

EARSC

European Association
of Remote Sensing
Companies



eovox2

Horizon Scanning Report

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1 INTRODUCTION

The purpose of this report is to present the European EO service industry's view of the major events, issues, initiatives and drivers that could have an impact on the sector. It is intended to help EARSC members prepare and anticipate likely changes to their markets and user expectations. This report is intended to be a "living document" that is periodically reviewed and updated with fresh views and inputs contributed by EARSC members.

This "Horizon Scanning" report has been prepared by the European Association of Remote Sensing Companies (EARSC), with the support of the European Space Agency's Earth Observation Value-Adding Element (VAE) programme.

The report aims to scan the horizon for major European or Global events and trends that may have a direct or indirect impact upon the remote sensing industry, and therefore to EARSC members and the wider Earth observation (EO) value-adding sector. It tries to identify what those impacts are likely to be, and how the EO VA sector may have to respond.

1.1 PURPOSE

Why have we written this report? The main driver is that EARSC members have often commented that they don't have enough time to step back from their daily busy working environments to take a longer-term view of things that may be happening at European or Global levels, and to think about how these may impact their business over the next five years. We consider that one of the ways EARSC could help is by scanning the horizon every 1-2 years, and making a set of findings and views available and accessible to member companies.

A secondary objective is to provide input to EARSC's forward planning. Where should EARSC focus its attention over the coming year? What actions should it take? What issues should it take positions on? Who should we be meeting and lobbying, and with what objective? To answer these questions requires us to take stock of the prevailing conditions and outlook and form a view on the areas that need the most attention.

1.2 A LIVING DOCUMENT

But we can't do this without your help. To produce this report, EARSC has consulted with its members to gather information and compile a view of the major trends and events that are likely to have an impact on the EO service industry over the next 5 years. This consultation took place over the spring and summer of 2010. The current version of this report is being issued in Q1 of 2011 and is intended to be as up-to-date and current as possible at the date of issue.

Also, the external environment is constantly changing, and the industry must constantly adapt and reassess its responses to this changing environment. We have therefore decided to make this report a "living document" that is periodically reviewed and updated by the EARSC community to reflect issues of importance at any point in time. We will try to update it at least every 2 years.

Therefore, this report needs you!

All EARSC members are requested and encouraged to review this document and provide inputs and comments via the EARSC secretariat. EARSC will collect all inputs received and use them in the next update of this report. Please contribute to this exercise, it will help the whole industry if we work together to share our views and perspectives in this way.



This report needs you!

All comments and feedback are valuable and will be appreciated. EARSC welcomes suggestions of new ideas and concepts to be added to the document if they aren't currently considered, or help with identifying things that have changed since the report was written, or to highlight material that is no longer relevant and can be removed. Or simply to augment current material with new perspectives and insights. Please send your comments to secretariat@earsc.org.

1.3 DOCUMENT STRUCTURE

This report has been organised as follows:

Section 1 Introduction (this section) – presents the objectives, purpose and structure of the report, and introduces references and abbreviations.

Section 2 Current World Trends and Drivers – presents a summary of the trends we are aware of which may have an influence upon the EO VA sector, and some of their underlying drivers.

Section 3 Major Initiatives and Events – aside from the trends, there are major initiatives going on at European and Global level that are likely to have an influence upon the EO VA sector.

Section 4 Impacts Upon EO Markets – presents an analysis of the likely impacts of external factors upon the sector, with some comments on how the sector may have to react or respond.

Section 5 Key Issues for EARSC Attention – to draw the discussion of trends, drivers and initiatives into a preliminary action plan for EARSC in 2011, this section tries to identify the key issues we should focus on in the coming year.

1.4 ABBREVIATIONS USED

Abbr.	Description
AIS	Automatic Identification System (used on ships)
BRIC	Brazil, India, Russia, China
CCI	Climate Change Initiative
COP	Conference of Parties (to the UNFCCC)

Abbr.	Description
DUE	Data User Element
EO	Earth Observation
EEA	European Environment Agency
EC	European Commission
ESA	European Space Agency
EOMD	Earth Observation Market Development
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GMES	Global Monitoring for Environment and Security
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
LBS	Location Based Services
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
VA	Value Adding
VAC	Value Adding Company
VAE	Value Adding Element
WB	World Bank

2 CURRENT WORLD TRENDS AND DRIVERS

This section captures the key trends in today's world that are likely to (but may not) have an impact upon the EO VA sector, and tries to identify some of the main drivers that underlie each trend.

