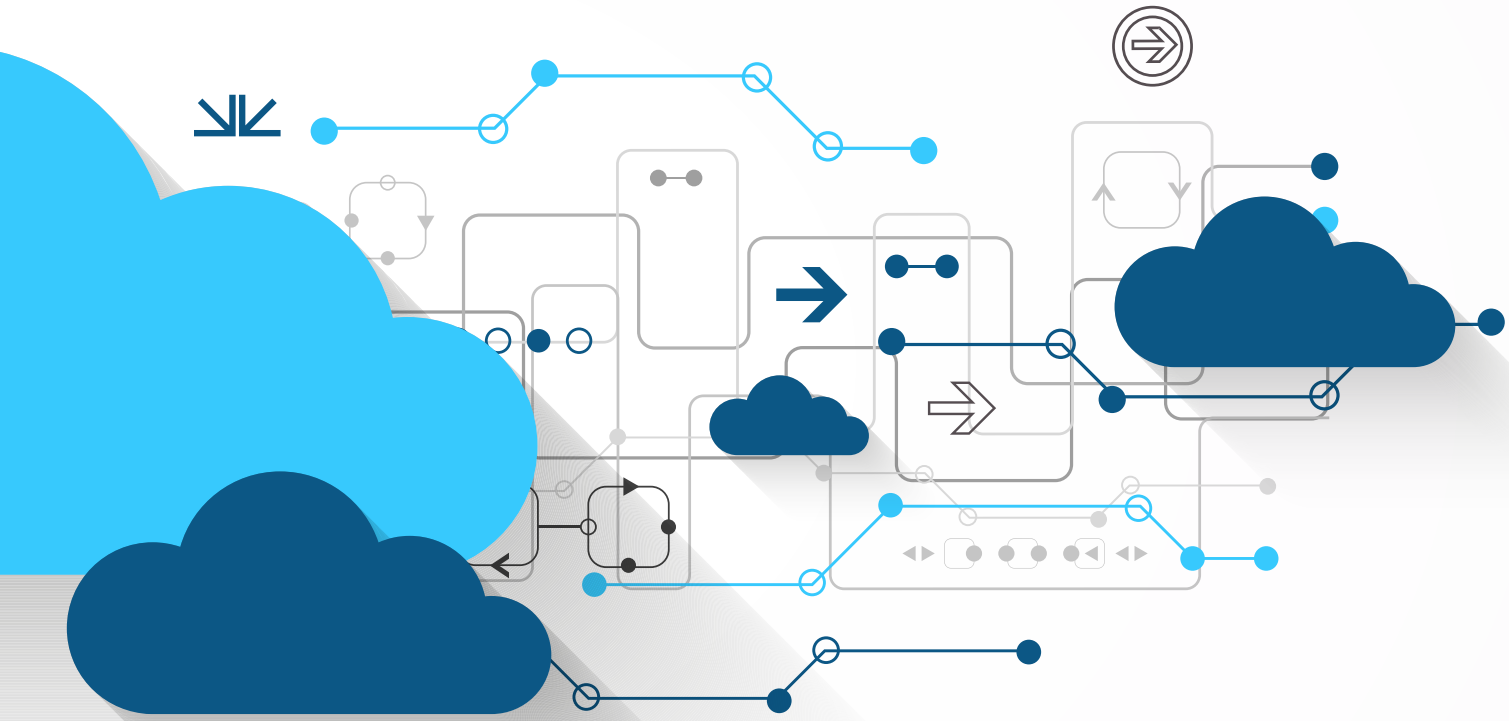
OCRE | Open Clouds for Research Environments



OCRE's experience through researchers' eyes

Recommendations on how to improve access to cloud and EO services for the scientific community in Europe

ABOUT OCRE

Since its launch in January 2019, the **EU-funded Open Clouds for Research Environments (OCRE)** project has greatly improved ease of access to cloud services and EO data for researchers through several tendering processes. OCRE has played a strong supporting role in the development of cloud computing and innovation in Europe by providing European public institutions with an online catalogue of commodity-type commercial digital services.

Via the catalogue the project granted access to a vast choice of cloud and EO data suppliers, many of whom were not previously available, and provided volume discounts to both research and education institutions. As a result, the European research community obtained access to powerful tools to carry out the computational work and boost innovation with greatly reduced legal, financial, and technical barriers.

