

Creating a European Alliance for Earth Observation (EO) Services

Responding to GEOSS

EARSC, the European Association of Remote Sensing Companies represents the Earth Observation geo-information services sector in Europe. Today EARSC has 76 members (67 full members and 9 observers), coming from 23 countries covering the full EO services value chain including commercial operators of EO satellites, resellers of data, value-adding companies, geospatial information suppliers, consultancies and system/software providers. The sector plays a key role in providing value-added, geo-spatial information to its customers in Europe and the world. In 2014, the revenue of the sector in Europe is €900m giving work to 6800 highly skilled employees and is growing at around 8% per annum. The sector is dominated by small and medium enterprises with over 95% of the companies having less than 50 and over 60% having less than 10 persons employed.

This paper reflects the views of the full members of EARSC which are commercial companies, coming from Member States in the EU or in ESA, providing services (including consultancy) or supplying equipment in the field of remote sensing or using EO data. EARSC observer members are informed and may have commented on the paper but are not necessarily endorsing its conclusions.

Introduction

The EO services sector is evolving very rapidly. New and innovative satellite operators are entering the market especially in the US, new data sources are emerging including unmanned aircraft systems (UAS) and crowd or citizen sources using mobile technologies and large IT companies such as Google and Amazon are seeking to establish geospatial market-places. All is leading to more data and many more potential opportunities to exploit it.

In Europe, we have an active and vibrant EO services sector developed as a result of European investments into EO satellite technology, as well as dense networks for collecting environmental data, but which are fragmented and distributed over many countries in Europe. Europe's governments are investing heavily in Copernicus, the world's first operational EO programme, which should lead to a concerted effort and are major stakeholders in the Group on Earth Observation (GEO) which continues to evolve as a public grouping.

GEO is a global effort to co-ordinate actions in the field of Earth Observation and address 9 defined societal benefit areas (SBA's). The US is supporting the ambitions of Google and Amazon to provide platforms to provide the services and to create this as a marketplace. Copernicus is by far the largest contribution to GEO coming from any public source. Hence there is a strong risk that these two IT giants become the gatekeepers for geospatial services whether for commercial, governmental or citizen's use and consequently, de-facto control the exploitation of the EU Copernicus programme and other programmes in Europe.

In order to help develop the industry in Europe, we consider that an alternative marketplace is needed building on Europe's strengths and with its operation adapted to a European approach. This would be complementary to the US platforms but with a different business model encouraging innovation, the use of open data, and the protection of the rights of both supplier and client. It must be a platform for doing business and not for controlling business.

A Growing Market

The quantity of data is exploding in every direction. Every individual, business, government is both generating data and consuming it. Commentators consider that the data revolution has already started¹. Earth Observation data is a key part of this data explosion with the Sentinel satellites forecast to deliver 8-10TB of data per day² and more and more in-situ data acquisition systems as well as citizens delivering huge quantities of data. For the EO services industry, whilst EO data is the primary

¹ 4 Ways Big Data Will Change Every Business <http://www.forbes.com/sites/bernardmarr/2015/09/08/4-ways-big-data-will-change-every-business/2/>

² <https://eos.org/profiles/sentinel-satellites-initiate-new-era-earth-observation>

raw material with which they work, they depend on its combination with other data sources to generate commercial geospatial products and services.

Making these data available through a common marketplace is a priority to stimulate cross-domain interaction and innovation and move science to business. The steps being taken by Google and Amazon lead in this direction. Today, one of the biggest challenges facing the EO services industry is to build the market for their products and services. But with the explosion of new data, it is a market which will develop and we are just standing on the brink. Some examples where EO data will be a core component to be combined with other data sources are:

- The future evolving market for carbon trading where global intelligence is essential for policy makers and commercial actors. New information products to support the market will be needed. According to the World Bank, the value of the carbon pricing mechanism in 2015 is \$50b³.
- Agriculture services both to serve farmers in precision farming methods but also linked to the EU water quality directive where EO data together with in-situ, meteo, biological and socio-economic data will inform policy makers and citizens regarding healthy and sustainable practices.
- Health services where EO data combined with in-situ and meteo data can inform on conditions and risk as well as providing evidence for policy decisions ranging from construction to schools and urban planning. Such an approach supports the Smart Cities initiative of the EU.
- Marine information which can serve commercial companies (shipping, fisheries, off-shore) as well as citizens (coastal waters, beaches) and policy makers (pollution) linked to scientific communities providing research into the environment and the global climate system.
- Citizen risk from natural hazards and supporting mitigation through better, more-directed information allowing citizens to take more-informed decisions and supporting public security services to protect them from extreme events.

These five examples demonstrate the potential where surely more domains will emerge as the technology matures and we start to get to grips with the data which is emerging. They also show how the derived information is of high relevance for Governments, supporting them in decision makings, hence a European governed Marketplace would be required.

Many initiatives are already emerging at European level and new solutions based on European level Research and Innovation⁴ would help develop and integrate tools to improve gathering and exploit EO and complementary data (UAS, mobile, in-situ etc) and take a major step to help structure the European market. An alliance of EO and other data suppliers can help drive and serve these initiatives. What should we do to ensure that this happens?