This section aims to list the key **trends** relevant to the EO market and one or more of their underlying **drivers**. It groups these into environmental, technological, socio-economic and geopolitical dimensions.

For this discussion, a **trend** is a discernible pattern of change. This can be linear, accelerating or decelerating. For example, “the number of Earth Observation satellites in orbit is increasing rapidly” is a trend. A **driver** is a factor that directly influences or causes the change. Drivers can be direct or indirect. An example of a driver that influences the above trend is Moore’s law which has made the price/performance of EO satellites increasingly attractive.

The trends have been numbered T1, T2, ... for ease of reference from later sections of this report. Within each grouping, items are listed in order of perceived importance (most important first).

2.1 ENVIRONMENTAL TRENDS

- T1. Climate Change:** The earth’s climate continues to change – temperatures and sea levels continue to rise, quantities of greenhouse gases in the atmosphere continue to increase, and other observable changes.
- Drivers include industrialisation, rapid growth of emerging economies, global population increase, reliance upon fossil fuels, and other factors.
- T2. Depletion of natural resources:** The demand for earth’s natural resources continues to increase, whilst supply is finite. Competition for scarce natural resources is therefore increasing.
- Drivers: global population increase, industrialisation, natural disasters, reliance upon natural resources.
- T3. Increase in natural disasters:** Natural disasters and extreme weather events (floods, forest fires, hurricanes, earthquakes etc) seem to be increasing in both frequency and severity, although part of this may be explained by increased media coverage rather than increase in actual events.
- Drivers include climate change, media coverage.
- T4. Food and water scarcity is increasing in parts of the world:** Extreme weather events and increasing temperature are exacerbating instability due to immediate shortages of food and water in parts of the world. Longer-term effects may include a degradation of agricultural land that increases internal and regional migration.
- Drivers include climate change, political factors, logistical factors.

2.2 TECHNOLOGICAL TRENDS

- T5. EO data is becoming more readily available:** The number of EO missions is increasing rapidly, data is becoming available at higher spatial and temporal resolutions, and free access to EO data is increasing.
- Drivers include the evolution of sensor technology due to investment by ESA, Member States and others and the evolution of sensor technology and the decreasing cost of EO missions; the European GMES programme; growth of national and commercial EO programmes; US data policy
- T6. Increased availability of location based services:** Location-enabled services are experiencing rapid growth – linked to growth of location-based content
- Drivers include reduced cost of GPS receivers and their proliferation in mobile devices; availability of higher integrity services such as EGNOS; future drivers include Galileo and next generation of GPS.
- T7. Information technology trends:** Movements towards resource-sharing, cloud computing, processor farms, ‘software as a service’ with more content and functionality delivered online than in standalone platforms or bespoke applications. This in turn is driving a trend for increased online security, increased network bandwidth, increased online storage.
- Drivers include Moore’s law, growth of internet, improved connectivity.

2.3 GEO-POLITICAL TRENDS

- T8. The number of nations with indigenous EO capability is increasing.**
- Drivers include the low cost of smallsats/nanosats, availability of cheap launch facilities e.g. from India, China and Russia, and relaxation of export controls.
- T9. Defence and intelligence use of EO data continues to grow:** Agencies such as the US National Geospatial Intelligence Agency continue to place large contracts with EO data providers for satellite imagery.
- Drivers include military operations e.g. Iraq/Afghanistan, intelligence operations e.g. monitoring nuclear proliferation, and rapid availability of commercial data versus data from government owned satellites.
- T10. International security issues continue to increase:** Conflict areas such as Iraq, Afghanistan; recent unrest in north African and Mediterranean Arab nations (Tunisia, Egypt, Libya, Bahrain and elsewhere); frontier disputes such as Darfur or Georgia; Nuclear proliferation concerns in Iran, North Korea; Piracy e.g. Somalia.
- Drivers include political factors, difficulties of policing, etc. but also technology such as social networking (internet, twitter, facebook)

T11. Emerging economies are experiencing rapid growth: “BRIC” countries Brazil, Russia, India, China and other emerging economies such as Indonesia, Turkey, Mexico and others have rapidly growing economies leading to massive growth in demand for consumer services in those countries, including for import of goods and services.

- Drivers include the current recession in western economies, lower cost bases in the emerging economies, deregulation, several other factors.

