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IT TAKES TWO TO TANGO: IDENTIFYING AND MITIGATING REGULATORY CHALLENGES OF UAV TO PROVIDE INTEGRATED EO-UAV END-TO-END SOLUTIONS

Abstract

The year 2021 marked a significant milestone with NASA's Ingenuity undertaking the first of several flights above Mars. NASA's Unmanned Aerial Vehicle (UAV) opened new avenues for aerial imagery collection in conjunction with satellite and rover data. Indeed, on Earth, UAVs are already emerging as a crucial link bridging the gap between satellite-based and ground-based geo sensing systems. While Mars presents unique challenges for drone flights, on Earth, regulatory concerns are arguably the biggest challenge of all.

In December 2020, the EU's new drone regulations entered into force. It establishes a robust legal framework for drone operations, and has also been influential in shaping rules outside of the EU block. This paper explores the impact of drone regulations on integrated End-to-End applications.

UAVs are widely used for monitoring sparsely populated areas - such as agricultural or forested areas. However, new End-to-End applications (such as air quality control or energy efficiency assessments) will often involve densely populated regions. Operating drones in such populated areas - rightly - involves a strict regulatory regime for reasons of safety and privacy. This paper will argue that such regulatory challenges, as well as their potential solutions and mitigation measures, deserve more attention from the space community. Drawing on real-life case studies, this paper shows the critical interconnections and challenges faced by the integration of Earth Observations and UAV systems. Specifically, it focuses on End-to-End solutions using data for disaster relief, emergency response, environmental protection, and healthcare.

In a global attempt to meet the Sustainable Development Goals, this paper focuses on the European regulatory challenges and considers two key aspects:

- An overview of regulatory challenges faced by drone operators which could have an impact on the provision of End-to-End integrated services.
- More specifically, a description of how the use of specific UAV remote sensors and their design affect the regulatory assessment and approvals, thus impacting what type of End-to-End services an operator can offer.

This paper casts a light on the interconnectedness between challenges faced in using drones and those encountered within the space sector. The absence or limitation of drone imagery overlapped with Earth Observation data poses challenges that span from lack of a comprehensive understanding of our Planet's health, to hindering crucial information for disaster relief or trajectory prediction. In conclusion, this paper identifies a gap and possible mitigations to achieve seamless integrated applications.