³ World Bank; Carbon Pricing Watch 2015

⁴ Research Infrastructures: Helix Nebula, ELIXIR: European Life-Science Infrastructure for Biological Information, European Plate Observing System, Smart Specialisation strategies (regions), Smart cities etc. EMBL: European Molecular Biology Laboratory.

Challenges for the Industry

Industry is facing many difficulties to adapt to this changing paradigm. European industry is too focused on institutional programmes and needs to be stretched and challenged to adapt. The strong presence of the public sector as both customer and sponsor coupled with the Europe of individual Member States has acted as a brake which must be released.

- Fragmentation: 95% of the companies in Europe have less than 50 employees and 65% have less than 10. These are distributed throughout the EU member States. This diversity can be a strength but requires a common approach. In particular, to address both large commercial markets and export markets requires them to act together.
- Today, the public sector is 65% of the market for EO services today⁵. Government policy interest to be supplied with global intelligence drives this and means that only a partnership approach can be successful. Public agencies exist in many MS which are often found competing with the private sector for the same business.
- European Security and Defence policy: whilst the largest US player, DigitalGlobe, has the support of a single anchor tenancy contract to supply surveillance imagery to the US government, this possibility does not exist in Europe where responsibility remains with 28 Member States.

In summary, the European industry would need support to create a structure allowing the development of a marketplace through which they can address both European and global customers. They need an IT infrastructure to be put in place operating to rules whereby they can protect their businesses. A European Earth Observation Market Place would provide a concrete frame addressing EC priority policy challenge on “Digital-Single-Market, allowing a seamless integration of science (open science cloud) in to business. The creation of a programme⁶ allow the creation of a structure addressing also smarter government policies and to link with research actions.

European Capabilities

Harnessing science and business is a priority to enable research activities to be commercialised. Many initiatives in Europe are looking to tap into and exploit this trend to develop economic growth and jobs. One example is the Helix Nebula which, based on science needs, is establishing a European Cloud Computing partnership. It is the basis through which several European IT actors seek to co-operate and offer a single service. The same platform can serve commercial interests equally as science ones.

The Helix Nebula approach is based on fundamental values and principles which can serve well the EO services sector (as well as others). It will allow full traceability of IPR in an open, competitive and fair marketplace. These are particularly important compared to the business models of Google and Amazon which do not share these principles. A marketplace built upon these values will open the

⁵ According to EARSC survey of the EO services industry in Europe and Canada. 2012 and 2014 surveys.

⁶ <http://ec.europa.eu/priorities/digital-single-market/>

possibility of new and innovative business models not possible elsewhere. Companies (globally) will be given a choice and a real alternative to the existing possibilities.

Many elements already exist in Europe whether they be infrastructure elements or relevant programmes which should be harnessed to create the new marketplace. Furthermore, a very capable industry and a rich ecosystem of small and innovative companies⁷ offer specialised services based on European R&D investments coming from Framework and Horizon 2020 programmes. Other key elements are:

- The Helix Nebula Marketplace Broker⁸; a commercial offering user's access to a range of cloud providers
- The GEOSS broker services software developed under FP7
- R&D capabilities developed through Horizon 2020 and oriented towards the GEOSS Societal Benefit Areas (SBA's).
- ESA's science and Earth Observation programme providing new satellite observing capability
- Commercial initiatives such as NovaSAR, Spire and Iceye which seek to join existing players offering commercial EO data.
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Furthermore, other European platforms such as EPOS, ICOS, EMBL and projects such as ELIXIR could be associated to the marketplace which is developed so providing a much larger user base but also other sources of data which can be assimilated.

The Institutional Component

Europe is driving two "programmes" which are directly relevant for an EO Services Marketplace - Copernicus and GEO – and which can be harnessed to this strategy.

GEO : A European node for GEOSS is necessary to ensure that all the European actors can benefit from the EU governments investments. Such a node should enable the exchange of data and should be built upon a European IT platform which can provide the basis for an EO services marketplace.

Copernicus: The European flagship programme Copernicus is reaching operational status; Copernicus has the goal to develop and deliver necessary geo-information based on global satellite observations to European policy makers as well as being perceived as a motor for growth of the downstream private sector.

Furthermore, Europe has a number of relevant goals which link to this effort; for example to establish a connected single digital market. Data and information made available according to the free and open data policy would contribute to and benefit from this wider initiative. EO provides global intelligence

⁷ For details see the EARSC Industry Survey 2015. Published September 2015.

⁸ <http://hnx.helix-nebula.eu/broker.html>

especially when coupled with other data (eg socio-economic, environmental variables etc). It has long been a key component to monitor and ameliorate the effects of climate change and policies linked to energy, food security, exploitation and protection of the arctic amongst many others are all served by information coming from EO satellites.

Making these products available in an easily accessible way is a key step; the difficulty to do this has been one of the barriers to the development of the technology. Further research and especially innovation is needed to overcome this. With Copernicus, Europe has a key asset; through GEO this can be turned to a global asset at the same time helping the EU to be a global actor.