2.4 SOCIO-ECONOMIC TRENDS

T12. Increased public awareness of geospatial data: Public awareness of geospatial data is increasing, and new uses and applications of geospatial data are constantly being found.

- Drivers include platforms such as Google Earth and Bing Maps which provide mass market access; the public internet where geospatial data can increasingly be found; the media’s use of geospatial data.

T13. EO is increasingly being used as a source of ‘evidence’: EO is increasingly being used for example to verify subsidies related to crop acreage claimed by farmers, to verify sustainable use of natural resources (e.g. logging), or to identify deliberate oil spills and link them to the ship that caused it.

- Drivers include EO VAC ability to generate these high-level products derived from EO and combining it with other sources of geo-information (ship AIS, etc).

Are there other trends that are important and relevant to our industry? Please make your views known by email to secretariat@earsc.org.

3 MAJOR INITIATIVES AND EVENTS

This section captures the main Global and European initiatives that are seen to be of particular significance to the EO VA sector.

This section aims to recognise that certain initiatives and actions taking place at Global and European level may have a bearing upon the EO VA sector.

Initiatives and interventions have been numbered I1, I2, ... for ease of reference from later sections of this report. Within each grouping, items are listed in order of perceived importance (most important first).

3.1 GLOBAL INITIATIVES

I1. United Nations Framework Convention on Climate Change (UNFCCC)

COP15 – Copenhagen 2009 and “Post-Copenhagen”: The 15th Conference of the Parties (COP15) in Copenhagen¹ marked the culmination of two years of negotiations under the auspices of the UNFCCC and the Bali Roadmap. The purpose of the negotiations was to create a comprehensive, legally-binding international treaty to replace the Kyoto Protocol when it expires in 2012. However, it only achieved a minimalistic document now referred to as the Copenhagen Accord. World leaders described this as a "first step" to dealing with global warming, but admitted that it isn't enough to address the problem. Environmental stakeholders argued it fell short of the ambitious legally binding commitments that the planet needs in the face of climate change impacts.

COP 16 – Cancun 2010: The subsequent UNFCCC conference took place in Cancun, Mexico, from 29 November to 10 December 2010. The decisions centred on continued, strengthened support to developing countries efforts in adaptation and mitigation, including concrete technology transfer projects. It ended with the adoption of a package of decisions that set all governments more firmly on the path towards a low-emissions future and support enhanced action on climate change in the developing world. Countries also agreed to strengthen education, training and public awareness on climate change through increased funding for such activities, and to engage civil society more strongly in national decision-making and the UN climate change process. See <http://unfccc.int/2860.php>.

- Relevance to EO VA sector: Monitoring using EO data sources is likely to take an increasingly prominent role in verifying countries' claims regarding emissions reductions, in verifying the effectiveness of mitigation strategies, and in policing the countermeasures that countries implement.

¹ See <http://www.climaticoanalysis.org/wp-content/uploads/2010/01/post-cop15-report52.pdf>

- Also during the summit, ESA held a side event² focusing on its Climate Change Initiative (CCI), which is making full use of Europe's Earth observation space assets to exploit robust long-term global records of essential climate variables. Contribution to such initiatives represents another area of interest to the EO VA community.

12. Rio Earth Summit (2012): In 2012 the UN Conference on Sustainable Development (UNCSD) or 'Rio+20' will take place in Rio de Janeiro. The objectives of the Summit are: to secure renewed political commitment to sustainable development; to assess progress towards internationally agreed goals on sustainable development and to address new and emerging challenges. The Summit will also focus on two specific themes: a green economy in the context of poverty eradication and sustainable development, and an institutional framework for sustainable development. See <http://www.earthsummit2012.org/>. A recent study³ by the United Nations Environment Programme (UNEP) has highlighted how environmental sustainability programmes can lead to job creation and a healthy economy that is resource-efficient and low-carbon.

- Relevance to EO VA sector: Earth observation has a specific role to play in the green economy, offering environmentally friendly and non-invasive methods of monitoring, observing and surveying from satellite. It can provide valuable data to support and target sustainable development programmes.

