

## Fractionated sensors to enhance the Earth Observation service: The Satellite Swarm Sensor NETWORK (S3NET) study

O.Bischoff<sup>1</sup>, R.Freddi<sup>2</sup>, P.Gurfil<sup>3</sup>, H.Hart<sup>4</sup>, F.Lange<sup>5</sup>, \*M. Lavagna<sup>6</sup>, J. Naghmouchi<sup>7</sup>  
R.Scheiber<sup>8</sup>

<sup>1</sup>DSI Digitale Signalverarbeitungssysteme & Informationstechnik GMBH

<sup>2</sup>CGS S.p.A Compagnia Generale Per Lo Spazio

<sup>3</sup>Technion Israel Institute of Technology

<sup>4</sup>ARTTIC SAS

<sup>5</sup>RAMON CHIPS LTD

<sup>6</sup>Politecnico di Milano-Aerospace Science & Technology Dept, Milano - Italia

<sup>7</sup>Innovationsgesellschaft Technische Universitat Braunschweig MBH

<sup>8</sup>Deutsches Zentrum Fuer Luft - Und Raumfahrt Ev

\*michelle.lavagna@polimi.it

### ABSTRACT

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So far, limited research has been conducted on fractionated and distributed sensors for Earth Observation from space. Such application opens many different challenges to be deepened and assessed in terms of feasibility such as the sensor fractionation strategy and data fusion and the related formation flying geometry. These aspects are strongly dependent on communication and on-board payload-processing capabilities and needs, on synchronization techniques between swarm satellites, as well as on station keeping and pointing capabilities of the space segments. The S3NET H2020 project, currently on going, is focusing in stepping forward in the technology development with respect to the mentioned challenges. The consortium sees well balanced competences in the needed fields, from electronics to distributed communication network design and implementation, to space mission design, platform integration and formation flying design and control, to optical and Synthetic Aperture Radar design and management.

The project, starting from the most promising and demanding mission scenarios, will define and develop two benchmarking systems which will result in the TRL3 demonstration of these performance improvements : fragmented and distributed EO optic (high-resolution optical and hyperspectral) and radar payload are considered.

The paper will show the user cases missions selection process, base on either Optical or SAR payload to be fractionated and the trade-off process occurred to select and size the baseline mission scenario and space segment platform. The use cases definition is the first step to identify the requirements and constraints for the communication and payload data on board handling and processing the electronics design is driven by.

The beneficial effects on the quality of service, mission scalability, increased incremental deployment, cost savings for satellite missions through extended satellite operations/life-time,

restructuring of the space imaging value chain and lastly, further independence from ITAR restricted products will be discussed as well.