GÉANT
Networks • Services • People

# CONNECT

THE MAGAZINE FROM THE GÉANT COMMUNITY | ISSUE 47 2024

## DRIVING INNOVATION AND DIVERSITY THROUGH GLOBAL COLLABORATION

**DORCAS MUTHONI:** INSPIRING AFRICAN WOMEN IN TECH

**CONNECT INTERVIEW:** EVELIEN RENDERS

**TOWARDS THE OCRE 2024 FRAMEWORK**

**INSIGHTS ON THE EUMEDPLUS PROJECT**

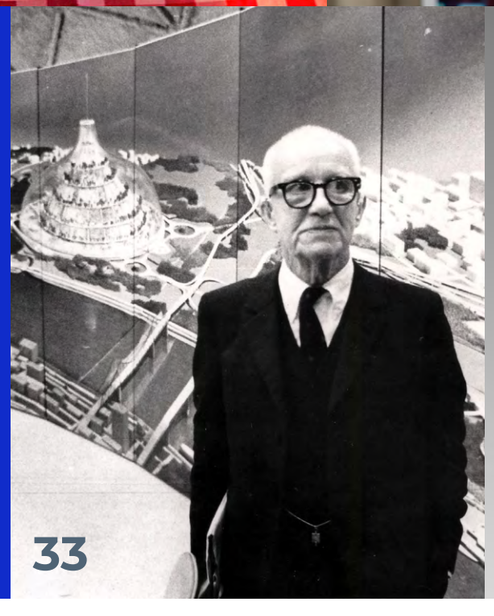
**SUBMERSE PROJECT CONTRIBUTING TO THE UN OCEAN DECADE AND UN SDGS**













# Contents

# Editor's welcome

What does collaboration look like to you?

I'm sure you will agree that we in the GÉANT community see it everywhere, every day. Whether it's in our own teams, organisations, committees and working groups, or in the many projects in which we take part. It happens at all levels and in all manner of ways. Much like GÉANT's values of passion, innovation, community, and trust, collaboration is one of those terms that can be applied to a million different situations, and we can see it in the smallest actions between individuals or in the often more visible large-scale approaches between multiple organisations. However it occurs, collaboration is everywhere and is increasingly important in our evolving environment.

In this issue of our long-standing magazine, we shine the light on many of these collaborations and the positive change they are bringing to – for example – diversity, equality, and innovation. Our feature interview with AfChix founder Dorcas Muthoni shows how collaboration is driving forward real change for women in the R&E community and beyond; EUNIS President Evelien Renders describes the collaboration that is leading to more opportunities in education; it is collaboration that has led to the OCRE 2024 framework that will support so many R&E users in the coming years; we read of collaboration in the context of cybersecurity at Diamond Light Source; and how the EUMEDplus project will help to enhance research collaboration across the Arab Mediterranean countries and Europe.

And, of course, the TNC25 Programme Committee has announced its theme for next year's conference: Brighter Together. If that doesn't capture the beauty of collaboration perfectly, I'm not sure what does! Clearly, GÉANT does not describe itself as a collaboration of NRENs for nothing. There are further examples throughout this issue, and I urge you to explore every page, where you'll find articles on the CSM24 campaign; Time & Frequency; DFN's 40th anniversary and an interview with Christian Grimm; the Network eAcademy and its expanded learning offering now including Quantum and Time & Frequency; and so much more.

Enjoy the issue!

Paul Maurice, GÉANT

CONNECT is the magazine from the GÉANT community; highlighting the activities of Europe's leading collaboration on e-infrastructure and services for Research and Education.

## The Team Behind CONNECT

Reflecting the breadth of our community, the articles you read in CONNECT are contributed by a wide range of people from the GÉANT Association, the GN5-1 project, and from our NREN and regional partners. The planning, production and editing is performed by a small team highlighted below.

**Editor:**
Paul Maurice, GÉANT

**Production Editor:**
Silvia Fiore, GÉANT

**Regular contributors:**
Cathrin Stöver, Paul Maurice, Silvia Fiore, Karl Meyer, Rosanna Norman, Leonardo Marino, Grace Cooper and Hendrik Ike (GÉANT).

This magazine is published by GÉANT, as part of GÉANT projects GN5-1 and GN5-IC1, which have received funding from the European Union.

The following projects that may be mentioned in the Magazine also receive funding from the European Union: AfricaConnect3 (DG INTPA), EaPConnect (EU4Digital), EUMEDplus (DG NEAR) and SUBMERSE (DG CONNECT).

# The GÉANT Association is delighted to announce Lise Fuhr as our next Chief Executive Officer, set to succeed current CEO Erik Huizer on 21 November 2024

Lise has served as Director General of ETNO, the Brussels-based association representing Europe's leading telecom operators, for nine years. She is Chair of the Danish Cyber security organisation "Security Tech Space", and in August 2022 Lise was nominated as a member of the United Nations Internet Governance Forum Leadership Panel, serving a three-year term. Between 2017 and 2024, Lise was a Board member of European Cyber Security Organisation (ECSO). From 2016-2022 she served as Chairwoman of the Boards of Public Interest Registry (.org domain name registry) and the Public Technical Identifiers (PTI), formerly IANA, and affiliate of ICANN.

**Words:** Paul Maurice, GÉANT

From 2009 to 2016, Lise was Chief Operating Officer of DK Hostmaster and DIFO, the company managing .dk domain names. From September 2014 to October 2016, Lise also chaired the Cross Community Working Group for the IANA Stewardship Transition, building on her strong network within the internet community. Lise has over 20 years of experience within the internet, technology, and telecoms industries and is a lifelong member of ATV – the Danish Academy of Technical Sciences – an independent think tank.

Lise commented,

**"Building on a career working with technology and innovation, I am truly looking forward to joining GÉANT and its diverse membership. The research and education community is moved by a strong sense of purpose, which I am eager to serve and support with the whole organisation. I am honoured to succeed Erik Huizer and grateful to the Board for entrusting me with this responsibility."**

On behalf of the GÉANT community, welcome, Lise!

# CONNECT Interview:

# Dorcas Muthoni,

## Connecting and Inspiring African women in tech

As defined by Face2Face Africa, Dorcas Muthoni is one of Kenya and East Africa's leading innovators and the woman "behind some of the most widely used web and cloud applications in Africa".

Kenyan entrepreneur and computer scientist Muthoni has been impacting lives on the continent with her leadership and technology advocacy. At the age of 24, she started her own software company, OPENWORLD, now a leading e-Government and Business Software Services firm in the region.

She was one of the very first women to join the Kenyan NREN, KENET, and then moved on to join the Board of the UbuntuNet Alliance, the regional network for East and Southern Africa. She is also the founder of AfChix, a mentorship and capacity building initiative for women in computing across Africa. Since 2004, AfChix organises many community-oriented activities such as the annual Computing Career Conferences and career workshops for women in technology, and has brought together many role models for young women interested in a career in computing. Among many other awards, Muthoni was also inducted to the Internet Hall of Fame in 2014, in the category of global connectors.

We spoke to her about her journey in computing and her experience working in the world of research and education.

**Interview by:** Silvia Fiore, GÉANT

**Picture**
AfChix
TechWomen
Summit 2017

**Dorcas, you have been following your vocation since the early years – you founded OPENWORLD in your early twenties. How did you journey start?**

My journey started at the University of Nairobi, where I graduated in Computer Science in 2002. Right after that, I joined a project that led to the creation of the Kenyan NREN, KENET. At the time, the project explored how to interconnect universities' networks. It is then that I started to notice how very few women attended technical classes, but when I started hiring new people at KENET, it really hit me. I just couldn't find any female applicants! I started talking to some of my friends and realised it was a common trend across universities and jobs in Computer Science. This is how I started to become interested in how to involve more women in our field. I started by sharing information to girls so that they could make informed decisions and be confident in their career choices.

**Some years after joining KENET, you also became a member of the Board of the UbuntuNet Alliance. How have you seen the African research and education community develop and evolve throughout the years?**

When I joined the Board of the UbuntuNet Alliance in 2022, I was pleased to see how many Eastern and Southern African countries had started their own NREN. I remember that my boss at the time, Victor Kyalo, spoke highly about how to collaborate with TENET, the South African NREN, and bring together local higher education institutions in our shared NREN communities to leverage the power of negotiation and get better rates. This was at the time when we were getting the first submarine cable to the Eastern African coast, and we were looking for ways to pursue the same objective. Today it is inspiring to see African NRENs supporting their community to grow and coming together regionally under the RRENs. It is a lot of hard work, and I hope that it will only grow in the future and that they continue to support higher education institutions to create the workforce of the future.

**Twenty years ago, you co-founded AfChix. The organisation has been having a huge impact on the local community of women with impressive statistics and lots of initiatives. Can you tell us more about AfChix? How did it start and where is it now?**

I was very happy when the first female student applied to one of our vacancies at KENET. She had attended a Kenyan university, yet her experience was very similar to mine – you could count the female students in her class on one hand! At that time, I was spending some time meeting Heads of Technology departments as well as IT managers of universities, and I remember only one or two were women.

It is because of these conversations that Irene Misoi and I created our first "computing career workshop for girls" series hosted at the Catholic University of East Africa. We would invite representatives from universities and together tell the girls more about career opportunities for computer scientists. I also reached out to other women I knew who would come and share their testimonies. Having these role models at the workshops was key to help us make it real.

**"I always say, when you are a child and you visit a doctor, you know what it means to be a doctor. But this does not apply to computer scientists, because they are not as present in our society as other jobs, and therefore it is more difficult to relate to them for young girls".**

We also printed out some info packs for schools to increase awareness of existing programmes. We talked to teachers to make sure they would have an encouraging attitude towards careers in tech. Unfortunately, sometimes, parents talk their girls out of such careers, because they view them as too hard or too masculine, but the girls need to know that they can do it, if they want to. Even if you are interested in fashion, you'll come across technology at some point. It's the future and it's all around us, so you don't want to miss out or you'll be isolated.

We've involved many women in AfChix's journey, even outside of Kenya. Now we have 25 chapters all across the continent and lots of friends around the world who run similar initiatives. We organise hands-on training courses, storytelling through role models in different IT fields, and also career workshops in the community. This way, we have impacted thousands of women who now have the confidence to go to the next level and have become role models themselves. I am really proud of the cascade effect of our network.

**With your involvement in the research and education community and commitment to empower women in technology, how do you see the role of national and regional RENs in Africa in shaping the next generation of female engineers, scientists, technologists and mathematicians?**

The way I see the RENs help shape the next generation of women in STEM is by ensuring that universities have the right infrastructure to create a promising and adequate environment for technical courses to thrive, so that students can follow their training courses and acquire the knowledge they require to succeed in their career.

