

TODAY'S EUROPEAN SPACE PROGRAMMES: APPLICATIONS AND SYNERGIES WITH A VIEW ON EASTERN EUROPE

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CONFERENCE REPORT

Organised by the Romanian Space Agency (ROSA) with the support of the European Space Agency (ESA) and the European Commission, the 6th edition of this regional gathering provided local and regional public and private organisations with information on the latest business opportunities created under the European Commission's satellite programmes. Focusing on Eastern European stakeholders, the two day event took place under the auspices of the Romanian Ministry for Research and Innovation.

Covered topics emphasized the use of Earth Observation, satellite communication and satellite navigation technologies for socio-economic benefits and environmental management. At the centre of these benefits, local and regional confirmed and potential users presented their experience and needs during the Eurisy powered round table.

As user requirements evolve, so do business models. As such, European Commission representatives emphasized the need to encourage and support European companies **to create new space based applications, in line with new societal needs and trends**. The cross-sector synergy potential of space based applications was particularly emphasized, as well as the need to support a critical mass of Start-ups and innovators across Europe. The Copernicus Academy and Relay Networks, alongside numerous accelerator and incubator programmes were set in place to do just that. Ensuring the continuation and the extension of such programmes will thus be a priority for the next EU budget.

"The best way to predict the future is to be involved in shaping it" advocates Matthias Petske, Director of the European Commission Satellite Navigation Programme. From Big Data to the Internet of Things, data and access to data have taken centre stage as innovation catalysers. Satellite data needs to be a part of it. And when it comes to Earth Observation data, according to the Copernicus Support Office representative, **we are reaching our maximum capability to distribute the data we generate**. More than 4 million products of EO data are available on ESA's Sentinels Data Access Hub, one of the four available. In the last three months alone, more than 6.6 Petabytes of Copernicus EO data has been downloaded by the platform's 90,000 registered users. Data size and download limitations are thus translating into more time and effort for users to obtain the needed data. Moreover, downloads are currently restricted to two products at a time. The next generation of data hubs, namely the future EU Data and Information Access Service (DIAS) aims to

tackle these challenges. By shifting to cloud computing the Copernicus service will aim to **carve download time and remove local capacity constraints**, such as limited internet capabilities and as such, **bring users closer to both Copernicus tools and services**.

In addition to Copernicus, the Galileo GNSS programme was further detailed throughout the first day of the event. Location awareness, the next phase in the digital revolution, is driving not only the automotive industry, but extends to wearables, location based services, geo-marketing and so on. **The need for ubiquitous connectivity, positioning, synchronization and coverage will drive the need for new technological developments and hybrid multiplatform solutions.** With Europe lagging behind in terms of patents for GNSS applications, ESA's Navigation Innovation and Support Programme (NAVISP) hopes to change that by supporting industrial competitiveness in its member states. Comprised of three pillars, the programme will consist of both technology and product development support. These will be offered alongside calls for tenders and funding opportunities for private companies interested in exploring GNSS capabilities. More information on the programme can be found [here](#).

A public-private initiative, the future EU GOVSATCOM programme was also discussed as a necessary element to exploit synergies between military, industry and civil institutional actors. Spurring from the need to pool and share capacity, the lack of common satellite communication standards in Europe, institutional fragmentation and cyber security needs, the programme is seen by industry representatives, such as Eutelsat, as a step forward towards expanding Europe's autonomy and security. Moreover, according to Mr Stefano Agnelli, Director for European Institutional Affairs at Eutelsat, the creation of such a partnership involving industry players will contribute to maintaining Europe's commercial competitiveness. With many stakeholders to be potentially involved, such a partnership would thus benefit from a neutral European centre to oversee procurement, certification and mission planning. With the next 2021-2027 EU Budget under discussion, GOVSATCOM's future development and implementation will be a key point on the agenda. In the meantime, Eutelsat recommends a "learning by doing" incremental approach where GOVSATCOM usage and end-to-end services can be tested and demonstrated within the existing deployed capacity.

Eurisy round table: exploiting the synergies of the European Space Programmes for the benefit of environment and society

In recent years we have witnessed a plethora of natural and man-made disasters. From forest fires to floods, earthquakes, droughts and food shortages, the costs of such disasters is considerable, not just in humanitarian terms but also for socio-economic development. Climate change, deforestation, population growth, rising consumption, urban areas expansion and many other factors, play a role in speeding up the recurrence of such natural hazards and extreme events. In this new environment where risk management and environmental resilience are of crucial concern, it is becoming increasingly important to improve the assessment, early detection and monitoring of risk. Satellite based information and services (Earth observation, satellite communications and satellite navigation) together with other technologies can make a substantial

contribution to improve warning systems and assess risks, as well as support recovery efforts after events occur.