13. The 2007-2010 financial crisis: The financial crisis of 2007 to the present was triggered by a liquidity shortfall in the United States banking system, but has gone on to cause the collapse of large financial institutions, the bailout of banks by national governments, and downturns in stock markets around the world. Consequences have ranged from impacts on housing markets, failure of numerous key businesses, substantial declines in consumer wealth, substantial financial commitments incurred by governments, and a significant decline in economic activity. The crisis is affecting governments' finances in a number of ways. There has been downward pressure on government spending in western economies, which is having the overall effect of accelerating the shift of power from Europe/US towards Asia, and of diminishing Western soft power by making its economic and financial systems less attractive. More commentary available at http://en.wikipedia.org/wiki/Financial_crisis_of_2007-2010.

- Relevance to EO VA sector: There may be positive and negative impacts upon the EO VA sector: austerity measures may force public sector agencies and organisations to cut back on their observation programmes and information gathering exercises, but on the other hand, they may also turn to satellite data as a cheaper and more

² See http://www.esa.int/SPECIALS/Space_for_our_climate/SEMIOGOR9HG_0.html

³ See <http://www.eco-business.com/news/2011/feb/21/green-economy-myths-debunked-unesp/>

effective method of collecting data consistently (compared with for example aircraft-based remote sensing campaigns).

- 14. GEO and GEOSS:** The Group on Earth Observations (GEO) is coordinating efforts to build a Global Earth Observation System of Systems (GEOSS). GEO is a voluntary partnership of governments and international organizations, and includes 85 governments and the European Commission. GEOSS will link together existing and planned observing systems around the world and support the development of new systems where gaps currently exist. It will promote common technical standards so that data from different instruments can be combined into coherent data sets. A 'GEOPortal' will offer a single Internet access point for users seeking data, imagery and analytical software packages relevant to all parts of the globe. The aim is to connect users to existing data bases and portals to provide reliable, up-to-date information for decision makers, planners and emergency managers. More information at <http://www.earthobservations.org>.
- Relevance to EO VA sector: As GEOSS gains momentum, more countries and organisations will join as contributors of processed data and imagery in support of its aims, and this will drive the need for EO VA services to supply timely and coherent data sets. As more users and decision makers come to rely upon information derived from GEOSS, end-user demand for geo-information services will grow.
- 15. US government places large contracts to purchase EO data:** The US National Geospatial-Intelligence Agency (NGA) has been acquiring imagery from DigitalGlobe and GeoEye since 2003 - two commercial contracts in 2003 paid for half of the \$500 million cost of each satellite and promised to purchase \$150 million of imagery per year from each; \$7.3 billion in follow-on contracts were announced in August 2010 that involve imagery purchases over 10 years (\$3.8B to GeoEye that will also help pay for a new satellite, and \$3.5B to DigitalGlobe that will also help enhance its ground infrastructure). There has been strong criticism from European players who see this as a threat to Europe's commercial Earth imaging industry. Evert Dudok, CEO Astrium Satellites said: *"you allow your suppliers to sell imagery to the rest of the world at marginal cost. You are creating a de facto monopoly, or duopoly, for the production of data"*; Giuseppe Viriglio, Chairman Telespazio: *"The business will not be sustainable anymore for some companies because of this NGA award."*
- Relevance to EO VA sector: As noted above, such initiatives/moves have the ability to benefit certain EO data service providers with lucrative long term contracts, but also to skew the competitive marketplace for EO data services and disadvantage other EO data service providers.

3.2 EUROPEAN INITIATIVES

- 16. Lisbon Treaty (2009):** The Treaty of Lisbon entered into force on 1st December 2009, amending the constitutional basis of the European Union. It aims to enhance the efficiency and democratic legitimacy of the Union and to improve the coherence of its action. The treaty foresees that the European Security and Defence Policy will lead to a common defence agreement for the EU when the European Council resolves unanimously to do so, and provided that all member states give their approval through their usual constitutional procedures. The Lisbon Treaty also unambiguously enshrines space as a shared responsibility for the EU and its Member States.
- Relevance to EO VA sector: A common security and defence policy will imply common surveillance needs, many of which can be met using the capabilities of the EO VA sector. A common approach to space across Europe should lead to aggregation of European satellite observation needs and thereby the ability to build pan-European EO services.
- 17. Establishment and implementation of European Space Policy (2007+):** The first ever European Space Policy (ESP) was adopted in April 2007 as a joint document of the European Commission and ESA⁴, with a strategic mission based on the peaceful exploitation of outer space, and recognising that space systems are strategic assets demonstrating Europe's independence and readiness to assume global responsibilities. The European Space Policy will ensure that Europe plays a leading and significant role in space and that space-based technologies maximise benefits to Europe and its citizens. The implementation of the policy has been subsequently developed at the 5th Space Council (2008) which highlighted new priority areas (including space and security, space and climate change) and the 6th Space Council (2009) which focused on the contribution of Space to innovation and competitiveness. A vision of 'the ambitions of Europe in Space' was outlined by the president of the European Commission, José Manuel Durão Barroso, during a key note speech on 15 October 2009, recognising GMES and Galileo as flagship programmes, and highlighting the importance of space in climate change and security.
- Relevance to EO VA sector: The recognition of the role of space data for climate change and security needs, and more widely to benefit European citizens, will ensure the long-term continuity of satellite data sources upon which the EO VA sector relies heavily – uncertainty over the long-term continuity of such data has hampered the development of sustainable services and user demand in the past.
- 18. INSPIRE Directive (2007):** The INSPIRE directive aims to create an infrastructure for spatial data within the European Union. It came into force in May 2007 and full implementation is expected by 2019. The objective is to enable public sector organisations throughout Europe to share spatial