Once this is set, if we want to see more women joining, we must look back at how students get admitted in these programmes in the first place. For example, in Kenya, a student would need to pass some of what we call cluster subjects, such as maths and physics. We need to make sure that girls are not dropping out of these key subjects and losing, in practice, the chance of getting into technical university programmes.

In addition, what is of paramount importance for me is paternal support. Over the course of my career, my father never discouraged me to follow the path I had chosen for myself. Men need to be good champions of this change as well.

NRENs and RRENs should continue to build and modernise the infrastructure to support this change. And, at the same time, they should encourage the recruitment of more women in their own ranks. This is how it works: when you see something, you relate to it, it becomes real, and you stop imagining it. And let's not forget encouraging as many male engineers as well to go out there and be the champions of this movement.

**So, Dorcas, yours is a story of success. You are an entrepreneur and a computer scientist, member and fellow of several international and African boards, recipient of many awards and 2014 inductee to the Internet Hall of Fame. And you have been working a lot on activities that inspire young girls to join the world of tech. Did you have a role model when you first started and throughout your career?**

I like to say that I learn from everybody, including children. I like to reset my mind by learning from the environment I am in. I remember Prof. Wangari Maathai working on environmental conservation. I grew up in Central Kenya surrounded by beautiful nature. At the time, she talked about climate change before people understood what it was. She had a background in environmental science, and even if I didn't know what science it was, I saw how strong and committed she was to her mission. She had the ability to stand up for the right thing to protect the environment and I could relate to that. I never met her in real life, but I always admired her and her work, and that inspired me to be equally passionate to my own cause.

**So, what do you have in store for AfChix?**

We have listened to the testimonies of people that have been impacted by our work and we realised that we cannot stop. The need to mentor young people and to encourage young women to undertake IT careers will never stop. It is a field that is constantly changing and requiring lots of learning, and we want to be there to help.

At AfChix, we have put together a strategic plan to create a solid foundation to continue our mission to bring together role models and make sure that women can find peers to connect and learn from. We also want to be part of the conversation that explores the policies that can make this happen at both the public and private sectors. We also want to encourage women to exchange stories in their local community because experiences across different African countries might be different and might be dependent on local context and cultures.

I will take this opportunity to thank everybody who has supported our work, partners, sponsors, and all the women who have come on board and shared their stories and mentorship time on a volunteer basis. This was not done by me alone but by all the minds and hands that came together.

For more information about AfChix visit **afchix.org**

# Out With the Old, in With the New

Following the European Elections of June this year, and subsequent confirmation of the second term of Commission President Ursula von der Leyen, her first and most important task is to appoint a new team of Commissioners. In forming her new 27-person team, or 'college', for the next five years, the political landscape has changed. What is this new landscape, and why does it matter to us?

**Words:** Hendrik Ike, GÉANT

Before focusing specifically on the Directorate General which directs the European Union's financial support for GÉANT and its membership – DG CNECT – it is worth looking at the wider political picture. One could argue that Von der Leyen's Commissioner appointments either serve the times or are a product of them, but the web of geopolitical trends is reflected in her team's makeup. Each member state nominates a single commissioner who is designated to utilise political competence to bring about legislative success – they are not required to be technical experts. Von der Leyen has moved quickly, practically and ambitiously; she has given out portfolios that suit regional blocks. In the Northeast and Baltics, there is a defence (Lithuania), foreign affairs (Estonia) and security (Finland) focus, for obvious reasons. In the South and Southeast, we have social issues at the centre - Mediterranean and Crisis Management portfolio (Croatia), People, Skills and Preparedness (Romania), Cohesion and Reforms (Italy) and Sustainable Transport and Tourism (Greece). And in central and western Europe, almost all the portfolios have an economic or industrial angle.

This has been dubbed as a Commission looking to deliver 'Prosperity, Security, Democracy' to Europe. These three words are to be at the centre of European policymaking for the next five years; the core priorities that will be delivered against a backdrop of competitiveness. Note the key themes now omitted, such as the 'Green Deal' or 'Protecting our European Way of Life.' In light of the need for economic stablisation following COVID-19, a growing trade conflict with China, and the winds of war in the East, the new priorities sadly reflect our troubled times and will continue to do so for the foreseeable future. But what does it inherently mean for our community?

Before looking specifically at policy, there will budgetary discussions to be had. Immediately following that, the Commission Work Programme for next year will be published in December, although most of that has already been pre-drafted. The successor of Horizon Europe – named Framework Programme 10 for now – will need to be finalised as part of the wider Multiannual Financial Framework (MFF) discussions, to begin in 2028. Currently, the most vocal discussions concern cohesion funding and defence spending. Yet, so far it looks as if the larger yet quieter programmes, such as the Common Agricultural Policy, Regional Funding and Research Budget, will emerge unscathed from cuts, although much can change next year.

Thierry Breton, the previous Commissioner who held DG CNECT within his mandate, has resigned due to political disagreements with Von der Leyen. Despite receiving unwavering support domestically in France, his strong willed, business-oriented and market dependent thinking created a polarisation within the Commission. Although technically dependent on Parliamentary approval this Autumn, his replacement is set to be a Finn, Henna Virkkunen. Virkkunen is an ex-MEP and held several ministerial posts in Finland. Importantly, she also sat in the Committee on Industry, Research and Energy (ITRE) of the European Parliament. She is highly versed in security – specifically spyware – and was also a rapporteur on the non-binding opinion of integrated digital platforms. Virkkunen is apparently held in high regard by others, including Von der Leyen, who has given the Commissioner-designate the Executive Vice Presidency of the College, a position held by only five other candidates within the larger team. It is also worth noting her title – EVP for Tech Sovereignty, Security and Democracy. See again the now unavoidable interlinking of the technical world and the geopolitical risk areas just mentioned.

However, there are positive benefits to our community here. Public organisations such as NRENs are uniquely situated in protecting the European digital space, due to their non-commercial existence and member state domesticity. So be it for connectivity, trust and identity or a rising profile of security – among others – the inherent nature of NRENs themselves could become an increasingly attractive option for national and European policymakers when looking to deal with geopolitical problems. The security aspect can hold multiple benefits, with not just an emphasis on cybersecurity software and training, but also the development of key technologies that can be used on our current infrastructures. Finally, NRENs hold a key position in supporting the health of vital institutions, be that for trust and identity, security services, or for promoting Open Science and FAIR principles in an increasingly skeptical and hostile digital environment. The GÉANT EU Liaison team and the GÉANT (GN5-1) Project Policy Engagement Task will be monitoring this new political agenda closely.

# TNC25: BRIGHTER TOGETHER

**Words:** Silvia Fiore, GÉANT

On 24-25 September 2024, the TNC25 Programme Committee got together in GÉANT's Amsterdam office to work on the conference's theme and initiate the development of the programme. The air was buzzing with ideas and insights, and every conversation had one goal in mind: how do we work together to make sure that we collaborate outside of silos, while encouraging the next generation of speakers to contribute with innovative proposals?

This year's theme embraces exactly our community's spirit of collaboration, breaking down barriers and sharing wide-ranging expertise. Known for its commitment to diversity, Brighton mirrors TNC's aim to dismantle boundaries and foster cross-disciplinary dialogue. TNC25 will explore breakthroughs in cybersecurity, international partnerships, and network resilience, focusing on future-proof solutions to address current and future challenges.

**IT IS THROUGH THIS COMMUNITY COLLABORATION THAT WE ALL LEAD THE WAY FOR A MORE INCLUSIVE FUTURE FOR RESEARCH AND EDUCATION. LET'S SHAPE TOMORROW, BRIGHTER TOGETHER.**



## THE BRIGHTON DOME

TNC25 will be hosted by **Jisc** in the premises of the Brighton Dome with its beautiful Indian inspired domes and stylish Art Deco details. The Brighton Dome has a rich history spanning over 200 years. It first began as the Prince Regent's stables and riding house, and then later became home to ABBA winning the Eurovision Song Contest. Standing as a testament to the city's kaleidoscope of cultural richness, the Brighton Dome is the perfect location for an international and cross-disciplinary event like TNC25.

## CALL FOR PROPOSALS

The Call for Proposals for single presentations and side meetings is now open. All proposals can be submitted via the TNC25 website.

**Submission Deadline**:
Single presentations and side meetings, 28 November 2024.

## TNC25 PROGRAMME COMMITTEE

Ieva Muraškienė, NORDUnet (CHAIR)