Eurisy's round table gathered together representatives from local and regional public organizations to exchange on the use of satellite based information for monitoring and mitigating such natural and man-made risks. To kick-start discussions, the session introduced the Copernicus Emergency Management Service (EMS).

In operation since 2012, the Copernicus EMS service provides disaster management information based on space data. And it does so globally. In-situ and other geo-information data are also added to the mix depending on the user's request. The service supports the EU's Emergency Response & Coordination Centre (ERCC) in Brussels and works closely with the International Disaster Charter team to ensure non-duplication of efforts, since no agreement delimitating or separating responsibilities between the two structures exists.

Its two products, rapid mapping and risk and recovery mapping are provided free of charge to authorised users (e.g. national public authorities overseeing civil protection and emergency services) and the ERCC. Whilst Rapid Mapping is available 24/7, all year round under a standardised workflow and product, the Risk & Recovery mapping service is tailor made and can incorporate user data in addition to satellite imagery. Coordinated under DG GROW, DG ECHO, the European Environment Agency and the EU Joint Research Centre, these EU bodies support the service in several ways. One of JRC's tasks is also to **translate user requirements into technical specifications**. Since the service can be activated only by registered users, local and regional organisations interested in obtaining EMS products need to submit their demand to their [national representatives](#). Such was the case in Croatia, where a local NGO has asked the National Protection and Rescue Directorate (NPRD) to trigger the Risk & Recovery mapping service. As a result, seismic risk assessment maps were delivered by EMS for several urban areas in the country. An additional assessment was done for forest fires. The resulting open data is available to access on the [EMS portal](#).

Working on-demand, activation requests are evaluated to ensure their eligibility. In some cases this step is necessary to avoid non-duplication of work when cross-border risks or incidents occur. For example, Croatia tried to activate the GMES ERS service (EMS's predecessor) in October 2010 after the Ajka alumina sludge spill. The accident had taken place at an industrial site in Western Hungary close to the Croatian border. Croatia's demand was however declined as Hungarian authorities had already triggered the service. The data was also locked, according to Mr Andrija Antolovic from NPRD. One year later, two other activations were declined due to short deadlines or non-eligibility. Subsequently, in 2014, the service was successfully activated following a series of floods on Croatia's territory.

While the service is free of charge and is perceived by users as ideal for post-event mapping, activation procedures and bureaucracy are perceived as burdensome. Especially when users are asked to describe what type of data they need, or to submit their own data sets. Data acquisition challenges are also reported by the Copernicus EMS office which can spend **66% of its efforts on satellite tasking and data acquisition**. However, according to NPRD, the Copernicus EMS products

have acted as a **quality model for local authorities catalysing investments** that would allow them to reach the same level of analysis locally.

Since 2012, the EMS has been activated over 256 times for humanitarian crises, storms, floods, earthquakes etc. Due to the Sentinel's slow rotation timelines (5-10 days), **Copernicus data has rarely been used for rapid mapping products**. Moreover, when it comes to natural disasters, Copernicus data may be insufficient as usually high resolution images are needed for an effective detailed assessment. Less used, risk and recovery mapping products can take up to 20 days to be delivered, thus, allowing for Copernicus data and other information integration work to be carried out by the EMS team, JRC and others. These maps can be particularly helpful for medium to long term planning of drought mitigation measures, natural hazard risks or the assessment of damages after forest fires and other related canopy risks.

Such information comes in hand for public companies such as Vojvodinasume. Located in Northern Serbia, the company relies on satellite data, geo-information and drones to manage the region's scarce forest resources. Covering 7% of the area, almost half of the forests and forest land managed by Vojvodinasume fall under protected legislation. Thus, monitoring forest health, disturbances and climate change effects are vital for this organisation. Their budgets rely on the funds obtained from selling wood products. Thanks to an Interreg Danube Transnational Programme, "[DanubeParksConnected](#)" the company had the opportunity to undergo training on Copernicus data use. As such, with the funds made available through the project, Vojvodinasume was able to purchase a **software solution that will allow them to integrate Copernicus with their existing data sets**. Due to the limited resolution, the tool will be used to monitor larger forest areas. On top, **for smaller parcels, the company will continue to use ortho-photos from drones**. More information on Vojvodinasume's user story can be found [here](#).

European funds, this time Horizon2020, have also enabled projects such as [Danube-FloodRisk](#), [WaterCore](#) and [EO-Moses](#) to pilot satellite based solutions in Romania's South and South-East regions. Both agriculture intense regions, the areas have been subject to extreme droughts, as well as severe flooding during autumn/spring seasons. During summer months water demand exceeds supply. Moreover, the agricultural sector is an inefficient water user, as water is a minor fraction of the total production costs, according to Ms Mary-Jeanne Adler, representing the National Institute for Hydrology and Water management on this occasion. As such, by combining Earth Observation data with hydrological season forecasts, weather data and in-situ measurements, the Institute wants to convince farmers and local authorities of the benefits obtained through efficient water management. And that well managed water demand and consumption will translate into more *crop per drop*. In case of drought, by combining water use monitoring with frequently updated forecasts on water needs, public authorities' will be better prepared to plan for water allocation. In the future, the information would be delivered through an online platform and potentially a phone app on weekly, monthly or seasonally basis.

