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OPERATIONAL IMPLICATIONS OF ENDOWING HYBRID RADAR-OPTICAL SATELLITE
SYSTEMS WITH AI BASED IMAGE ANALYSIS CAPABILITIES**Abstract**

The needs expressed by the Earth Observation market are evolving towards shorter revisit times, high reactivity and a higher variety of image products while keeping image resolutions high. Indeed, one or two satellites are not enough anymore to address applications relative to national security, disaster management or commercial monitoring.

To answer these needs, Airbus put two satellite products on the market, the S250 optical and S250 radar. They are designed with constellations and complementarity in mind. An advanced ground segment ensures that customers can maximally exploit the great reactivity and huge acquisition capacity that come with a system combining several of these satellites.

The paper describes one of the major implications of such constellations on the ground segment: the satellites can easily flood end users with image products of multiple types, therefore image analysis is necessary to automatically extract first level of information fast enough, allowing analysts to concentrate on their main skills and concerns. This way a decision can be made quickly whether to reprogram the constellation's acquisition plans, potentially cross-cueing between optical and radar observations.

The paper goes into the topics Airbus has been working on for endowing its systems with operational capabilities of image analysis using AI technologies. Technical and programmatic questions must be treated in many areas: training of new Machine Learning algorithms and re-training of existing ones on the new sensor products, the qualification, monitoring and maintenance of the algorithms and of the end-products, the timeliness at which the end products must be produced, the alignment of products generated by optical and radar algorithms in view of feeding sensor agnostic analytics products, the standardisation of algorithm interfaces for future capability extensions, the sizing of the IT infrastructure.

When tackling these topics, considerations on the customers' business needs and system level considerations are of central importance.