Guy Halse, TENET

Tomasz Szewczyk, PSNC

Mihály Héder, SZTAKI

Ilias Papastamatiou, GRnet

Kristine Andersone, University of Latvia

Neil Shewry, Jisc

Dawn Ng, GÉANT

Renato Furter, SWITCH

Chris de Loof, BELNET

Brian Nisbet, HEAnet

Jeroen Wijenbergh, GÉANT

Joost Gadellaa, SURF

Zacharias Törnblom, SUNET

Anca Hienola, Finnish Meteorological Institute

Ann West, Internet2

Julie Menzies, Canarie

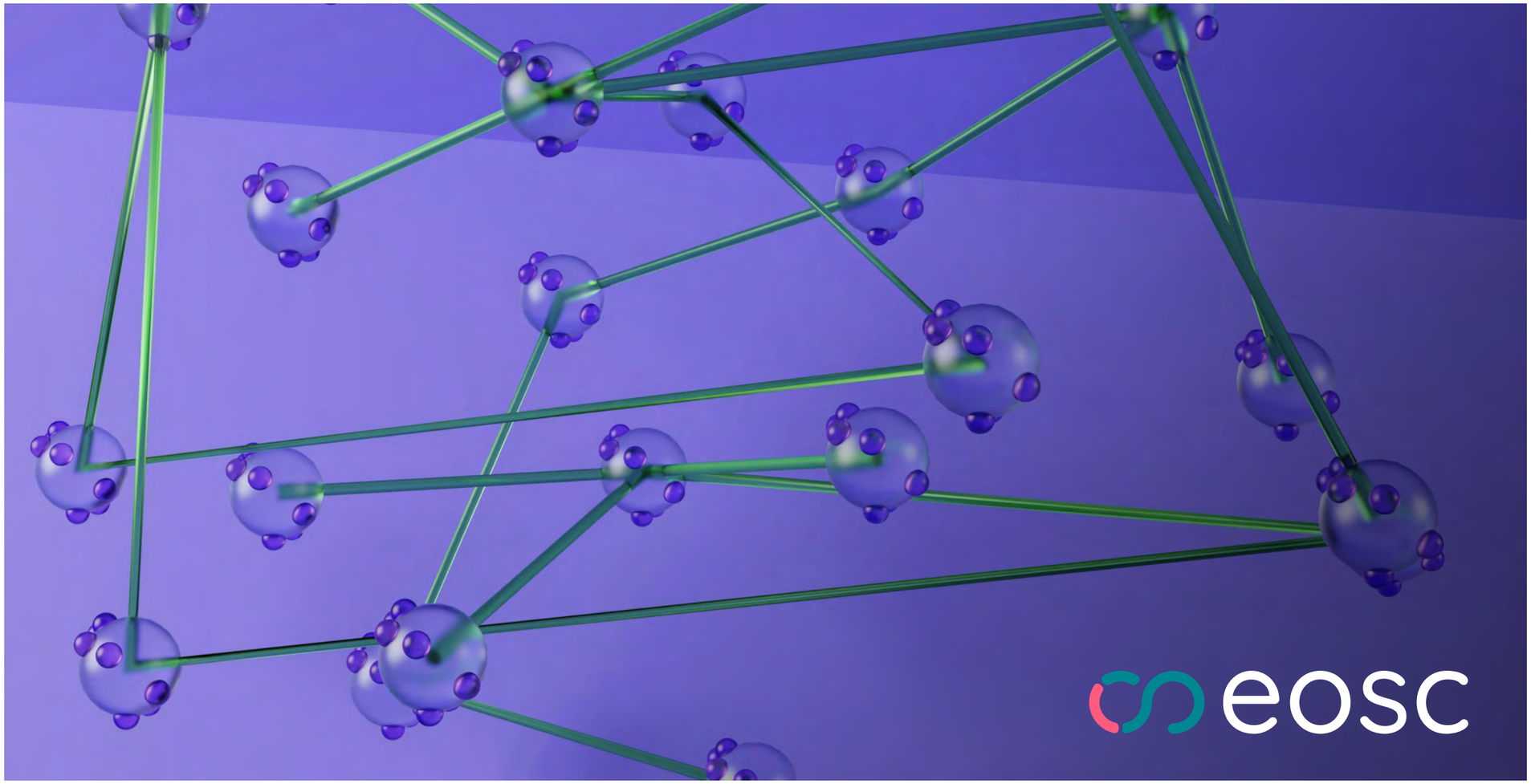
Don't miss any update on the upcoming conference! Subscribe to the **TNC mailing list** and visit the new TNC website at **tnc25.geant.org**.

tnc25

**Pictures**
Top left: Brighton Royal Pavillion. Credits Adam Bronkhorst.

Bottom left: The Lanes in Brighton. Credits Adam Bronkhorst.

Right: Brighton Dome. Credit Jim Stephenson.




# The role of the GÉANT Association in the European Open Science Cloud

This position paper outlines where members of the GÉANT Association can collectively contribute to the development of the European Open Science Cloud (EOSC).

'GÉANT Association' is the collaboration of European National Research and Education Networks (NRENs) and includes the central coordinating body, the GÉANT Organisation. Where the term 'GÉANT Organisation' is explicitly used, this refers only to that body.

EOSC is the data space for research and innovation and by contributing to EOSC, it is considered that the GÉANT Association is also de facto contributing to the development of data spaces as a whole.

The GÉANT Association acknowledges the goals and value of EOSC, and this paper provides a consolidated view on EOSC and supports the positioning of NRENs in EOSC. The paper builds on the 2023 GÉANT/NREN position paper on EOSC nodes.

## The current role of the GÉANT Association in EOSC

The EC's Data Strategy – of which EOSC is part – combines processing data: Cloud, High Throughput Computing (HTC) and High-Performance Computing (HPC infrastructures), storing data (data infrastructure) and moving data (network infrastructure). The GÉANT Association provides the high-speed, secure pan-European internet backbone as well as the federated identity infrastructure essential for research. These services are key for realising the EC's vision for Open Science and also support users of HPC and Big Data in Europe.

The GÉANT Association has substantially contributed to EOSC since its inception. The GÉANT Organisation was one of the four founding members of the EOSC Association together with the Italian NREN, GARR. The GÉANT Association's expertise in building and operating federated infrastructures is one of the main contributions provided so far to the development of EOSC, alongside expertise in providing compliant access to commercial services.

The GÉANT Organisation participates in the EOSC EU NODE procurement to operate the EOSC AAI which enables federated access to EOSC Exchange Services. Some NRENs are also key providers to the EOSC EU Node offering different types of services across the three 'Lots' that compose the EOSC EU Node. Furthermore, experts from NRENs and the GÉANT Organisation are contributing to shape EOSC by participating in the EOSC Association Task Forces, the EOSC Association Board of Directors and representing their ministries in the EOSC Steering Board advising the EC and the Tripartite Governance.

# Opportunities

The GÉANT Organisation is collaborating with other European e-Infrastructures to develop a common approach towards EOSC, and is a signatory to the joint e-Infrastructures statement that details eight elements for the success of EOSC: that it be open, publicly funded and governed, research-centric, comprehensive, diverse and distributed, interoperable, service-oriented and social.

The GÉANT Association can contribute to this vision in several ways:

## The GÉANT Association as the Communication Commons for EOSC

Under the 2021 seven-year EC Horizon Europe Framework Partnership Agreement with the GÉANT consortium of European NRENs (GN5-FPA), the GÉANT Association agrees to ***"evolve the European Communications Commons to provide secure, cost-effective, highly available and reliable services for very high-speed connectivity, identity inter-federation, mobility, security and trust services and solutions; increasing creativity and efficiency of research and ensuring the digital continuum of services to R&E users anywhere in the EU, bridging the divide between developed and less-developed regions. The connectivity and associated services provided are indispensable for seamless, unimpeded access to relevant data, as well as exploitation and management of data generated by European researchers in almost all large research infrastructures."***

The GÉANT Association should naturally thereby become the communication commons for EOSC, contributing secure seamless high-speed multi-domain networking and wide peering together with federated identity services delivering appropriate access to cloud services, data, research infrastructures and the many other components and resources of EOSC. In addition, the GÉANT Association can have a role in a coordinated data management framework where the network, compute and storage are all working together to serve the needs of researchers. Furthermore, the GÉANT Association can contribute to end-to-end performance optimisation and user support services including data planning consultancy, troubleshooting, training and service marketing.

## NRENs as EOSC Nodes

The concept of an EOSC node continues to evolve, with the EOSC EU NODE being the first implementation of such an infrastructure. While the ways to connect the various EOSC Nodes are also being discussed under the EOSC Federation banner, different NRENs are likely to take up different roles in the EOSC Federation – some will become national nodes, others will provide services and infrastructure to EOSC Nodes or provide access to third party services for cross-domain service sharing. A national node of EOSC could also simply be an NREN distribution mechanism/platform for resources focused on the local/national research community. However, NRENs could also provide national resources, contribute to thematic, regional and institutional nodes and participate in a consortium for a national node.

## Technology & policy harmonisation

The GÉANT Association contributes to the standardisation and convergence of technologies and policies and has long-standing expertise and solutions to contributing to the implementation of the EOSC Federation. The GÉANT Association can effectively contribute to advancing many of the challenges of EOSC to date such as trust at scale, harmonisation of Open Access and Open Science initiatives in accordance with the EU strategy, interoperability and the skills gap between users and e-Infrastructure services on both pan-European and national levels through NRENs and R&E communities.

On the road to a trusted, seamless, integrated environment for research, not only do the network and identity infrastructures play a fundamental role, but so do the organisational strength, services and expertise of the GÉANT Organisation and the member NRENs – all have a key contribution to make towards the successful realisation of EOSC.

A key aspect that needs further analysis is where the GÉANT Association can contribute to the persistent challenge of paying for services across national borders. The proposed GÉANT Trusted Digital Research Environment (DRE) is a potential example of the above, enabling trusted connections to trusted resources such as EUDAT, EGI, EuroHPC and other trusted services as t hey arise.

## Facilitating access to third-party services

The EOSC vision includes the notion of cross-domain service usage, simplified to allow users in one country to access and pay for services made available in another country. This is a longstanding point that the GÉANT Organisation and the member NRENs are in a good position to tackle due to their legal ties to almost every institution in the EOSC community and their position as national organisations. There is a good opportunity for some NRENs to act as a service access broker to facilitate access to third-party services, as indicated in the document Requirements for EOSC nodes.

## Facilitating access to commercial services

The GÉANT Association has built up a strong capability for conducting joint procurement on behalf of the entire European R&E community in order to meet the needs of our community that cannot be provided in-house. Currently this capability is being applied to facilitate compliance with the EU Procurement Directive which provides access to good agreements with infrastructure-cloud providers, such as the US hyper-scalers and their European competitors. The EOSC community will likely require access to multiple types of commercial services over time. The GÉANT Association is well positioned to undertake the work required to create and maintain such a joint EOSC portfolio of compliant agreements with research-relevant services.

# Goals

The GÉANT Association will work to achieve the following aims:

## Gain commitment from the EOSC Tripartite to use the key infrastructure and federated services provided by the GÉANT Association

GÉANT and the NRENs are in a unique position to provide network, AAI and other services from their existing portfolios thanks to many years of substantial investment at national and European level, with a strong Member State mandate, to deliver a portfolio of innovative services developed specifically for demanding user communities. Meanwhile, procurements are more frequently being implemented by the EC where contractors are only 'encouraged' to integrate with GÉANT Association services. So, whereas there is no obligation for EOSC to use key infrastructure and federated services provided by the GÉANT Association, there are clear benefits in utilising such established infrastructure, and indeed the demanding use cases of EOSC are seen as a welcome further driver to continued innovation in the service portfolios. The obligation to use MyAccessID for the EuroHPC Federation Platform serves as an example of how this commitment can be beneficial to all, and how it can be implemented.

## Establish the GÉANT Association as a trusted EOSC partner for security-related matters

The G7 emphasises the increasing importance of research security and integrity in international collaborations. As focus on digital sovereignty intensifies and security and access standards evolve (SIMPL, EIDAS2, EU digital identity wallet), the GÉANT Association should take a leadership role as a trusted partner for EOSC in terms of steering security-related developments.

## Support the EOSC community to leverage the experience of the GÉANT Association's capability to create federations and manage cross-border services

The GÉANT Association is able to ensure that, for example, researchers in Finland have the same capabilities and see almost the same services that researchers in Italy can, and that they can share their data. This is a marked difference between the GÉANT Association and commercial providers and this strength should be leveraged. GÉANT's capability for joint procurement should be used to benefit EOSC.

Read the full paper **here**.