⁴ See http://ec.europa.eu/enterprise/policies/space/esp/index_en.htm

information about the environment. INSPIRE is based on the infrastructures for spatial information established and operated by the 27 Member States of the European Union. The Directive addresses 34 spatial data themes needed for environmental applications, ranging from coordinate reference systems to elevation, land cover, orthoimagery, geology, land use, atmospheric conditions, oceanographic features and much more. See <http://inspire.jrc.ec.europa.eu/>

- Relevance to EO VA sector: The sector will find itself increasingly under pressure to comply with INSPIRE provisions and ensure that spatial data products are compatible and interoperable. This may imply some increased cost in the short term to make EO VA systems and products compliant, but will bring significant advantages in the long term as barriers such as proprietary data formats are broken down. It will also help provide EO VACs with access to new customers and markets across the EU, as all public sector organisations will be able to work with INSPIRE-compliant data services and products.

19. GMES Initial Operations & Data Policy: On 16 June 2010⁵ the European Parliament approved with a large majority the Commission's proposal of 20 May 2009 for a regulation on the European "Global Monitoring for Environment and Security" (GMES) programme and its initial operations 2011–2013. This gave a green light to the development of the operational GMES system by 2014, which will enable the EU to collect its own EO data for environment and security uses. The regulation contains a provision for open and free of charge access to the collected data, so that all local, regional and national players can use these data to respond to natural disasters, to monitor climate change as well as to take better decisions on agriculture, forestry, energy, urban development, infrastructure or transport. The regulation provides €107m in extra funding for the 3-year initial operations phase, supplemented by €209m from the EU seventh research framework programme (FP7) "space" theme for accompanying research actions.

- Relevance to EO VA sector: GIO paves the way for fully-funded operational GMES services in the period 2014 onwards. The programme is of particular interest to European EO VACs with interests in providing core and downstream data services for GMES.
- The open access policy for GMES data should also boost a downstream market for which small and medium-sized VA companies can develop new and innovative applications to exploit the data. Some EO mission operators also perceive a threat to commercial EO data sales.

Do you agree that these initiatives are relevant to our industry? Are there others that we have missed? Let us know by email to secretariat@earsc.org.

⁵ See <http://www.earsc.eu/news/adoption-of-the-regulation-on-gmes-programme-and-its-initial-operations-2011-2013>

4 IMPACTS UPON EO MARKETS

Based on the external trends and drivers this section identifies the expected impacts upon the EO services market and how the EO VA sector may need to respond to this evolving and changing market.

In the discussion below, impacts upon the following players are identified

- **EO VAC** = an Earth observation value adding company who processes EO data into products and services
- **EO Data Provider** = an operator of EO missions or a broker who sells EO data on behalf of an operator
- **User** = a consumer of EO data products and services

The major impacts upon the sector are expected to be as listed below, numbered M1, M2, ... for ease of reference. These impacts are grouped into the areas of user expectations, application areas, and new markets. Within each group the market impacts are listed in perceived order of importance (most important first).

