A SYSTEM OF SYSTEMS GROUND SEGMENT TO SUPPORT SECURITY APPLICATIONS

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ABSTRACT

The progress of Copernicus projects into initial operative services is showing the complexity and operational bottlenecks in satellite data supply: as end users put forward requests and activations for Earth Ovservation (EO) based services, providers face the thresholds of requirements such as responsiveness or spectral capabilities. To develop the "S" of security within GMES-COPERNICUS, ESA has (i) valued the EO needs roadmap, (ii) assessed data access infrastructure options, (iii) explored the concepts of operation and (iv) defined architectural system lay outs. GMV has undertaken an analysis of user requirements for security and presented a technical solution for a system of systems coordinated data access in the short, medium and long term up to 2025.

1. A SYSTEM OF SYSTEMS GROUND SEGMENT PROPOSAL

The analysis of user requirements showed that security products are increasingly demanding in terms of resolution -better than 1m-, responsiveness -better than several hours from request to delivery-, and frequency. The most demanding needs originate in joint operations for crisis response, which require the fastest responsiveness. Yet, as COPERNICUS evolves and the new Thematic Centres come into force, it is clear that less demanding applications end up desiring the tighter security requirements. Furthermore, all requests are bound to the same missions, tasking and access systems. 43 user requirements (UR) sets were analysed pondering technical and general aspects. Technical requirements examined were: resolution, acquisition mode, info update, geo-accuracy, info age, delivery, scale, bit quantification, spectral range & resolution, cloud coverage, scene size, swath width and responsiveness. General requirements examined were: enhanced cost benefits, EO-GIS integration capabilities, user categories & ranked access, raw and value added data policy, confidentiality, mapping capabilities, remote data transmission capabilities, classification of some data, accessibility to archived data, maintenance of data formats, acceptance as legal proof and direct raw image reception allowance.

Underlying key elements to come up with a feasible solution have been:

1. The system should cope and handle crisis mode requirements (therefore with high responsiveness)
2. The system should be secure, meaning by that, to assume security policies and the governance of organizations, assets and interfaces
3. The system should realistically deploy committed missions and a ingest missions under development
4. The system should be long term sustainable and scalable

The proposed solution makes use of ESA Missions Sentinels, GMES contributing missions, other EU civil missions, EU military missions and International civil & dual missions. The proposed ground segment includes the necessary elements to support these missions and achieve the necessary performances. It combines all present and future European ground or space missions. Combination of these assets is the key driver, shaping the GMES-S system of systems concept; the gap analysis shows that standalone satellite missions are far from providing the necessary performances for security purposes. The solution focuses on interoperability and scalability, enabling the highest level of cooperation in terms of committed assets versus obtained products/services. GMES-S dual data access system should motivate countries hosting strategic assets, since it provides a gain for National interests while it builds up a European service system with high performances, without the fear of losing strategic advantage. Finally, the proposed ground segment includes the necessary elements to allow the wide-spread geographical access to system capabilities at the European, National, and Regional level, whilst ensuring data/systems security, confidentiality, and integrity.

2. CONCLUSION

GMES-S is conceived as a system that shall deliver EO information for security applications across the EU.
The most demanding needs will be driven by the crisis response which shall require a very fast responsiveness.
The proposed solution should be able to:

- Meet tight demands of resolution,

responsiveness and frequency

- Deploy bespoke security EO satellites
- Combine ground & space assets. Combination is the key driver, since standalone missions are far from necessary performances
- Handle interoperability of instruments and long term scalability
- Cost effective, benefiting from current systems under design
- Benefit from international cooperation of National strategic assets
- Allow for cooperative schemes: committed assets vs obtained products/services
- Allow for Win-Win schemes. Win National interests investing in a join European capability, with no fear of losing strategic positioning
- Allow for wide access at European, National and Regional levels
- Ensure data/systems security, confidentiality, and integrity

The proposed ground segment includes the necessary elements to support these missions and achieve the necessary performances.

The proposed ground segment is specifically designed to combine present and future European ground or space assets relevant to security needs. The proposed system of systems is suitable and cost effective; this system will strongly benefit from parallel developments and commitments at the political and organizational level, in cooperation with on-going discussions with the users and the system designers.

3. ACKNOWLEDGMENTS

4. REFERENCES

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