# CONNECT Interview: Evelien Renders (SURF), President of EUNIS

## How can we all contribute to improving education?

Evelien Renders works at SURF as an advisor for international collaboration and has recently been appointed as the President of EUNIS. CONNECT spoke with Evelien, who delves into her various roles and provides an insight into what EUNIS means to the community.

**Interview by:** Grace Cooper, GÉANT

## What does your role at EUNIS entail?

**EUNIS** (European University Information Systems) is all about connecting people who are passionate about using technology to improve higher education across Europe. We bring together IT professionals, university leaders, and researchers to share knowledge, collaborate on projects, and influence policy for digital transformation. It's a space where we can learn from each other and push for a future where technology genuinely enhances education and research.

As President of EUNIS, I'm involved in setting the strategic direction of the organisation. This means making sure we're focused on the right things, like supporting digitalisation professionals in their roles, advocating for policy changes that benefit higher education, and creating a secure, inclusive digital environment. A big part of my job is bringing people together, whether it's at conferences, through working groups, or in informal discussions, to spark new ideas and drive positive change.

## Can you describe your role within TF-EDU?

I'm on the steering committee at **TF-EDU** (the Task Force for Educational Services and Activities) which is responsible for facilitating our NREN colleagues to learn from each other. With the annual survey, we create a big-picture view of the NREN educational service landscape. Our goal is to share how NRENs are facilitating their educational institutions with different tools and services, such as LMSs, Learning Analytics, and eduID, to fit together and how we can make them work better for everyone involved.

One of the things I love about this role is that we're not just talking about what's going well, but also what's not working and why. We open up space for people to share their experiences honestly, which is crucial for learning and growth. TF-EDU is similar to a hub where ideas come together, and in the future, smaller working groups might form around specific challenges, such as integrating digital credentials or improving virtual learning environments.

## Can you tell us a little more about your background prior to this?

I actually started my professional journey with a master's degree in Classics, which might sound a bit unexpected for someone working in digital transformation! After graduating, I worked in event organisation at Radboud University, where I found my first taste of coordinating complex projects and engaging with diverse groups of people. From there, I moved to the international office as an Erasmus+ coordinator, working on student mobility outside Europe. This role introduced me to the Erasmus Without Paper project, where I witnessed how collaboration between different experts including architects, information managers, and functional application managers, could transform a cumbersome paper process into a streamlined digital solution.

After this, I shifted gears and joined the IT department as an information manager for education. This position provided me with a deeper understanding of how technology can support and improve educational processes. It was a fascinating blend of my experience in education and my growing interest in digitalisation, and it ultimately paved the way for my current roles at SURF and EUNIS, where I continue to explore how we can use technology to make education more accessible and effective.

## What are you hoping to achieve within these current roles?

With EUNIS, I want to help digitalisation professionals in higher education to be seen as strategic partners, not just IT support. I believe they can be key players in transforming how universities operate, making them more resilient and ready for the future. For example, our Enterprise Architecture Special Interest Group organises an EA week where colleagues can learn how to put the Higher Education Reference Model into practice.

At SURF, we focus on ensuring our digital solutions are built around public values such as accessibility, reliability, freedom of choice, and privacy. This means prioritising open standards to prevent vendor lock-in and protect user autonomy, privacy, and security. By working collectively with members and public organisations, we can set strong conditions for suppliers, ensuring that digital solutions are not only accessible and secure but also adaptable to meet the evolving needs of our community.

One of the things I'm focusing on is building a comprehensive overview of the educational digitalisation landscape. It's about getting everyone on the same page so we're not reinventing the wheel in different corners of Europe. A concrete example is the **EduXS project**, where we're creating a database of standards, services, and tools that institutions can use to avoid duplication and build on each other's work.

## What does EUNIS mean for the community?

EUNIS is a place where people from different parts of higher education come together to share what works, and what doesn't, in digital transformation. It's not just about technical solutions; it's about understanding the bigger picture and how we can all contribute to improving education. For the community, it means having a network of peers who face similar challenges and can offer insights, support, and collaboration opportunities.

## Are you working on something special right now? Have you got a current favourite project?

Right now, I'm really excited about two projects, the first is EduXS. This is all about creating a map of the digital education landscape in Europe. It helps people see what's already out there—standards, services, documents—so they can build on existing work instead of starting from scratch. For example, if an institution is looking to set up a new digital credential system, they can see who's already done it and what standards they used. It's about sharing knowledge and avoiding duplication. The second project is **Visual Language for Educational Interoperability**, which is a project close to my heart because it tackles the challenge of making a complex topic, interoperability, more understandable. We've developed a visual language to help people from different backgrounds discuss how to improve the student journey and make systems work together better. It's been fascinating to see how using visuals can break down barriers and spark new ideas.

This can be found on **www.interopvisual.eu**. We would love to hear how people are using it, and for any additional feedback, please email **interoperability@surf.nl**.

## What do you envisage for the future of EUNIS and any potential collaborations between EUNIS and the community?

For EUNIS, I see us continuing to be a key player in the digital transformation of higher education, but I'd love to see even more collaboration with other networks and organisations. Imagine a future where the EUNIS community works closely with GÉANT and the NRENs to create truly integrated systems that support student mobility and digital learning across borders.

In TF-EDU, I'm excited about the potential to really connect the dots between different educational technologies and services. We've got a great opportunity to influence how digital tools are used and developed, not just within NRENs but in the broader higher education community. It's about creating a resilient, adaptable system that supports both students and educators in the long run.

DFN
DEUTSCHES FORSCHUNGSNETZ




# DFN celebrates 40 years

This year, DFN Association celebrates 40 years of supporting science and education.

**Words:** Paul Maurice, GÉANT

Founded in 1984 as a central joint scientific institution, the DFN Association was initially responsible for the sustainable operation and expansion of a German Research and Education Network and its services. Today, DFN operates and develops the communication infrastructure to Germany's broader scientific community, linking institutions in higher education and science across 850 locations all over Germany. Its X-WiN network provides the technical backbone, totaling 10,250 km of optical fibre and a multi-terabit IP platform between 65 core nodes. More than 1,3 exabyte of data exchanged over it every year makes it one of the largest R&E network in the work, putting DFN at the centre of much of Europe's R&E data movements.

To celebrate the anniversary, an event was held in June this year at the European School of Management and Technology Berlin (ESMT Berlin) with an opening speech by Prof. Dr.-Ing Stefan Wesner, Chairman of the Board of the DFN Association and Director of the IT Center University of Cologne, followed by a tour of the neighbouring Humboldt Forum where guests viewed the ethnological collections and enjoyed rooftop views of the surrounding Berlin skyline. The day continued with a drinks and food reception, after which guests settled in the Tower View conference room for the keynote speech from former DFN Chairman Professor Dr. Hans-Joachim Bungartz.

In his speech, Prof. Bungartz described the DFN Association as a 'blueprint for "self-help in science" in the German scientific landscape'. He went on to discuss the highlights, successes and challenges of the past 40 years including the founding period, the first independent scientific network and milestone step from a funded project to the economic autonomy of an organisation supported by science.

DFN's interactive timeline of its events is available on its website **here**.

**Pictures**
Top left:
1989 | The scientific network X.25-WiN goes live with 230 connections. The first private-sector service contract of the Deutsche Bundespost and DFN was signed by Federal Minister Dr. Christian Schwarz-Schilling, Friedrich Winkelhage and Prof. Dr. Eike Jessen (from the left).

Second row right (black and white):
1991 | One year after German reunification, 51 scientific institutions from the former German Democratic Republic are connected to the X.25-WiN scientific network of the DFN. Hans-Martin Adler from DFN introduces the network.

Bottom left:
"A life without DFN? Possible, but pointless" – this was the title of the birthday speech by former DFN Chairman Prof. Dr. Hans-Joachim Bungartz.

Bottom right
Prof. Dr.-Ing. Stefan Wesner, Chairman of the Board of the DFN Association welcomes the guests to the anniversary celebration.:

DFN
DEUTSCHES FORSCHUNGSNETZ

For this issue, CONNECT spoke with Christian Grimm, CEO of DFN to understand more about DFN's plans and the evolving European scientific landscape. Christian served on the GÉANT Board of Directors, including as Chair of the GÉANT Board from 2015 to 2020, and in 2024 received the Vietsch Medal of Honour at TNC24.

### Christian, looking back over DFN's history, what makes you most proud?

First of all, it's worth noting that I joined DFN in 2009 right after its 25th anniversary. So, there is a whole generation before me that brought DFN up to speed and I'll never underestimate what they have achieved. For our 40th anniversary, we asked our community to share thoughts and memories about DFN. The quotes we received illustrate the strong ties we have established – to our members and between individuals. To receive such confirmation that we make a relevant contribution to supporting scientists and how much that is appreciated makes me humble and also a little proud, of course.

### How has DFN's user community and their needs changed over that time?

In the early days it was all about connectivity, a matter of few visionary experts. Every newly connected site got celebrated and much of the discussion centred on network technologies and architectures. Today, connectivity is considered a basic supply, much like water and electricity, to all scientific disciplines. As long as our network is performant, cost efficient, resilient and secure there is little concern about how we achieve this. Of course, discussions now extend to the many services we now provide over the network.

The most relevant change probably is that together with our member organisations we now operate a huge environment across Germany: the use of interconnected systems across our networks has become the natural basis every scientist and student uses as part of their daily work.

### You served on the GÉANT Board for many years, what do you see as the biggest change in the GÉANT community over the past 10 years?

First, your question gives me the opportunity to convey my congratulations to GÉANT's 10th anniversary! Are we aware that GÉANT is a comparably young organisation? Maybe not, and to me that's a good indication that the merger of DANTE and TERENA into the GÉANT Association has gone quite smoothly and is well supported by all its members.

When you ask IT folks about changes over a decade there's certainly a lot to tell. However, I don't think the main changes are IT related – it's the environment that changes and with that the nature of NRENs. We have seen many national and European initiatives coming. Due to their different nature some NRENs are quite active in new areas, others less so. On one hand this opens the space for new joint initiatives, on the other hand it challenges us to keep a close eye on what remains as common ground.

### What do you see as DFN's most important objective over the next five (or ten if you prefer) years?

We serve our member organisations primarily through their IT service centres. To me, these centres are in an increasingly difficult situation: more is expected of them while at the same time their options to actually do more remain restricted. This opens the need for more cooperation, but also the question about the demarcation lines between us and our members. For example, currently we expect the first level support for most of our services within the respective organisations. We certainly won't be able to take over the first level support in the future, but collaborative models and the use of AI can lead us to new approaches. And this will happen soon.

### Where do you see Europe's science, research and innovation in 10 years' time? Do you think that national and EU level public funding will be sufficient to compete globally?

