IAF EARTH OBSERVATION SYMPOSIUM (B1)
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DOMINO ARCHITECTURE – A MODULAR, SECURED AND EVOLUTIVE ARCHITECTURE FOR EARTH OBSERVATION GROUND SEGMENTS

Abstract

Today the Earth Observation (EO) market is tending towards increased operational needs in terms of responsiveness, revisiting, and multi-mission complementarity as well as cheaper and tailored ground segments. Addressing these needs in the EO ground segment perimeter, the Domino architecture is a modular, secured and evolutive architecture for EO ground segments with the goal to provide a standardized architecture shared by industry and institutions, by primes and providers of ground segment building blocks in Europe. In order to do so, model-based system engineering standards are used to define a set of Dominoes with standardized interfaces and clearly defined functions with modularity as a key driver. The modularity relies on the fact that a domino is autonomous, is monitored, produces KPIs

on the delivered service, may serve more than one mission and could relies on its own infrastructure. A ground segment is therefore an assembly of Dominoes fitting the needs. The Domino architecture started as a French initiative (named Domino-X, https://domino-x.space/) supported by the French plan France relance together with significant investment from French industry. It is now developing in Europe thanks to ESA and European Union support, though several Domino initiatives (Domino-A, E and S) or European projects, as well as in several export projects. Domino-E aims at the development of the access of several information via a unique access point, that offers the EO operators the ability to coordinate and smartly prioritize their imagery needs between different systems. Security of the Domino ground segment is ensured by design thanks to the defined interfaces and is also considered as part of each Domino design. Further analysis is done in the MESEO (Muti-mission Efficient and Secure high capacity end-to-end EO) project, also named Domino-S, which aims at enforcing security aspects at system and function levels by design focusing on a trustworthy cloud-based security through space for data sovereignty. The Domino architecture can evolve and this is demonstrated thanks to Domino-A project which aims at proving that the Domino architecture can be extended to radar constellation. Further investigations are also conducted to improve the standardized interface by adding rules and governance of API. The Domino architecture is part of SPIDER (Space based Persistent ISR for Defence and Europe Reinforcement) project that interconnect multiple Domino-based systems, thanks to a Federation layer. The latter provides European countries with a direct access to all member state systems, subject to inter-governmental agreements.