



**CEOI Industry Consultation Workshop
Summary Report**

**Future "Land Surfaces" Geo-Analytical Services from Earth
Observation and The Instruments Necessary to Enable Them**

28th June 2019

London

1. Introduction

Following grant support for a number of projects to companies developing technologies for the New Space sector, CEOI ran this Workshop to further explore the emerging market for downstream services from space, the data sets / types that these services will need, and the future instruments required to deliver them. It focused on Land Surfaces and the rapidly growing need for large scale, real-time geo-analytical imaging to improve management and response in sectors ranging from agriculture and forestry to insurance.

The consultation brought together industry representatives and leading academics in this emerging field. Attendees were from geo-analytical imaging companies, applications scientists, constellation operators, instrument developers and VCs. It provided a fascinating opportunity for participants to contribute ideas, identify future needs, learn, discuss, and network.

The outputs will inform the focus of future CEOI and UKSA funding programmes. Specifically targeting Land Surface applications, the meeting aimed to:

- Understand potential market developments in downstream services from EO data and their market drivers;
- Illustrate developments in EO instrumentation and applications science that will enable these new services;
- Identify key barriers and technical challenges to their implementation;
- Investigate the possibility of brokering relationships with interested parties along the supply chains for promising new applications / markets;
- Create opportunities for attendees to network across the different communities.

The meeting was held under Chatham House rules; attributions of individual comments were not recorded and the input from the participants has been synthesised into a composite of views from the meeting. This report summarises those views, which will be incorporated, along with the science needs, into the CEOI strategy for the next generation of Earth observation / remote sensing instruments.

To set the scene three academic presentations were given:

1. Earth Observation Data – Real Life Applications and What They Tell Us (Prof.Heiko Baltzer, Un Leicester);
2. Emerging Optical and Quantum Detector Technologies (Dr Andy Vick, RAL);
3. New Space Microwave Imaging (Dr Jasmina Lazić (Un. Edinburgh/OMS).

The initial round table introductions from the delegates identified a wide range of challenges and application interests in future geo-analytical services for land services. These challenges and interests were explored more deeply in the main discussion.

2. Summary of Meeting Discussions

The participants, coming from a broad cross section of the New Space sector, saw a wide range of opportunities and challenges in future "land surfaces" geo-analytical services from earth observation and the instruments necessary to enable them.

The discussion started with market and applications needs and then moved on to discuss the technology requirements necessary to enable the identified needs (i.e. need pull rather than technology push discussion).



A number of key issues were identified that need to be considered when designing future EO instruments and satellites, whether for science or commercial missions.

- Total systems approach needed from sensor to answer
- Improved power / comms / etc are important
- Download speed – identify where is it important and for which applications?
- Latency is crucial for a range of geo-analytical imaging applications, but technical developments can be negated by the commercial needs of satellite operators, who may prioritise other tasks over those with low latency needs.

At the end of the discussion session, each participant was asked to identify one key need for their organisation. These are:

Hardware

- Smaller, cheaper, higher resolution sensors
- Large deployable antennas
- Phase array antennas for power reductions
- Onboard processing – algorithms (e.g. adaptive scanning, super resolution enhancement, cloud&change detection, image quality assessment, moving object extraction)

Data

- Ensure sensors produce analysis ready data to meet operational needs
- Data certification
- Data quality – easily understandable and available
- With increasing multiplication / fragmentation of EO techniques and data, need systems to fuse and interpret data plus specs and standards.

Platforms

- Sensor / GPS / system bundle for drone deployment with data quality system
- Instrument systems for HAPS

Industry Initiatives

- Coordination of funding sources for end-to-end support
- Technology horizon scanning and long-term strategy for data

3. Conclusions from the Meeting

The main conclusions from the discussion were:

- a) The New Space markets for EO data, especially in geo-analytical imaging, are only just emerging and their future technical needs are not yet clear.
- b) Once individual market needs are clear, CEOI will have an important role to play in supporting development of relevant technologies for these New Space applications from TRL 3 to 8. Therefore, CEOI is therefore likely to be reactive rather than proactive in supporting technology development for commercial New Space applications for EO.
- c) CEOI's role should remain focused on the upstream elements of the data chain, i.e. sensors, instruments, supporting technologies, and onboard data processing techniques, drawing a boundary for its support at the data downlink.
- d) CEOI needs to ensure that the playing field is level when evaluating New Space EO project applications (i.e. ensure no inadvertent bias towards science missions)



- e) CEOI needs to outreach to New Space instrument companies, satellite builders, constellation operators (possibly in collaboration with other programmes such as SPRINT) to inform them of CEOI supported developments and to potentially engage them with the CEOI programme.

4 Conclusions for the CEOI Technology Strategy

CEOI will continue to support development of relevant Earth Observation technologies for the New Space sector. The inputs and conclusions of the workshop, as summarised in this report, will provide an important input into the strategy development process for the CEOI programme.

Further information about CEOI projects and programmes can be found at <https://ceoi.ac.uk/>. You can also contact the CEOI Director, Professor Mick Johnson: Tel: +44 (0)1438 774421 or email: mick.johnson@airbus.com.