In Europe, we have recently seen how quickly priorities had to be adjusted at national and EU level. This makes it difficult today to talk about sustainable and adequate funding for science, research and innovation. However, I do not believe that more funding always leads to better science. But there is no doubt that we need to agree more on priorities in order to remain competitive. I see this also a challenge to us. Maybe not everything we have done over the last decade was successful or at the end relevant.

### What does the GÉANT community need to do to continue to be relevant on a global scale?

Saving the best for the last, this is indeed a tough question. Our current strong position cannot be taken for granted and there will be various challenges to maintaining it, and each will require specific measures. And certainly, remaining united is a key element here.

In my time as chair, I found a high-level perspective that helped me as a guiding principle in some difficult situations: keep European NRENs (and not just EU-27 or any other subgroup) as close as possible together and ensure we support each other in the best possible way to make us better together.


# In memory of Dr Boubakar Barry, WACREN CEO

Colleagues and friends at GÉANT have been shocked to learn about the unexpected passing of Dr Boubakar Barry on Wednesday 18 September 2024 at the age of 65.

**Words:** Cathrin Stöver, GÉANT

It was at the World Summit of the Information Society in Tunis in November 2005 that representatives from GÉANT (then DANTE) and the European NREN community met Dr Barry for the first time. In September 2006, Dr Barry was appointed Founding Head of the newly established Research and Education Networking Unit of the Association of African Universities, based in Accra, Ghana. And it was in Accra in November 2006, where under Dr Barry's guidance the first formal meeting of African NRENs, EU NRENs, DANTE, as well as interested universities and libraries' representatives took place. Here, we first formulated the idea of a wide-spread network interconnecting African NRENs into a continental backbone and to the rest of the world. Subsequently, Dr Barry and the RENU unit at the AAU supported the creation of the first regional network in Sub Saharan Africa: the UbuntuNet Alliance. Dr Barry himself served as a founding Director on the first Board of the UbuntuNet Alliance. Equally, he supported GÉANT (then DANTE) and our partners in the feasibility study we carried out in 2008. This study led to the first AfricaConnect project starting in 2011. And, while AfricaConnect initally focused on East and Southern Africa, Dr Barry ensured that there was also start-up funding available for WACREN, the new regional research networking organisation in West and Central Africa, which he founded in 2010 and where he became founding CEO in 2013, building the community of interconnected NRENs.

Ever since these beginnings, we worked closely with Dr Barry. Together with the colleagues at WACREN, we increased the dedicated research networking capacity for West and Central African NRENs and the services offered to students, academics and scientists in the region. Bringing the information society to West and Central Africa was Dr Barry's life's work and his calling. At GÉANT, we are proud to have been part of his success.

Boubakar was a wonderful person to work with and a dear friend. He was a good man, an honest man and a believer. He was a smart man, looking ahead with vision. He gave stability to WACREN and to GÉANT's interaction with his part of the world. He was dependable and he delivered results, most often with very little resource available to him and throwing himself with all his energy into the delivery. Boubakar was approachable, with time for his colleagues who had become his friends. He had the best laugh, the warmest embrace and an ability to make you sit down at a table and stay. Unforgotten the many hours alongside conferences, sitting in the evenings, listening to a band and talking about the past, the present, the world, music, books, his garden and the time he was a DJ in Dresden. Unforgotten his moves on the dancefloor. Unforgotten his generosity, his energy, his enthusiasm and the unbending commitment with which he fought for his beliefs.

The untimely passing of Boubakar Barry leaves a hole in our global community of NRENs and we will miss him. Our heart goes out to our friends and colleagues at WACREN and the NRENs in West and Central Africa. We send our deepest condolences to Boubakar's family and friends.

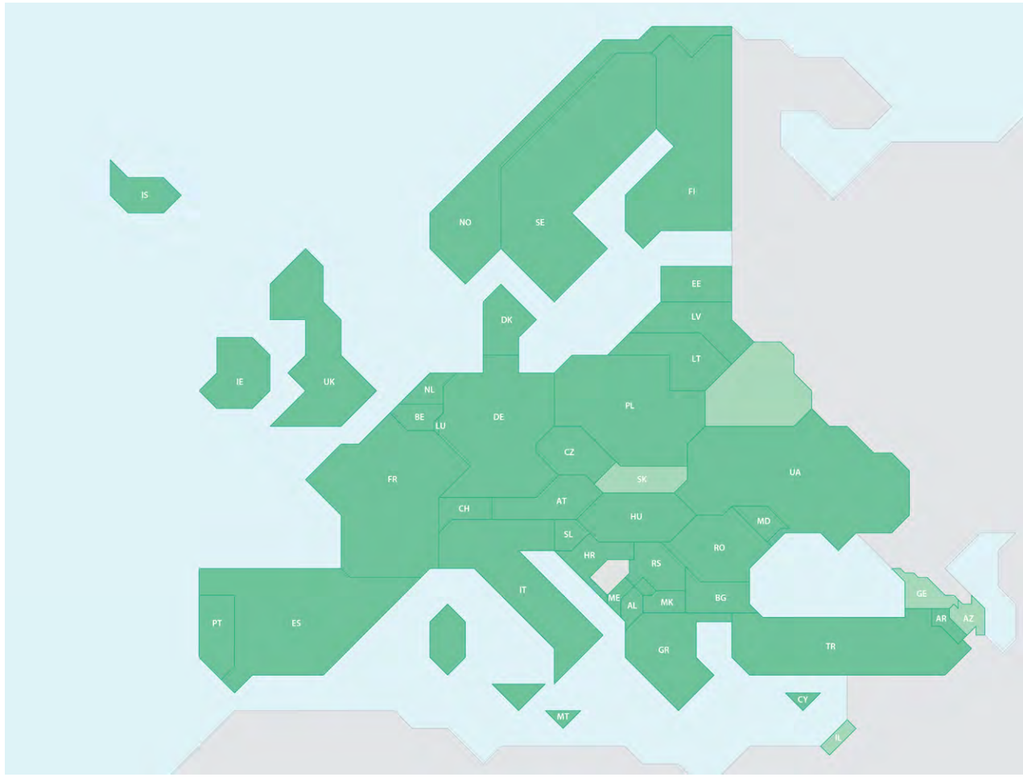
WACREN has opened a Condolence Book here: **boubakarbarry.wacren.net**


# Towards the OCRE 2024 Framework

## – Everything you need to know about the transition from current to upcoming cloud framework agreements

Since 2016, GÉANT's flagship cloud frameworks have fostered digital transformation across Europe, by enabling easy, convenient, and compliant consumption of commercial cloud services for Research and Education (R&E) institutions. In this article, we provide a comprehensive update on the current and upcoming cloud service agreements for the pan-European R&E community.

**Words:** Leonardo Marino, GÉANT




**Picture**
Map of countries participating in OCRE 2024 (in dark green)

### An update on the OCRE 2024 Framework (available from February 2025)

Following an intensive phase of evaluation of tender responses, we are pleased to share with our community that the new GÉANT cloud framework – OCRE2024 – is now in the final stages of preparation. The new framework agreements are expected to become available on 3 February 2025 and will be in place for a period of five years.

From that date, all the organisations that had expressed through their NREN their willingness to participate will be able to procure cloud services via the OCRE 2024 Framework agreements, in a compliant, easy and cost-effective way. The full list of OCRE 2024 participating institutions is available here: **clouds.geant.org/ocre2024entities**

Cloud service offerings in the OCRE 2024 Framework will be available in 39 countries across Europe, each with its own portfolio of Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS) solutions.

The OCRE 2024 Framework will incorporate several improvements in response to community feedback, aiming to better address the needs of the R&E community. Some key improvements include:

- **Enhanced Compliance**: With a focus on sustainability, privacy, security, adherence to European laws and regulations and reporting.
- **Improved Commercial Terms**: Including better & minimum discounts, reduced egress costs, local billing and more extensive access to complimentary training and support resources.

Additionally, the OCRE 2024 Framework will continue to provide and support important features, guarantees and support mechanisms already covered by the previous framework, such as – to name a few – free ingress, guaranteed exit support, identity management (including support to eduGAIN), peering connection with GÉANT and NRENs, root access, CRF invoicing, split billing, Bring Your Own Licence (BYOL), shared use and other support services.

We believe this updated Framework will provide even greater value and support for the cloud service needs of R&E institutions across Europe.

### Current Framework agreements (OCRE 2020)

The current OCRE 2020 framework, facilitated by GÉANT and European NRENs, lasts from 1 December 2020 until 30 November 2024. As such, institutions participating in OCRE 2020 will still be able to contract new Call of Contracts with an OCRE 2020 supplier until 30 November for the maximum of four years.

For institutions that are already utilising existing framework agreements and contracting under a valid Call off Contract that is almost expiring, it will still be possible up until 30 November 2024 to sign a contract extension for a maximum period of up to four years, or to opt for termination upon agreement to switch to a new contract under the OCRE 2024 Framework.

Given that many institutions are already leveraging Call off Contracts under the OCRE 2020 Framework, these extensions – if needed – may be relatively straightforward to implement and can serve as an interim solution during any necessary transition period towards the new OCRE 2024 Framework.

If you have any questions or need further clarification, please do not hesitate to reach out to your **local NREN representative** or **GÉANT** for more details on the transition between OCRE 2020 and OCRE 2024 and the next steps.

OCRE 2024 Open Clouds for Research & Education

# CSM24 Your Brain is the First Line of Defence

The annual European Cybersecurity Month, the initiative coordinated by ENISA and the European Commission, is in full swing, and GÉANT is once again running its own large-scale Cybersecurity Month (CSM) awareness campaign to support this. Since 2020, GÉANT has been a key contributor to this initiative, and this year, the focus is on social engineering with the tagline: "Your brain is the first line of defence."

**Interview by:** Rosanna Norman, GÉANT


## Understanding Social Engineering

**What is social engineering?**

Social engineering is nothing more than 'human hacking': it's a generic term used to manipulate people in order to obtain valuable information or to gain access to IT systems.

What makes social engineering especially dangerous is that it relies on human psychology, rather than using vulnerabilities in computer systems.

It's all about psychology: social engineers target our minds. They gain our trust and then strike by encouraging us to divulge personal or financial information, click on unsafe links, or open malicious attachments.