Although rationalising water would allow farmers to save resources, there is a lack of incentives to optimize water use in the country. Moreover, **few to none of the users involved in the pilot project would agree to pay for such a service**. In their view, it should fall upon the public authorities to provide it to them, for free. Currently, the Romanian Waters Authority is looking into whether the relevant public authorities can afford to cover the costs of a continuous service.

A similar case can be found in Hungary where the Ministry of Agriculture, through the Research Institute of Agricultural Economics, provides farmers with a free centralised crop risk management system. Hungary's landlocked position and high crop-land ratio, puts the country's agriculture sector at a competitive advantage in the EU. Its continental climate however, also renders crop yields highly volatile, with recurrent droughts and flooding affecting the country's agriculture sector. In addition, public authorities identified a recurrent mismatch between the risks covered by insurances and the actual damages caused by adverse climate events. For example, whilst 87% of the risks covered by insurances were related to hail incidents, only 21% of the crops were affected by hail contrary to droughts, flooding and/or frost event. Moreover, only 30-40% of farmers were covered against such adverse risks. This led the Ministry to take stronger action in tackling agriculture risks and set up additional remote sensing based mitigation and subsidies schemes in cooperation with insurance companies.

A fully digitised system, the platform covers 77 thousand farmers, 11 insurance companies and investment funds, 19 regional government offices together with eight central offices and institutes. Linking all these stakeholders, the tool aims to support, among others, the processing of climatic related damage claims on agriculture crops. Beyond the meteorological likelihood of external adverse events, the system also integrates socio-economic data. Additional information such as, price and production risks, water management parameters and so on, allow for adjustable claim rates.

When an adverse incident occurs, farmers can submit their loss and claims electronically using a mapping system. By merging Earth Observation data together with crop models, meteorological parameters and other socio-economic factors, damage claims can be double checked using remote sensing based information. Due to the high number of stakeholders involved, **site inspections by electronic and GIS technologies remain however mandatory. As such, there is no clear indication as to what percentage of the claims could be solved only through satellite data use.** Data sharing and data privacy concern remain high, especially among private insurers who are reluctant to share information with their market competitors. However, according to Mr Andras Molnar, the complex sets of data and information received allowed the institute to develop new risk managing tools despite the fact that **data sharing remains a thorny subject.** To support transparency, collaboration and partnership building, an open data portal has been set by the institute (available [here](#)). To keep costs under control the **institute used mostly free and open satellite data for the system.** Its maintenance requires approximately 4% of the Ministry's budget and **while insurance companies participate in its use and review, they do not contribute financially to its development.** Nonetheless, the system's success translated into an increasing number of insured farmers, as well as a precise control of compensation claims for both public and private stakeholders. As such, the Institute aims to develop the tool to include new target groups (e.g. dairy and poultry farmers) and/or introduce bonus malus clauses, similar to car insurance schemes.

Despite the numerous advantages of using satellite data for risk mitigation, operational cases of such services remain however limited in the region. Furthermore, among those making it past the pilot stage, few have been implemented following a viable business model. Without such a model they **remain dependent on public funding.**

Due to their transversal nature, the inclusion of satellite data use and trainings in EU funded projects, such as Interreg Danube is a most welcome addition to disseminate Copernicus use for water management. A similar practice could be carried across additional regional projects and other capacity building funds. Drawing on the feedback received from our speakers, the region would also benefit from a stronger, more efficient knowledge and data transfer from academia to policy-makers. According to Ms Adler, bridging this community divide would allow for better decision making, at all levels. Market development would also benefit from more private-public cooperation and the Hungarian Agriculture Risk Management System is a good example of such an initiative. Although large consortiums, such as Hungary's insurance system, require increased coordination efforts, they act as a catalyser for building trust and long term partnerships.

When it comes to data sharing, the region would also benefit more from open data policies. With a potential to decrease red tape, such policies could also support the development of more private-public initiatives. Aspects such as open data policies and cross-border interoperability could be further addressed in future editions of the event. A focus on services obtained from overlaying technologies (satcom, satnav and Earth Observation data) could also prove of interest to public and private stakeholders.

Not aiming to cover all aspects related to satellite data use, the round table discussions endorsed a regional holistic approach. From disaster management to agriculture and forestry, the session aimed at involving various cases, studies and applications of satellite based information in the region, highlighting both the benefits and the limitations of satellite data use in these sectors.