POSITION PAPER:

GÉANT and the NRENs enable the European Knowledge Area

July 2021

Background

The concept of the European Knowledge Area is not novel. The European Council Conclusions of 2002 stated: *(47) notes the Commission's intention to propose measures in Spring 2003 to better integrate innovation into a European Knowledge Area, with the aim of improving the use of intellectual property rights across Europe, further developing and strengthening private investment and the use of risk capital in research and increasing networking between business and the science base;"[1].* It is not unusual for there to be such a long period from the conception of a broad idea to its implementation. **However, the post-COVID recovery is now seen as an opportunity to transform European research leadership into European competitiveness, for the benefit of the economy and society.**

The fact that the three elements of the Knowledge Area are under different EU competencies is a major challenge for legislators, both at the European level (Commission, Council and Parliament) and for lawmakers at the Member-state level. Since global competition is becoming increasingly linked to knowledge and collaboration, in the digital space especially, the traditional competencies laid down in the European Union treaties have been bridged in several ways. New European institutions, such as the European Innovation Council, have been tasked to make sense of these overlapping environments.

Solutions such as the European Research Area, (ERA) and the European Education Area, (EEA) had been previously agreed in order to create collaboration in greater Europe in these areas. The European Semester includes some measures for research, although primarily for Research Infrastructures. Finally, the Framework Programme, via Horizon Europe, provides the budgetary means and rules for research projects.

The European Member States are about to start a two-year discussion on the "Conference of Europe" in December 2021 and, as a consequence, the debate on the European Knowledge Area (EKA) will be a continuous topic. Complementing the legislation, there will be a substantial infrastructure restructuring in this area, supported by European-level financial resources and the Next-Generation EU fund. Investment into key projects under the Digital Europe Programme, such as the digital twins and Destination Earth, has the potential to define the European digital topology for twenty to thirty years.

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[1] European Council, Council Conclusion (15-16th of March 2002)

The role of GÉANT and the NRENs

The EKA represents the convergence of four different sectors: Education, Research, Innovation and, lately, Skills. In all four, GÉANT and the NRENs (National Research and Education Networks) provide services and expertise to enable the development of knowledge in Europe. GÉANT is a European association which serves the research and education networking community by providing connectivity. GÉANT's terabit-ready network is one of the most advanced and well-connected research and education networks in the world. In addition to the network, GÉANT operates global identity services such as eduGAIN (to enable federated access to web services for thousands of users in R&E institutions that participate in eduGAIN globally) and eduroam (federated access to network for millions of users in R&E institutions that participate in eduroam globally). GÉANT also facilitates collaboration between Europe's NRENs on topics of mutual interest and to explore the development of new services to address emerging needs. Finally, GÉANT will be able to contribute internationally by promoting the goals of the European Knowledge Area worldwide via its relationships with its international and regional partners.

Education

GÉANT conducts an annual survey to map the European NRENs' educational activities and services that provides an overview and indicates trends for future collaboration and development areas in the field of digitalisation of education. Apart from the provision of connectivity and eduroam, the top areas that NRENs are currently supporting for the educational institutions and communities or involved are: LMS (Learning Management Systems), DLE (Digital Learning Environments), Trust & Identity (such as eduroam, eduTEAMS and eduGAIN as well as integration with national government eIDs, eIDAS, etc) & Security (eduVPN and security best practices), videoconferencing for education (opensource based such as eduMEET, and commercial solution such as Zoom).

Since the beginning of 2020, GÉANT has established a Task Force on Educational Services and Activities, that brought together a community of experts from NRENs, universities, commercial companies, international organisations (UNESCO, World Bank) and governments to share, discuss and collaborate, when possible, in the interests of the digitalisation of education. Most countries are facing similar challenges, especially with the rapid conversion to virtual and digital education. Sharing knowledge and working together helps organisations to become more efficient in this area. One of the next challenges GÉANT is looking at is the area of digital assessment, digital exams and online proctoring.

Research

GÉANT and the NRENs interconnect researchers and educational professionals at 10,000 institutions across Europe supporting all scientific disciplines. Additionally, we play a strong role in multiple European projects designed to foster a more effective research environment in Europe. Following from GÉANT's very successful position as co-Chair of the EOSC

Executive Board and being a founding member of the EOSC Association, GÉANT is now partner in the EOSC-Future project.

EOSC Future is a large-scale investment by the European Commission to create a web of scientific resources that are open and/or FAIR, equipped with suitable services allowing their exploitation. In order to achieve this aim, the project will deliver the EOSC-Core and EOSC-Exchange as defined by the Executive Board Working Groups and integrate data and resources from the scientific cluster communities into the EOSC platform. As a result, European researchers will benefit from greater discovery and access to relevant data and services from various scientific domains, allowing them to enhance their studies or combine data for new, potentially cross-disciplinary research activities.