**What techniques do social engineers use?**

Social engineering relies heavily on the five 'Principles of Influence' established by behavioural psychologist Robert Cialdini. These principles are also commonly used in sales and marketing.
Here's an overview:

- Liking: People tend to give more credibility to those they like than to those they do not. To exploit this, social engineers try to appear trustworthy and attractive, and they pretend to share similar interests.
- Reciprocity: People naturally feel inclined to return a favour. Social engineers exploit this by offering something small, like advice, making you feel obligated to give something in return.
- Commitment and Consistency: Once we make a decision, we often feel compelled to stick with it. Attackers take advantage of this by first getting you to agree to small requests before asking for something bigger.
- Social Proof: We are more likely to support a product or initiative if people we trust have endorsed it. Attackers may use social networks to exploit this by claiming that your online friends have already approved an action, product or service.
- Authority: People tend to trust experts or those in authority more than others. Attackers might use phrases like "according to experts" or "science proves" to persuade you to agree to something.

**Different types of attacks**

From face-to-face interactions exploiting trust to sophisticated online schemes that trick people into revealing sensitive information, these tactics can take many forms. Below is a list of some kinds of attacks illustrating the diverse strategies used to manipulate individuals:

- Phishing - spear phishing/ smishing/vishing
- Pretexting
- Tailgating
- Baiting (USB)
- CEO fraud
- Romance scam

**How can you protect yourself?**

For our protection from social engineers, we humans have a powerful weapon: our brain! It's sufficient just to take a moment to think critically.

- Is this request question realistic?
- Who is the sender of the message?
- Why am I getting this call out of the blue?

The key message of CSM24 is clear: take your time to assess the situation and think critically, especially when you feel a sense of urgency coming into a conversation and if in doubt always ask back via a different channel.

## Follow the Adventures of Jake Doubt

In a four-part campaign video series, we follow Jake Doubt, Head of the Security Team at Guilder University (the imaginary country that features in our famous CLAW Crisis Management workshops). When several colleagues start receiving unusual requests, Jake decides to investigate. The series, presented in a playful manner, covers topics like spear phishing, romance scams, and tailgating. Through these videos, Jake uncovers the motives behind the social engineering attempts, providing valuable insights into the manipulation techniques used by cyber criminals.

## Tips and Tricks

Remember our Cyber Heroes from last year? They're back with more tips and tricks to help you stay safe online. Knowing what to look out for makes it much easier to protect yourself from cyber criminals.

## Webinar programme: what to expect?

The campaign features an interesting programme of webinars with renowned speakers from the R&E community who have been sharing their expertise and experiences, talking about insider threats, techniques used by social engineers to trick their victims, and methods to detect false multimedia content.

The full programme is available here: **connect.geant.org/2024/09/20/unveiling-geant-cyber-security-month-webinar-programme-register-today**

## Campaign resources accessible to all

The strength of our Cybersecurity Month campaigns lies in close collaboration with NRENs. Campaign materials, including visuals, banners, and video content, are available and can be reused free of charge.

### Get Involved!

Do you have any reactions, suggestions or comments about CSM24? You can reach the team behind the campaign at **csm@geant.org**.

# Research, resilience, and ransomware:

## Tackling cybersecurity challenges at Diamond Light Source

As part of GÉANT Cybersecurity Month 2024, this is from a series of interviews that showcase case studies of organisations raising cyber awareness in innovative ways or within challenging environments and stories of organisations and individuals who have faced cybersecurity incidents and successfully mitigated further damage through timely reporting.

**Words:** Jody Williams, Content marketing writer

What do Komodo dragons, COVID-19 protein structures, and ancient papyrus scrolls from Pompeii have in common?

They've all been subjects of research at Diamond Light Source, the UK's national synchrotron facility. Diamond plays a key role in global research, with over 14,000 researchers from around the world accessing its systems and data, around the clock. This constant access and the nature of its operations means Diamond faces unique security challenges.

Cheryn Tan, Senior Cybersecurity Officer at Diamond, shares how the facility is navigating these challenges while tailoring its security awareness initiatives to an audience composed largely of scientists and research support staff.

### Challenge 1: Availability is the priority

Diamond's beamlines — 10 billion times brighter than the sun — operate 24 hours a day, six days a week, with specific time slots allocated to different research projects.

Disruptions to the beamlines can cause significant delays for critical scientific work. "We have to make sure the facilities onsite are configured with resilience, and that we provide robust access and authentication methods for researchers working remotely," Cheryn explains.

"Availability is what people at Diamond are most concerned about. If the beamlines are unavailable, researchers can't complete their experiments — with a knock-on effect on their publication deadlines and even PhD completions."

This need for constant availability informs how Cheryn and her colleagues design security awareness initiatives to maximise their effectiveness. "We try to target what people care about — in our case, that's the availability of systems and data."

"We help staff and researchers understand that security measures are in place to protect their ability to keep working without interruptions." This includes defending against phishing emails that could lock down systems and addressing weak passwords that might allow unauthorised access to crucial data.

### Challenge 2: Remote access and global collaboration

Diamond Light Source is an international research infrastructure, with collaborators accessing its systems from all over the world. "Having people regularly logging in from different countries poses a challenge in securely managing remote access," Cheryn says.

"In a more locally based organisation, an unrecognised login from a non-UK IP address might be suspicious. But for us, it's usually legitimate."

The cybersecurity team must filter out malicious login attempts without blocking legitimate users.

"We're trying to find ways to improve and automate that process, but it still requires a bit of investigation. We need to ensure that security measures don't block the researchers' access to what they need, but instead enable them to continue working securely."

## Challenge 3: Balancing security with research needs

Like many research institutions, Diamond faces resistance to security measures. Researchers focused on their work often see security steps as frustrating obstacles.

"It's difficult to avoid pushback," Cheryn acknowledges. "Most people will be unhappy if you add more steps that feel like blockers."

To mitigate this resistance, Diamond's cybersecurity team involves staff from various departments in testing new measures before implementation.

"To minimise disruption, with security measures like multi-factor authentication we first test them with users from different departments and collect feedback before rolling out more broadly. We try to minimise exceptions, but if needed, we come up with secure alternative measures."

Collaboration is key. "Maintaining open channels of communication and explaining the rationale behind security measures helps ease tensions."

Diamond is also focusing on fostering secure development practices among its software engineers: "We want to build security into the software development process instead of it being an afterthought." By engaging engineers and including security in the earliest stages of development, the team hopes to create more resilient systems overall.

## Challenge 4: Tailoring security awareness for a diverse audience

Diamond's workforce is as varied as its research projects, and the cybersecurity team must account for this when designing security awareness programmes.

"We implement mandatory staff training on security basics — password security, data protection, phishing emails, and social engineering — but we also supplement this with webinars, posters, and talks throughout the year," says Cheryn.

"We have a very diverse range of backgrounds at Diamond, from beamline technicians to software engineers to HR and finance staff. And all of them have different levels of technical knowledge and ability."

This means that a one-size-fits-all approach to security awareness doesn't work. Diamond uses interactive training programmes and personalised communications to engage staff and researchers with different skill levels. One particularly successful initiative was a "choose-your-own-adventure" training exercise with multiple-choice options.

"We put participants in scenario like: You've accidentally clicked on a phishing email — what do you do next? And then it spirals into seeing suspicious activity and systems going down. It helped bring home how quickly cyber-attacks can escalate and have significant operational impacts."

Cheryn and her colleagues plan to expand their awareness efforts by creating tailored messages targeting high-risk groups, such as researchers handling sensitive data. "We want to keep security front and centre without causing panic or security fatigue," Cheryn adds.

## Challenge 5: Ransomware threats

After seeing ransomware attacks cripple other research facilities in the last couple of years, Diamond pivoted its focus to mitigating this risk.

"We identified ransomware as the biggest cybersecurity challenge facing Diamond Light Source. It's now clear it's not just something that affects large for-profit businesses — academic and research institutions are also being targeted."

Taking a proactive approach, last year Diamond's cybersecurity team ran a series of crisis simulations and tabletop exercises to prepare staff for ransomware attacks. These helped people understand the consequences of ransomware and how to respond effectively.

"The crisis simulation workshops — which we're currently expanding to include our partners — helped to bring home the message that ransomware is something we need to be ready for."

Cheryn highlights an unusual challenge at Diamond: distinguishing legitimate large data transfers from potential ransomware threats, as research projects often involve substantial data exfiltration. Since exfiltrations can precede encryption and ransom demands, Diamond's staff are trained to identify legitimate transfers. They have also engaged 24/7 threat monitoring of key infrastructure by a managed service provider to strengthen their defences.

## Challenge 6: Measuring the effectiveness of security awareness

"Measuring the effectiveness of security awareness programmes is always tricky, and we're still refining our approach," Cheryn says. Diamond uses feedback surveys and tracks phishing-reporting rates, but they know these metrics don't give the full story.

"It's tempting to rely on easy measures like how many incidents we've had, but that's not always the full picture. People are smart. They're not just learning about security from us — they're reading the news, talking to colleagues, and hearing about incidents at other institutions."

An important element of Diamond's security culture is creating a learning culture rather than a blame-oriented one.

"We don't want to blame people if they fall for phishing attacks, but rather help them improve. Attackers are getting more sophisticated, and people make mistakes because they are tired or distracted. We want to make sure they feel supported."

## Summing up: Security as an enabler of research

Diamond Light Source's cybersecurity efforts illustrate the balance between maintaining security and enabling world-class research. While staff may sometimes feel that security adds obstacles to their work, Diamond's approach is to show how these measures enhance, rather than impede, research progress.

As Cheryn emphasises, "We sympathise with how sometimes an additional step feels like a hurdle, but we always try to position security as an enabler of research, not a blocker."

By delivering tailored security awareness initiatives, engaging exercises, and open communication alongside robust systems, Diamond's cybersecurity team ensures that scientists can continue their vital work while staying secure.

### About Cheryn Tan

Cheryn Tan is a Senior Cyber Security Officer at Diamond Light Source, who has previously worked in companies including Vodafone and Red Hat. She is an ISACA Certified Information Security Manager (CISM) and Certified in Risk and Information Systems Control (CRISC). Outside of work, Cheryn enjoys travelling, cooking, yoga (floor and aerial), and spending time with her dog.

### About Diamond Light Source

Diamond Light Source provides industrial and academic user communities with access to state-of-the-art analytical tools to enable world-changing science. Shaped like a huge ring, it works like a giant microscope, accelerating electrons to near light speeds, to produce a light 10 billion times brighter than the Sun, which is then directed off into 33 laboratories known as 'beamlines'. In addition to these, Diamond offers access to several integrated laboratories including the world-class Electron Bio-imaging Centre (eBIC) and the Electron Physical Science Imaging Centre (ePSIC).

Diamond serves as an agent of change, addressing 21st century challenges such as disease, clean energy, food security and more. Since operations started, more than 16,000 researchers from both academia and industry have used Diamond to conduct experiments, with the support of approximately 760 world-class staff. Almost 12,000 scientific articles have been published by our users and scientists.

