not likely publish their technical or legislative intellectual property.

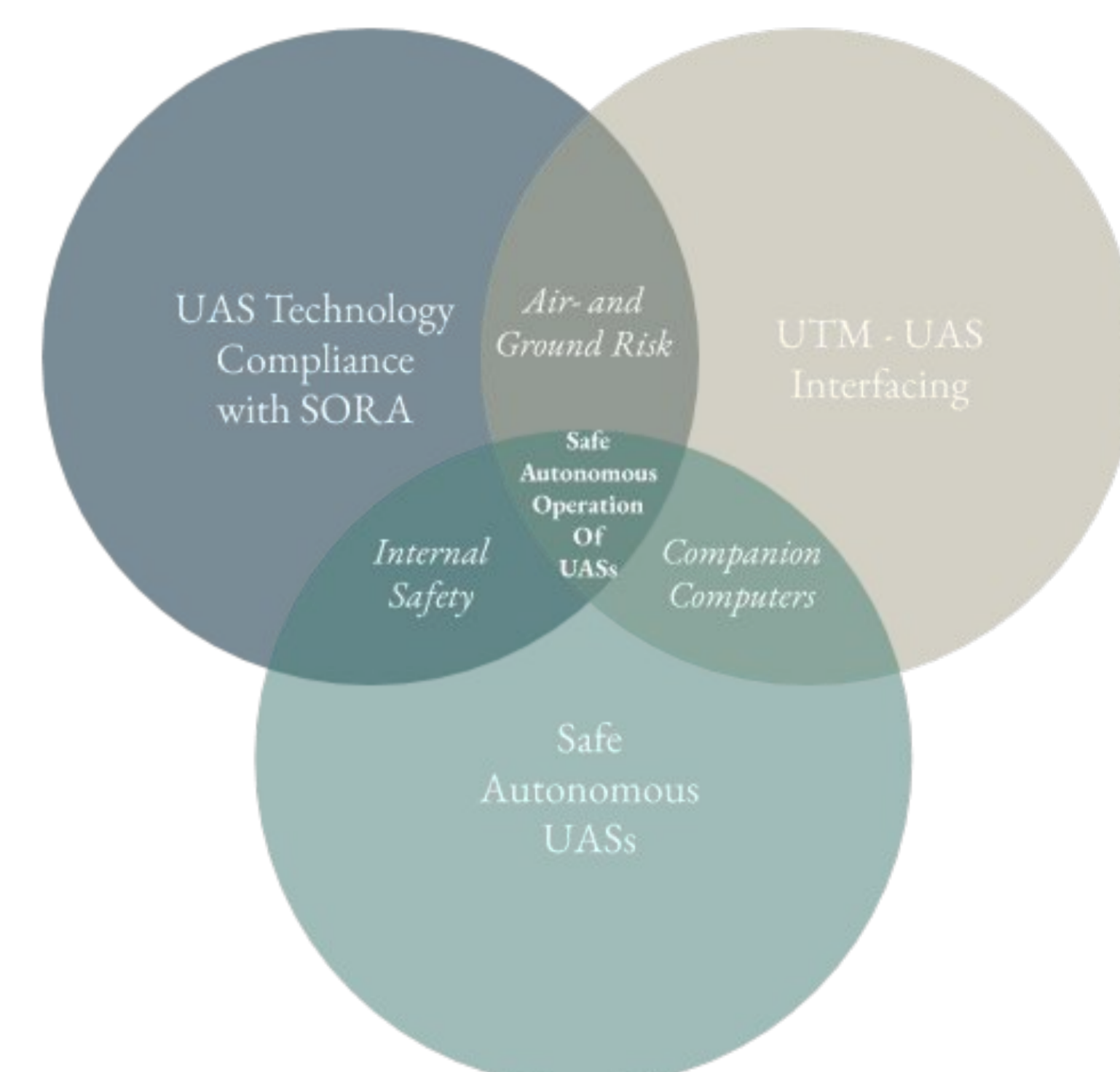


Research Focus

This PhD deals with removing major technological barriers to operating safety-compliant autonomous service drones in Europe.

The focus will be on three coupled key challenges:

- 1) **UAS Technology Compliance with SORA**, each time a new operator is writing a SORA, they are “reinventing the wheel”. In order to ease the process, methodologies that can be used to assist an operator in determining the missing safety-related SORA requirements are needed.
- 2) **Safe Autonomous UASs**, developing safe autonomous UASs for autonomous operations is difficult, and each manufacturer setting out to do so has to come up with own solutions to all the technical challenges. In order to ease the development of new, safe, BVLOS capable UASs, some standard components of hardware and software are needed.
- 3) **UTM - UAS Interfacing**, the current efforts towards UTM - UAS integration lacks a systematic approach. In order to advance, shared methods for handling normal flight and contingencies are needed. The three key challenges are tightly coupled, as seen in the diagram below.



Research Outcome

The amount of resources put into each of the key challenges is currently unknown, it will be determined based on assessed needs and barriers in the HealthDrone project and the progress of this PhD. When combining the results from the previously described sections, we end up with a set of workflows, architectures, components and tools that will systematize the evolving work within autonomous service drones and raise the level of the state-of-the-art within the sector. Papers will be published on the findings within these topics. In addition, a software repository with various components relevant to service drones will be made open source.

References

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