GÉANT is one of the major partners in the EOSC Future project, representing eight NRENs as Linked Third Parties. Collectively we lead the Technical Architecture and Interoperability Work Package, the procurement of commercial services, and a series of tasks on stakeholder engagement and service planning. GÉANT staff are also co-chairs of the Technical Coordination Board and provide leadership to guide implementation. The federated, system-of-systems vision of EOSC is challenging to realise as it requires the definition and adoption of a series of standards and protocols to allow the exchange and composability of data and services. GÉANT's history of success in achieving such goals across national boundaries in the space of networks and authentication is critical here, and the access to data and services in EOSC will need to be as seamless and user-friendly.

Innovation

GÉANT supports innovation within the topics outlined in the previous research and education chapters. The Horizon Europe Research programme by design focusses on innovation and subsequently created the European Innovation Council and the Horizon Europe Rules of Participation to bolster innovation. The new European Partnership Agreements and the EuroHPC Joint Undertaking are seen as a push for a larger constituency to benefit from data innovation.

As the European Commission's legislative ambitions for a more unified European Digital environment have been made clear with the new commission presidency, a key innovative concept to be realised are the nine common European Data Spaces. The nine Common European Data Spaces (CEDS) were announced within the European Strategy for Data in February 2020 and present a unique challenge in the EU's vision to create a digital single marketplace. They are thematically organised by data source, such as data in support of the Green Deal priority actions on climate change, or health data. GÉANT is in a key position to enable the interconnectivity of data spaces in response to the needs of European research, education and innovation community.

GÉANT and the NRENs will be actively supporting the 'Green Deal' data space of the Horizon Europe programme, where the "GreenData4All" and 'Destination Earth' (digital twin of the Earth) initiatives will cover concrete actions. Within Destination Earth specifically, a key consideration will be the availability and use of Copernicus data. The main partner is the European Space Agency or ESA. The other partners are EUMETSAT, ECMWF, Mercator

Ocean, Frontex, EMSA and EUSC. Copernicus is built to monitor and conduct research in order to help contribute to the UN sustainable development goals, tackle climate change and provide information to authorities during emergencies all at a global scale.

Copernicus is one of the core pillars of the EU Green Deal, and is at the heart of Destination Earth programme, which is the first identified 'user' of the EuroHPC programme. GÉANT and NRENs are responsible for disseminating data from the participating Copernicus service providers to the users in the interest of research. Real time data flow will allow more real-time decision making in both the private and public sectors and in policy making. In that sense, high-speed connectivity is an enabler to innovation in all fields.

GÉANT is currently working with ESA to become the wide area network provider for the whole Copernicus ground segment from 2022. In this situation, GÉANT and the NRENs would provide connectivity to ground stations and participating cloud providers, allowing the sharing of Copernicus data across its network for the purposes of Copernicus operations, as well as being the primary means of disseminating the data to the global R&E and non-R&E communities.

Skills

Over the last two years GÉANT has been actively participating in EC-funded projects that aim to implement the vision of the European Student Card Initiative (ESCI). The purpose of the initiative is to develop an online one-stop-shop through the Erasmus+ Mobile App for students to manage all administrative steps related to their mobility period - before, during and after their stay. This is being achieved in two main actions.

The first is to digitalise and streamline student mobility administration by enhancing the existing online tools and services developed to support Erasmus+ and by enabling online access to them. Secure online administrative procedures make information available for students which is essential to boosting student mobility across Europe. The second will be for the implementation of a common European student card.

In the MyAcademicID project GÉANT delivered the MyAcademicID Identity and Access Management Platform for Erasmus+, which enables federated access to two of the four Erasmus+ services by enabling students to login using their institutional credentials as well as eIDs compatible with eIDAS. Whilst the MyAcademicID project ended in December 2020, the work continues in the European Digital Student Services Infrastructure (EDSSI), where the project was awarded to the MyAcademicID consortium plus additional partners, who will further evolve the MyAcademicID platform and connect more e-services related to student mobility.

It is expected that by the end of 2022, 350,000 students from around 5,000 Higher Education Institutions will benefit from mobility each year. The MyAcademicID platform will support students in their applications and will offer a secure and privacy-compliant user experience. This will result in more people acquiring new skills (such as a new language, specific discipline, etc). Having such an infrastructure in place also paves the way to explore additional online services that could be relevant for students.

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GÉANT also engages in the European Blockchain Service Infrastructure (EBSI) to follow the diploma use-case; the aim is to allow citizens to manage their education qualifications across borders, using a permission blockchain ledger managed via the EBSI.