In this policy brief, the OCRE project has summarized several of the challenges faced by researchers when exploring cloud solutions for their work and the benefits of applying for commercial cloud solutions and approaching EO data providers through OCRE. In particular, the winners of the OCRE funding calls have been interviewed to identify the needs of the research community for cloud and EO data and the related benefits, their experience with OCRE, the impact of facilitated access to cloud and EO data, and the remaining barriers at local and European level.

CLOUD RESOURCES

The OCRE project has interviewed researchers who necessitated cloud resources for their computational work, but found it difficult to access commercial cloud services before applying through OCRE.

The difficulties and challenges faced by the research and educational institutions as described by the researchers prior to OCRE are outlined below.

Challenges

Finding funding and allocating **budget** to purchase cloud / EO services.

At the national level, obtaining funding for cloud /EO resources for public institutions has numerous **bureaucratic barriers** caused by tight regulations.

At the local level, there are several challenges because of **internal policies** within the public institutions and the procurement process itself. This is often caused by mistrust regarding cloud services due to data privacy and security concerns and the difficulties in negotiating prices, terms and conditions, and contracting.

Insufficient technical support in the infrastructure setup due to limited IT expertise/staff resources and internal barriers within the public institutions related to documentation and administrative procedures. **External consultation** might be an option, but it is often expensive and out of the budget for public institutions and for research projects.

Lack of knowledge about how to adopt, set up and operate complex cloud solutions effectively, efficiently, and safely. The set of tools and applications that a scientist has to master before efficiently using cloud services might be extensive and there might be limited opportunities to reach out to the IT department internally.

Accurate **estimates and quotes** are difficult to find prior the project start. Although there are generic calculators of the **costs** related to cloud resources adoption, they are often not representative of the actual costs and do not provide an accurate estimation based on the projects' requirements.

Lack of incentives for public institutions to explore new technologies because of the related costs, learning curve and reluctance to transition to new solutions.

Research institutions from associated **countries outside the EU** have additional entry barriers, particularly in regards to taxes.

OCRE Impact

- OCRE normalised the procurement process by providing **ready-to-use agreements** to purchase cloud resources and support through NRENs and partners.
- The access to cloud resources allowed a significant transition from small scale tests and free trials of cloud resources to **large scale experiments** enabling the expected research outcomes
- Public institutions obtained valuable experience in cloud resources procurement and opened a path for **more projects to be involved**
- **Impetus** to explore cloud computing thanks to the provided funding and community support.
- **OCRE framework and funding** allowed researchers and small research teams to invest in cloud services and perform analysis.
- **Via the provision of EO and cloud services more Interdisciplinary research can be facilitated and encouraged**.

"It is easier to focus on the research because you don't have to take care of the infrastructure, you can explore new research topics but also in my opinion to facilitate interdisciplinary research where you can tap into different data sources, different domains or work together with other researchers in a common space"

Martin Sudmanns, Paris Lodron University Salzburg, Department of Geoinformatics

- **OCRE facilitated the access to EO and cloud services thus allowing researchers to upscale research** and perform earth observational analysis over a much larger area.

"What I think is important for the research community is that their work is supported by IT, and not impeded. If computational resources are easily accessible and the knowledge how to use them is wider spread, then the research community can focus more and faster on the science than on the process how to get their data processed."

Olaf Tuinder, KNMI

Recommendations

- Provide **resources and expertise** to initiate and facilitate training about cloud adoption and the selection of the provider within public institutions both for administrative and IT staff.
- Provide clear training and resources on the **General Data Protection Regulation (GDPR)** in relation to the use of Cloud / EO services to reduce confusion and misinformation within public institutions which is currently a barrier to the use of these services.
- Grant a **simplified access to cloud resources** for the research community through economic incentives and ease their interaction with cloud providers to make the transition attractive. On the other side, the suppliers are more interested in cooperating with public institutions if the administrative barriers are reduced.
- **Raise awareness** at the National and European level about the positive impact that cloud resources can have for research projects. This includes cost-effectiveness and increased technological opportunities to boost the digital market.
- Provide opportunities for researchers to exchange data, cooperate between projects and **raise their voice** about their needs. This will further facilitate interdisciplinary research within this area.
- **Harmonize regulations within Europe** on procurement beyond the EU directives on joint procurement for R&E and data protection. This can be done for example through WTO – GPA regarding the procurement.
- When providing EC funding through EC Grant Agreements ensure **compliancy with VAT** and procurement regulations upfront. In hindsight this would prevent regulations upfront in order to reduce or avoid delays.
- Secure continual improvement by implementing an **iterative design and management method (Deming circle)** on the contracting and tendering procedures.
- Continue to **lower Virtual Barriers and Borders** - create a more streamlined pan-European approach whereby services and providers are not replicated in each country but instead are able to operate without virtual borders, i.e. at the moment there are still numerous contracts in different countries.
- Ensure the **sustainability of the services** and appropriate archiving of the data.
- framework similar to OCRE at the pan-European level, with access to multiple local and medium-size cloud providers. This would guarantee cloud sovereignty at the European level, and decrease the dependency on large private companies.