4.1 IMPACT UPON USER EXPECTATIONS

M1. Users of EO VA services will want their products delivered to them in novel ways, such as on mobile devices, seamlessly integrated with other applications and technologies of interest to them. (From T5, T6, T7, T12)

- EO VACs will have to find innovative ways of exploiting new and emerging technologies like iPhone Apps to deliver their services. Users expect a GUI similar to Google Earth.
- EO VACs will have to find ways to integrate their products and services with other data and services of relevance to specific user communities. A specific example is integration with GNSS, to provide services such as congestion charging and road tolling

M2. Users of EO VA will want data that is timely and relevant, does not take excessively long time to access and is available at low cost. (From T5, T7, T12)

- EO VACs will need to find methods of processing and delivering data to multiple users in a more timely manner – intelligent streaming and caching technologies will be necessary.
- VACs will need to find ways of reducing bandwidth requirements for streaming data to mobile devices – sophisticated compression and ‘multicast’ technologies may become increasingly relevant.
- EO data providers will have to continue to find cheaper ways to build, launch and operate EO missions – use of smallsats and nanosats, inexpensive EO constellations, new instruments and observation

techniques, exploring alternative financing techniques (e.g. PFI/PPP), and bilateral and multilateral approaches to meeting data demands.

M3. Climate scientists will increasingly rely upon EO data and will want it to be reliable and trustworthy, to enable them to monitor change and monitor the effectiveness of mitigation strategies. (From T1, T2, T3)

- EO VAs will need to be able to demonstrate beyond doubt the accuracy and reliability of their EO data products, i.e. that it has been calibrated and validated to climate standards, and data error characteristics are clearly identified.
- EO VACs may need to sign up to certification schemes that enable them to certify their data as being of 'climate quality'. Who should be the governing authority of such certification?

M4. Corporations and public sector bodies will want access to data that demonstrates they are operating sustainably and are not causing adverse impacts on the environment. (From T1, I1, I2)

- EO VACs will need to develop relevant products to help large organisations (multinational corporations/industrials, even government departments) demonstrate and prove their environmental credentials, e.g. by measuring their emissions, monitoring local pollution such as emissions and effluents, monitoring energy efficiency etc.

4.2 NEW APPLICATIONS AND SERVICES

M5. EO will increasingly be relied upon to help identify, protect and manage the Earth's scarce natural resources. National and international environmental agencies and NGOs will increasingly demand tailored EO data and products that allow them to identify and then monitor specific resources. (From T2, I1, I6)

- EO VACs will need to serve traditional sectors such as oil & gas, mining, etc with relevant services that help them identify reserves and help them conduct their business more effectively.
- EO VACs will need to serve the renewable energy sector with relevant information on suitable sites for wind farms, tidal/wave energy farms, expected yields, and other parameters.
- EO VACs may be able to offer repeatable solutions across EU member states aligning to EU policies at national/regional level in response to regulatory actions.

M6. The ESA/EC GMES programme will enable the development of new and novel applications and services by providing free access to data from the GMES Sentinels and providing coordinated access to data from multiple contributing missions. (From T1, T3, T4, I9)

- EO VACs will be able to develop (and charge for) novel value-added services that build upon and exploit the GMES Sentinel data policy,

which ensures free-of-charge access to all Sentinel data as well as the products generated to anyone interested in using them, mainly for GMES data use but also for scientific and commercial use.

- However data availability alone will not drive this market; a corresponding awareness and impetus amongst user organisations is also required, backed by measures at EC and member state level to ensure strong take up of these services driven by user needs.
- The issue of competition between public and private sector organisations for the delivery of such services remains a significant barrier to this market. Commercial providers of EO VA services frequently find themselves competing with publicly funded bodies and institutions for delivery of GMES services.

M7. Emergency services will increasingly rely upon EO data for planning and relief operations. (From T3, T5, T6, I6, I9)

- EO VACs will have to deliver more timely data products to users such as the emergency services – police, fire, ambulance, coastguard, vehicle recovery services, and others.
- EO VACs will have to explore novel methods of delivering EO based data and products to such services in the field, on mobile devices in areas of poor or limited internet connectivity.

M8. International development organisations (World Bank, IFAD, EBRD etc) will increasingly draw upon EO services to help them tackle food/water scarcity, regional humanitarian and security issues, amongst others. (From T1, T2, T10, I2, I9)

- EO VACs will need to develop specialised high-level EO products in response, as the relevant indicators such as crop health/yield, stored water resources are not directly observable and generally require sophisticated higher level processing.
- The EO VAC community will need more effective methods of access to the latest scientific techniques from academia and the ability to translate them into operational services.