Diamond is a not-for-profit joint venture between UKRI's Science and Technology Facilities Council (STFC) and the Wellcome Trust, one of the world's largest biomedical charities, with 86% and 14% ownership respectively. It is funded by the UK Government through STFC and by the Wellcome Trust. One of the most advanced scientific facilities in the world, Diamond's pioneering capabilities are helping to keep the UK at the forefront of scientific research.

# RESTENA open-source Security Operation Centre: protecting what matters

World events and the rise of cyber threats to global critical infrastructure, combined with the increasing awareness and growing number of security-related incidents are stimulating the demand for enhanced cybersecurity measures. The increasing complexity of R&E networks and product sets require more specialist skills. In response, several NRENs around the globe and connected institutions have coupled their established Network Operation Centre (NOC) with a Security Operation Centre (SOC). CONNECT met with Cynthia Wagner, Chief Information Security Officer for Restena, the Luxembourgish NREN, to talk about their requirements, plans and processes to build a SOC.

**Interview by:** Rosanna Norman, GÉANT

### Cynthia, thank you so much for taking the time to talk to us. Can you share with our readers the steps that Restena has taken to create the SOC?

The very first step was observational: engaging in discussions with information security managers from major research and education institutions in Luxembourg and assessing the current situation across the entire community. These efforts clearly highlighted the absence and the need for a SOC.

Next, we investigated how to implement it, focusing on requirement analysis: needs and costs. Consistent with our internal culture, one requirement was clear from the start: we needed an open-source solution. We concluded that initiating an EU project would be the best approach as it aligns perfectly with our open-source strategy. We explored available funding options and successfully secured one! We then wrote and submitted the Enhancing Cybersecurity Services for the Luxembourgish Research and Education community (LuCySe4RE) project to the European Union's Digital Europe programme (DIGITAL).

With the LuCySe4RE project accepted and validated by the Restena board, we pooled our internal resources to take up the challenge. Finding these resources internally was easy due to the high motivation for this new service. We assembled a multidisciplinary team, including engineers from various internal services, and kicked off the project in September 2023.

With the team ready for the challenge, we then had to choose the right technologies, start implementing the technical infrastructure and onboard a few research and education institutions in Luxembourg. The project was immediately accepted for testing by our participants.

### What technologies and tools will you be leveraging to build this new facility?

From the outset, it was clear that we would rely as much as possible on open-source technologies, and nothing could make us reconsider that decision. After thorough investigations, we identified a variety of components: Fluentbit, Logstash, OpenSearch, Suricata and the MISP platform, among others. We are particularly proud to use the MISP platform, developed in Luxembourg by our partner, the Computer Incident Response Center Luxembourg (CIRCL) of the Luxembourg House of Cybersecurity. MISP is not the only tool from our partners that we utilised in this project. We also employed the GÉANT **Security Baseline** to assess the maturity levels of the institutions participating in the project.

### What challenges did you encounter during the implementation process?

Even though the implementation process is still ongoing and new challenges undoubtedly await us, one of the initial major obstacles was the sheer volume of data transmitted by the partnering institutions. This data already amounts to many gigabytes, despite not all institutions having onboarded yet!

Another significant challenge arose when we decided to rethink our initial infrastructure setup, switching from Elastic to OpenSearch. This decision was crucial for cost reduction and project simplification.

### Will you monitor your network and your connected institutions, do you intend to measure security maturity levels?

Restena has been operating a NOC for many years monitoring all connected infrastructures. The future SOC and NOC will collaborate, as the data collected is valuable to both. In addition, the SOC will work closely with the Restena Computer Security Incident Response Team (CSIRT) to manage identified incidents, thus enabling advanced monitoring for our connected institutions.

Before implementing the SOC, we used the GÉANT Security Baseline to establish the current state of security maturity within Restena and the SOC-Project participants. This assessment will be repeated at the conclusion of LuCySe4RE, scheduled for August 2026. By doing so, we will be able to measure the evolution and overall impact of the LuCySe4RE project on Restena and the participating institutions.

### How will the SOC handle customer-facing interactions out of hours? Will you outsource?

One of the first decisions was to operate the SOC only during office hours. Among our community members, there is limited availability to handle security alerts on 24/7. However, we are now exploring the possibility to include a CSIRT on-call duty, for internal purposes in the future. This initiative might inspire others to follow suit.

### Which recommendations would you give to other NRENs who are planning to embark on a similar journey?

We have a robust and well-connected R&E network here in Luxembourg, with easy access to our institutions. Understanding their requirements is crucial. Once you've identified these needs, I highly recommend embarking on this journey. It is truly worthwhile! All you need is a dynamic and a motivated team, and thanks to the vibrant open-source community it's possible to access a variety of efficient open-source tools.

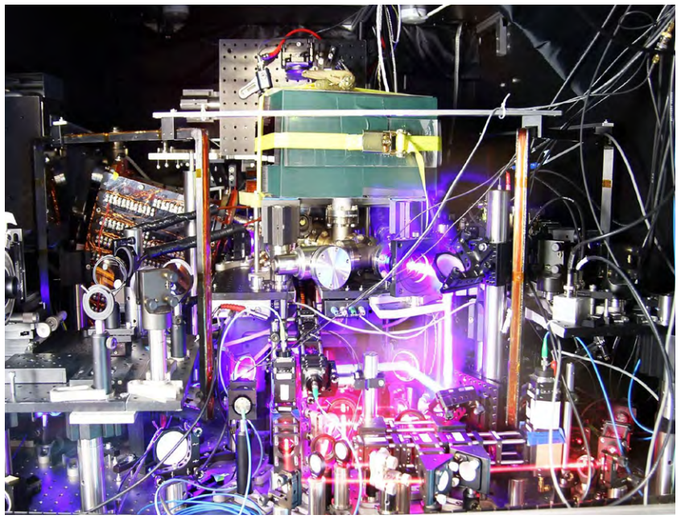
**Restena is ready to offer assistance to any NREN looking to get started!**

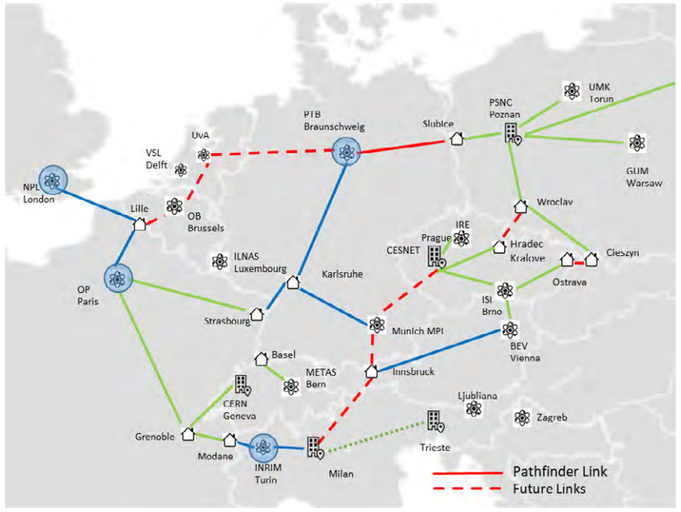

Picture
The team of the LuCySe4Re

### About Cynthia

Cynthia Wagner (fourth from left in the first row in the above photo) is the Chief Information Security Officer and Security Manager at the Restena Foundation, the national research and education network in Luxembourg. Previously, Cynthia was managing the Restena-Computer Security Incident Response Team. She graduated with distinction from the University of Luxembourg with a PhD in computer science, where she studied the effects of various data mining approaches on flow measurements for improving security. She is currently also an active member of different working groups at GÉANT. At a national level, she is a member of various advisory boards and the co-founder of Restena's CyberDay.lu and the Data Privacy Day conference. Cynthia is actively involved in teaching and in her spare time, she loves gardening and trying new recipes in her kitchen (whether she is successful or not).

# Time and Frequency Pathfinder Study – Helping Redefine Time for the 21st Century






"I'll be a second", "Can I borrow you for a second?", "Have you got a second?". Phrases we hear many times each day but what exactly is a second? Since, well time immemorial, we have been attempting to measure time to greater and greater degrees of precision and accuracy because so much of fundamental science relies on being able to measure everything and virtually all these measures rely on time.

**Words:** Karl Meyer, GÉANT

Since 1968, the second has been defined using atomic clocks – these used to be room-sized delicate machines but have been refined and shrunk down to fit into the GPS satellites that we all use every day for our sat-nav systems. These atomic clocks are amazingly accurate – if one had started at the beginning of the universe then its time could have drifted by around 100 seconds – but current science needs even more accurate measurements and so there is an international effort underway to redefine the SI unit of time, the second, by 2030 using the latest generation of optical atomic clocks.

These clocks promise to be orders of magnitude better than the microwave atomic clocks currently used to maintain the global time scale Coordinated Universal Time (UTC). State-of-the-art optical clocks have an estimated uncertainty of 10–18, or 18 digits of precision, compared to 10–16 achievable with the best Caesium fountain clocks today. These optical clocks would have an error of less than a second over the lifetime of the universe.

However, this precision brings with it new and different problems. At present, ground-based atomic clocks can collaborate with each other using for example satellite systems such as GPS to provide a "consensus" of time, but because the new optical clocks are so much more precise this satellite system simply cannot cope. Using them would be like asking your co-worker what the time was and them replying "Tuesday-ish".

Therefore in 2022, when the General Conference on Weights and Measures (CGPM) – the body ultimately in charge of the international system of units, the SI – approved Resolution 5 towards the redefinition of the second using optical clocks, it was agreed that, at the time, "only comparisons mediated by optical fibre links provide the required [low and predictable] instability and accuracy for comparing optical clocks"

And of course, this is where GÉANT, NRENs and the European science community are experts!

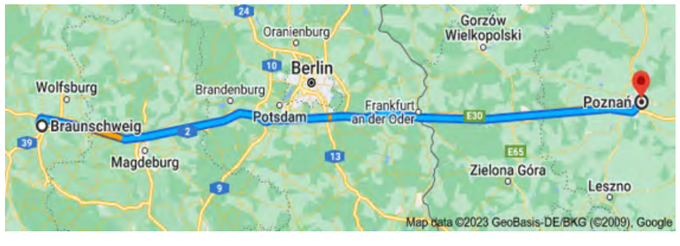
As of today, several European National Metrological Institutions (NMI) and universities are developing optical clocks. Four of them which are at the forefront of the development – in London, Paris, Turin and Braunschweig – are already connected through a network of international fibre links having emerged from national and bi-national initiatives. In addition, there are a series of national projects to interconnect sites either providing or benefitting from ultrastable and accurate frequency references. However much of this work is limited by national boundaries with very limited cross-border collaboration, and the future of existing cross-border links is always in the balance due to shifting national priorities.