Developing a European Marketplace for EO Services

A European marketplace for EO services will enable suppliers and clients to find each other and to do business. Like a physical marketplace it should reduce transaction costs to a minimum so enabling low-cost business to develop whilst enabling each user to find the products and services which they need.

- Suppliers to be able to offer data and information on their appropriate terms and conditions
- Clients to gain access to these data and pay for services in a simple but effective way.

The basic guiding principle should be to enable information as a service (INFOaaS) meeting the needs of GEOSS, Copernicus and the commercial suppliers. The innovation alliance which is proposed should enable solutions to be nurtured for a European Earth Observation data platform for the benefit of multiple users including the industry and facilitating the development of novel Earth observation services and products.

The infrastructure to support this should not be monolithic and must enable the large number of individuals and small businesses to innovate and bring new products and services to the market. The principles of Helix Nebula could be adopted to provide the infrastructure platform as a service

The pure Marketplace operations should be on a non-profit basis. Other principles would need to be addressed include the protection of IPR, the rules concerning exploitation of open data, security of information and privacy, financing and supporting new business models. This would offer a new model not available elsewhere and which could be an attractive place to do both science and business. Governmental geospatial needs should be expressed through an anchor-tenancy contract which would help to underpin the effort.

A new alliance can be created to oversee the activities which brings together the relevant actors; industry and researchers as a starting point, but also scientists and policy makers need to be engaged.

Industrial Participation

The IT industry has set up several collaborative structures on which to base an offer of Infrastructure including Helix-Nebula and the Big Data Value Alliance (BDVA). Some existing broker services include the GEOSS broker coming from H2020 project and commercial ones such as that provided by Airbus (Geostore). These and other infrastructure can provide the platform on which data and information are exchanged, stored and manipulated. Such a platform could even extend beyond the EO sector to connect to other platforms serving other sectors.

We propose to establish an Alliance of the industry service providers bringing together data suppliers and geo-services information providers. This should include companies involved in environmental data systems, in-situ and airborne measurements as well as Earth Observation. The Marketplace Alliance would build services using EO data on the platform and would integrate e-commerce.

Much of the effort to assemble data resides in the public and academic communities and many networks have been set up to co-ordinate their activities. An H2020 project ConnectinGEO has the objective to create a European Network of Networks (ENEON) and is presently working on this. EARSC joined this project with the vision that ENEON could be an element to make the link between an industrial grouping and the academic players.

Given the strong interest of government in EO services both as consumer and sponsor, should the same platform embrace the public sector? There are precedents for this. The organisation ERTICO was set up in the late 90's to address questions around Intelligent Transport Systems. This includes 100 companies and institutions and the governance includes a board with Member States. Hence the one platform combines all views.

More recently, other PPP schemes have been developed and these should be studied to find models on which the platform could be based. Eight schemes have been launched linked to research themes⁹ with different contractual arrangements but all bringing a diversity of actors into a single framework. The DPPP is the most recent of these which has led to the BDVA mentioned above but other models exist and an early discussion is needed to consider which of these would be the best one to adopt.

Getting started

A plan for action is needed rather urgently and we need to progress quickly to establish the platform. A Marketplace for EO Alliance would help bring together the actors to address these questions and to help guide the development and evolution of the necessary infrastructure. How can we proceed?

⁹ Factories of the Future, Energy-efficient buildings, sustainable process industry, European green vehicles, Photonics, Robotics, High performance computing, Advanced 5G networks for the future internet.

1. Engaging the stakeholders: agreement and alignment with the key public stakeholders will be needed. DG-RTD, DG Grow and ESA are the primary ones at European level. We can start with an industry forum through which to address these public stakeholders.
2. Specific R&I efforts: Industry and researchers have widely divergent goals. More industrial engagement in R&I actions are necessary but in alignment with those of the research community. A strategic research plan can be generated to define the specific activities which can contribute to the creation of the EO marketplace.
3. Structuring the demand. In the short term efforts are needed to organise the demand for services in order to stimulate a market. On the public side this is largely taken care of through Copernicus whilst on the private side it should reflect the views of value-added service providers. EARSC has been working with the Oil and Gas Industry to develop an OGEO Community leading to a sectoral marketplace and this could be extended into other sectors.

Several actions have started:

- DG RTD which seeks to develop a European GEOSS hub.
- DG Grow are looking at a platform structure to disseminate the Copernicus services,
- ESA to introduce a new approach to the EO ground segment; EO Innovation Europe

In this respect, the WP 2016/17 of H2020 offers new opportunities, under Societal Challenge 5 and the LEIT Space for the private sector to be involved in the research of new solutions to better access Earth Observation data in Europe, to deliver new Earth Observation technologies, and to develop Earth Observation downstream services to the benefit of the International Community represented by GEO.

Further actions can be envisaged with other players including DG Connect for the IT backbone which could link to other big data domains and with Eumetsat as providers of meteorological and climate data.