M9. Countries will come to rely and depend upon EO data sources to aid in the protection of critical national infrastructures. (From T5, T9, T10, I9)

- Demands for higher resolution and more timely data will increase.
- The need for secure observation and data delivery capability will increase (observation systems resilient to malicious attacks and inadvertent interruptions).

4.3 NEW AND EVOLVING MARKETS

M10. EO will play an increasing role in policing the planet, for example in monitoring nuclear non-proliferation, combating piracy and drug trafficking, reducing illegal immigration, etc. Law enforcers and prosecutors will increasingly demand EO data to support litigation and prosecution. (From T9, T10, T13, I1, I2)

- EO data providers will have to respond to the demand for more timely and higher resolution EO data, and for new types of sensors to detect violations not detectable through traditional EO methods.
- EO VACs will need a means of certifying that their EO data is accurate and authentic beyond reasonable doubt may have to be established, so that such data can be admitted as evidence in a court of law.

M11. The defence sector will continue to be the largest consumer of EO imagery and their actions continue to have the potential to significantly skew and impact the market for EO data and services. (From T9, I5)

- EO VACs need to be aware of this driver and the impact it may have on their business. They will need to work together to ensure any concerns of the European VA industry are clearly articulated (e.g. via EARSC) and are made known at European and national levels in member states.

M12. New commercial consumers of EO products and services will emerge. Demand for export of European technology and know-how will increase. (From T5, T6, T7, T8, T11, I3, I5)

- EO VACs may be able to exploit potential for EO services in areas such as e-Commerce, finance, insurance, oil & gas, civil engineering & construction, and others.
- EO data providers may be able to assist emerging economies with joining the EO generation.

M13. Need for standardisation and possibly certification in EO will become increasingly important as EO services develop, and consumers start to seek methods of differentiation between varying quality services. (From T12, T13, I1, I8)

- EO VACs and EO data providers will need to adhere to standards. Compliance with directives such as INSPIRE is likely to be enforced and policed more rigidly in future.

Do you anticipate other impacts upon our markets? Help EARSC to prepare industry for these by letting us know. Email us at secretariat@earsc.org.

5 KEY ISSUES FOR EARSC ATTENTION

Based on the discussion in the preceding sections, this section tries to pick out the top issues that need urgent attention by EARSC and the EO VA community in 2011, perhaps with specific interventions or positions.

Based on the analysis in this report, we believe the top 5 issues for EARSC attention in 2011 are the following.

- 1. GMES Operations Phase (from M6).** Several barriers still exist which hinder the EO VA sector from delivering the maximum economic benefit to Europe from GMES. Industry investment in services development cannot continue without assurance of measures to foster strong take up of these services. The GMES data policy continues to divide opinions in Europe and continuity of operational funding for GMES is still not assured. EARSC should consider how to raise such issues more prominently, with views and positions on the steps industry would like to see implemented in order to make the GMES operations phase a success.
- 2. Impact of large defence contracts on the European EO VA sector (from M11).** Defence agencies and ministries continue to be by far the largest consumers of the global EO imagery collected from satellites today. Contracts for supply of such imagery and services have the ability to skew the EO VA market in favour of suppliers to the defence sector. EARSC should consider what, if any, response is required to help safeguard the business of value-adding companies in the sector from such actions, and keep the industry competitive.
- 3. Competition between public and private sector (from M6).** The EO VA sector continues to face strong competition from public-sector organisations and agencies in Europe who are increasingly competing for commercial business. The EO VA sector must consider how to respond to this challenge and give users and customers of EO data and services clear differentiators and benefits in sourcing these from the commercial sector, and work to ensure a strong and appropriate relationship between public and private sector players with interests in delivering services e.g. from GMES.
- 4. Certification/standardisation of EO data services (from M3, M10, M13).** The EO VA sector needs to consider how it can make 'climate quality' data and services available reliably and consistently across the sector. A standard approach to quantifying and characterising or even 'certifying' the quality of EO data sets would bring increased confidence and therefore uptake of EO data services for a variety of applications. EARSC should consider whether and how such a scheme should be implemented.
- 5. Export of European capability (from M10, M12).** Significant opportunities exist in this area and the EO VA sector must consider how it can work together to address new markets with a collaborative approach – this is necessary because no individual VAC has the resources to tackle such markets on its own. EARSC could consider initiatives such as trade missions to promote the capabilities of the European EO VA sector in new market sectors and in new geographies.

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