Recommendations by GÉANT based on OCRE experience

*"It would be interesting to find a balanced score between efficiency and creativity in aggregating demand within the Pan European R&E community and supplying these services & tools for learners and researchers. A **Pan European procurement** could be the right context to get impulses for both - creativity and efficiency with demand and supply. First steps could be to organise separate end user- and market consultations on demand and possible supplied services, to share the outcome and knowhow within the wider R&E community. Finally collaborating by joint procurement, create economy of scale to get best value for money / potential available funding."*

David Heyns and Monique Pellinkhof (GÉANT)

EO PROVIDERS

The OCRE EO Catalogue is a also a key result of the OCRE project. It aims at creating a digital single market for commercial EO and Cloud services for research in Europe.

"We are seeing great demand for bespoke EO services based on Copernicus across all science disciplines in Europe. The OCRE EO Catalogue will provide extensive visibility to the growing number of innovative suppliers in this space, as well as opportunities to participate in the OCRE adoption funding initiatives and outreach across the broader EOSC."

OCRE Project Director David Heyns (GÉANT)

The OCRE project interviewed the representatives of the awarded projects for EO services to discover the challenges they faced and provide relevant recommendations.

Challenges

Difficulties in obtaining **a large quantity of high-quality** satellite imagery for the research community to guarantee an appropriate mapping accuracy.

The EO market represents **a niche** and is not well-developed yet, with many service providers being SMEs and Start-Ups, which creates obstacles for their visibility and accessibility.

Even when the research group has access to EO data, it might not have **the cloud infrastructure or computing capabilities to process** it.

Research groups might not have the necessary ICT capabilities to adopt and benefit from the available EO solutions.

Lack of awareness of the available solutions, particularly at the local level.

Insufficient support by the public authorities and understanding of the EO services value for researchers at the national and European levels.

OCRE impact

- Facilitated the **access to EO data** and its integration with the models developed by the research groups.
- Enabled the research community **to discover and establish partnerships** with new industries that offer specialized services.
- Allowed researchers to scale up their research.

Recommendations

- Promote EO services for the research community by mapping them and supporting the existing catalogues as EO data can significantly enrich research results in Europe.

- **Enable researchers to share their experience** and **exchange skills** to help research groups understand how they can exploit EO services and translate the benefits of EO data usage to the public.
- **Create networks** that ease the close cooperation between public institutions and EO providers to facilitate the access to the required auxiliary data for researchers.
- **Provide funding** to researchers seeking access to EO services, as it has multifarious societal benefits, such as promotion of scientific innovation and enablement of evidence-based decision-making.

Conclusions

The European research community is boosting innovation to improve citizens' lives and the environment we live in. Nevertheless, the vast amount of data and the often-limited computational resources require access to commercial cloud and EO services.

In numerous cases, public institutions and research centers do not have the technical or financial capabilities to access these services. Furthermore, the bureaucratic obstacles related to procurement and administrative barriers create additional challenges for researchers.

Regarding the relevant challenges, the interviewees underlined the insufficient awareness about the value of cloud services at the local and European level, which perpetuates administrative barriers for procurement. Additionally, they highlighted the need to revise internal policies and create financial incentives, as it was possible through OCRE, to encourage more research projects to adopt cloud services and learn from the experience of others.

Therefore, it is fundamental to create additional funding sources and supporting frameworks at the pan-European level to facilitate the access to commercial cloud and EO services for the scientific community. Furthermore, an important aspect remains the knowledge and skills exchange to minimise the technical difficulties in the transition to cloud.

