

IAF SPACE OPERATIONS SYMPOSIUM (B6)  
Ground Operations - Systems and Solutions (1)

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## GROUND SEGMENT CONTROL SYSTEMS: CHALLENGES IN THE NEW SPACE ERA

**Abstract**

The global space industry is evolving at an unprecedented pace, which affects the business models of all market operators. In Europe, national and international organisations are increasing their support and funding of ambitious new programmes in support of the evolving economy.

The transformation of the space industry is radical. It is driven by a change in business models as well as operational concepts, technology evolutions and these are so different that the space industry is increasingly segmenting into multiple sectors, each with a unique set of business drivers and therefore different solutions. Factors such as, time to market, cost to completion, etc. lead to very different system requirements that are not optimally satisfied by a single type of solution.

Providers of Ground Segment solutions that have traditionally worked with major national and inter-governmental institutions are considering this new variety of different use cases, adapting and evolving their offering with a diversified set of solutions, to be able to address all market sectors.

Central in all market segments is the concept of Operations as a Service (OaaS), which is becoming increasingly important.

The European agencies and industry are working since 2012 on the development of the new European Ground Systems Common Core (EGS-CC), designed to be the baseline for the family of ground segment systems. The novelty of the approach is in the commonality of the solutions being adopted allowing increased efficiency and standardisation of data interfaces and procedures among all actors of the space ecosystem. It will likely form the baseline of the institutional market sector in the near future.

In parallel to this development the fundamentally different needs of new organisations, mainly commercial businesses, several being start-ups, operating constellations of small satellites with shorter timelines, are being served by new cloud native end-to-end solutions. Such offering adapts well to the financial constraints and business models of (small) commercial ventures, with simplified licensing schemes, and agile and scalable solutions.

The paper investigates the drivers of the different market segments and the resulting evolution with respect to technical solutions for ground segment systems and operational concepts. Based on this it discusses the likely short-term future developments to support the virtualization of the space and ground segments and the evolution towards a fully software defined ground segment.