Methodology

The listed challenges and recommendations, as well as the benefits OCRE provided to the research community, were collected through individual online interviews. The interviews were conducted in November and December 2022, with the participation of research projects that were awarded commercial cloud and EO services through OCRE. To obtain a balanced and diverse range of results, the selection of the interviewees took into account their geographical distribution across Europe. The interviewees were asked to comment on their initial challenges in gaining access to cloud resources, their experience with OCRE funding, what was the impact of cloud resources for their research outputs, and how to ease the access to commercial cloud and EO services for the wider scientific community across Europe.

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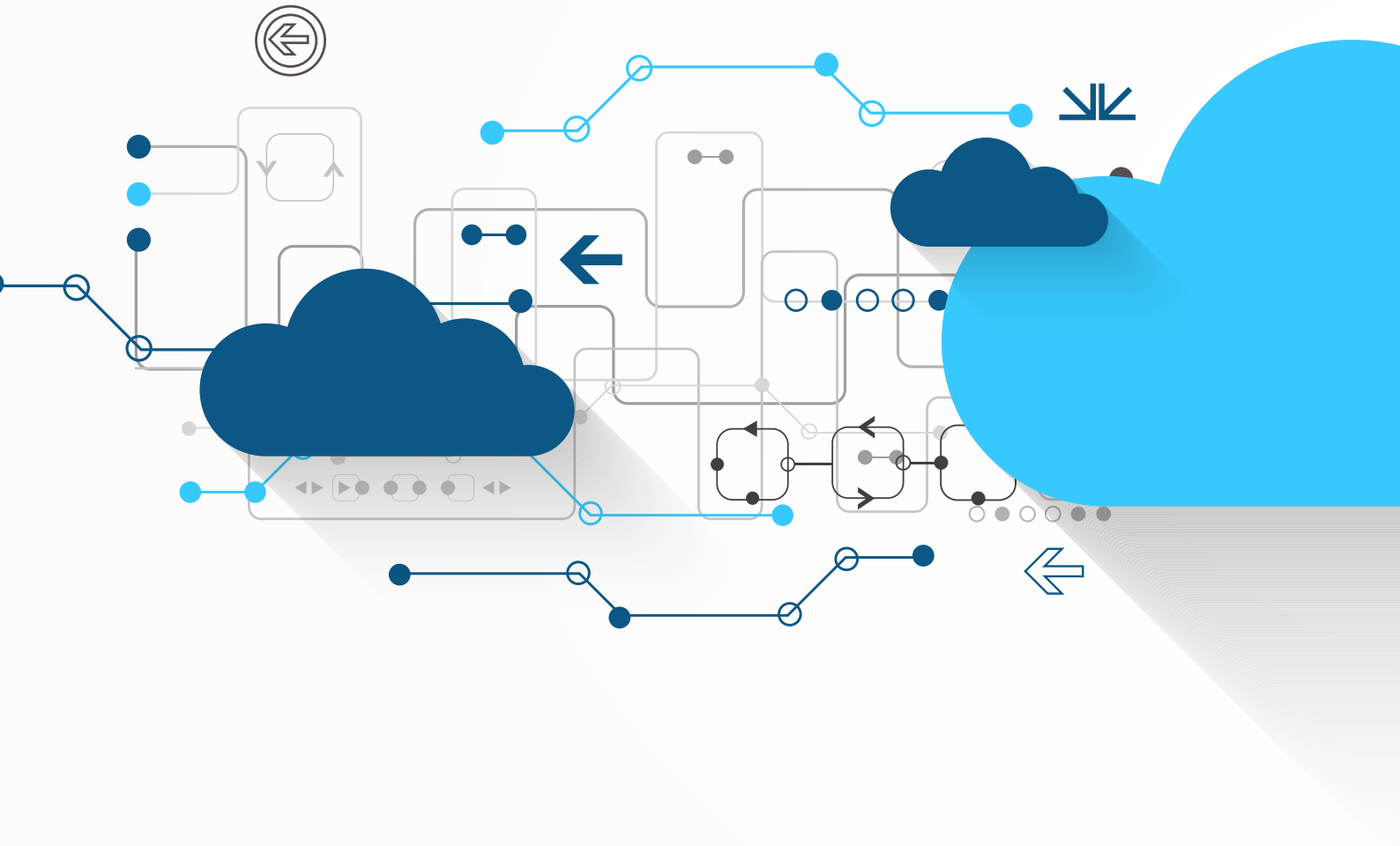

OCRE receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 824079