This is why the next iteration of the GÉANT project (starting in 2025) will be working with NRENs and NMIs to develop a pan-European fibre-based network to support the interconnection of these optical clocks, building on GÉANT's expertise in providing cross- border connectivity for NRENs. The aim of this work is to support the redefinition of the SI second, enable fundamental physics & astronomy research, and ultimately improve the resilience of critical infrastructures across Europe, by providing a higher-accuracy alternative to satellite-based time comparison methods.

Now, a pathfinder project to connect PSNC in Poznan, the hub of the Polish fibre network for the National Laboratory for Photonics and Quantum Technologies (NLPQT), to the PTB, the German NMI in Braunschweig (**www.ptb.de**) has been successfully completed, demonstrating the ability of GÉANT and the NRENs to support this work. The link, which utilises dedicated fibre specifically procured for this project and equipment developed by PSNC, was completed on 25 September.

This project is both a demonstration of the power of national and international research and education networks and also the ability of GÉANT, NRENs and the NMIs to work together to help advance science.

We would like to thank the invaluable work from PSNC, Pioneer, PTB and the team from GÉANT in the creation of this pathfinder connection and look forward to the continuing this success story in the next few years. Hopefully the next time you're asked if you "have a second" you'll be able to confidently answer "Yes".




If you would like to find out more about the Time and Frequency work in the GÉANT community, a dedicated Special Interest Group (SIG) has been created and information can be found at **community.geant.org/sig-tfn** The first meeting of this group took place in Amsterdam on 16-17 October and details of this meeting and future meetings can be found on the **dedicated event page**.

**Pictures**
Left: PTB PSNC GÉANT Team

Top middle: Optical Clock

Top right: Current NMI and National interconnections with proposed International links

Bottom: PTB PSNC GÉANT Pathfinder link


# Make time for Mentoring and prioritise your potential

'The key is not to prioritise what's on your schedule, but to schedule your priorities', The 7 Habits of Highly Effective People by Stephen R. Covey.

**Words:** Lisa Melrose, GÉANT

If you're keen to excel in your role and broaden your professional network, prioritising personal development is crucial. But with tight deadlines, meetings, and travel, it's easy for learning activities, such as researching new topics or learning new skills, to slip down the to-do list.

Mentoring is a powerful development tool, offering substantial benefits for both Mentees and Mentors. The challenge often lies in finding time to get started. What if you could streamline the mentoring process and still ensure a great match? Can you make personal development a priority without the hassle?

The new GÉANT Mentoring Programme (GEM) is doing just that for talented individuals across our community. It is tailored to support and develop talent using a talented pool of Mentors from all genders. After a very successful pilot, the programme is now open for new registrations from Mentors and Mentees. Here are some tips on how you can make time for mentoring and prioritise your potential:

## Time to develop

Eva Nestorovska, a researcher and GÉANT (GN5-1) Project Task Leader at PSNC, sums up a positive mentoring partnership: "Having someone you trust who understands you and supports your growth is invaluable. What's even better is that it's a mutually beneficial relationship!"

Mentoring offers significant rewards for both mentees and mentors. For mentees, it opens doors to career opportunities and expands professional networks. Mentors get the chance to enhance their leadership skills and gain fresh perspectives on their industry. Donal Cunningham from HEAnet reflects, "I've learnt a great deal about how the profession appears to someone just starting their networking career. Meanwhile, my mentee has made impressive strides toward a career in network engineering." GEM Mentors also benefit from being able to charge for their mentoring time commitment from the GÉANT (GN5-1) Project (WP1T5).

## GEM platform finds the time!

Finding the right mentor or mentee can be tricky and time-consuming. You must find a potential candidate in your organisation and make the sometimes 'awkward' first contact. Potential mismatches waste valuable time and cause frustration.

Enter GEM! GEM's platform with its advanced matching technology has changed the game for female mentees and their mentors across the GÉANT community.

GEM Mentees have found it easy to set their profiles with specific development goals and skills. They then step back and let the platform do the work, effectively matching them with suitable mentors and even generating a match 'score'. This streamlined approach ensures meaningful mentoring connections are made with individuals who know what they can both bring to the mentoring partnership.

## Time to get organised

Matched with the perfect mentor but struggling to fit meetings into your busy schedule? The GEM platform makes it a breeze. Its scheduling tool syncs with calendars to manage meetings effortlessly. Treat the mentoring sessions as essential learning opportunities and move them to the top of your to-do list!

Pilot participants have also praised GEM's session agendas. They help both parties understand the purpose and focus of each meeting with minimal preparation time and offer flexibility in choosing the length of the mentoring partnership. Customisable agendas help both parties to articulate objectives for each meeting and adapt as goals evolve, ensuring productive and focused meetings.

## Time to listen

Reflecting on and recording the information from each mentoring session is vital for making the most of the relationship. Francisca Martín-Vergara from the University of Malaga notes "Valuable feedback and support from my mentor has been crucial to developing my skills and expanding my professional connections."

Recording this feedback can be a chore, but GEM simplifies it by providing a central place to record development goals and notes. Another participant commented that noting and acting on the top three takeaways after each session significantly boosted her development and confidence.

## Time to find your mentoring match!

Time moves quickly, but your personal development doesn't have to fall behind. GEM's platform simplifies mentoring with accurate partner matching and hassle-free scheduling. Making time for mentoring time is crucial to empower and retain talent and share expert knowledge and advice across our community.

To find your mentoring match, find out more and register on GEM today.

Start exploring the GEM platform: **community.geant.org/geant-mentoring-programme**

# Tripling down on learning: GÉANT's Network eAcademy expands beyond Network Automation with Quantum and Time & Frequency courses

The GÉANT (GN5-1) Project initiative elevating community expertise in advanced networking technologies keeps expanding its reach and growing, with new educational resources, additional learning units, and entire new programmes. In this article, we launch the Quantum Tech eAcademy, disclose plans for the upcoming Optical Time & Frequency Networks (OTFN) eAcademy, and provide updates on various developments such as the anticipated AI section in the Network Automation eAcademy.

**Words:** Leonardo Marino, GÉANT

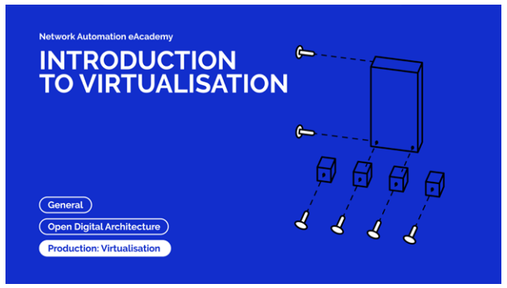
What does it take to keep up with the rapid pace of digital transformation, while at the same time driving change and innovation? And how can NRENs continue to evolve their services and networks to maintain the high standards their users rely on, while learning from each other? In this rapidly evolving digital ecosystem, staying ahead requires continuous training, common frameworks, shared skills and learning resources, as well as guidance, direction, clear routes and… maps to help navigate uncharted territories.

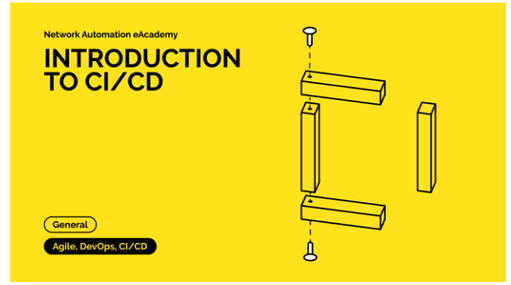
When it comes to new frontiers and emerging areas in networking, the GÉANT Network eAcademy perfectly caters to these needs. Created by the Network Development team within GÉANT projects (GN4-3 and then GN5-1) and supported by the GÉANT Learning and Development (GLAD) and Marcomms teams, the Network eAcademy is a service that includes a growing section of GÉANT's eAcademy platform entirely dedicated to different areas of advanced networking. It provides a wealth of free courses and learning materials for NRENs and for the research and education community at large, and especially for engineers, managers, researchers, students, who want to advance their knowledge in technical domains of network technologies and services.

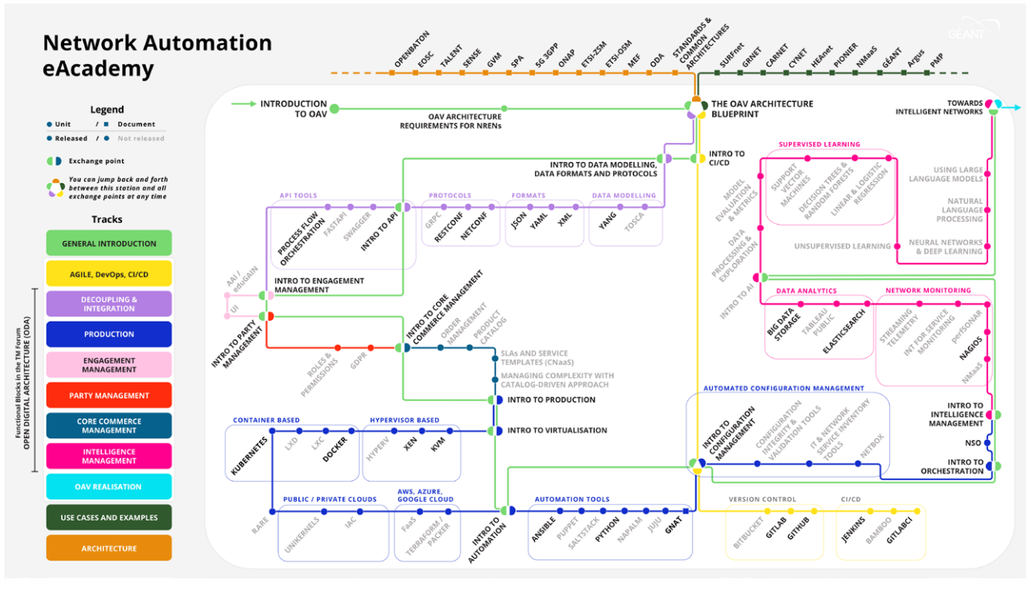
Courses in the Network eAcademy are created 'by the community and for the community'. Trainers are usually from NRENs and connected organisations, and course programmes are tailored to the needs of the R&E community, with the inclusion of NREN use cases, of references specific to the R&E context, and of relevant content from global R&E institutions.

Whether you're an experienced professional looking to expand your expertise in specific areas, or a student exploring the basics, the Network eAcademy is designed to meet your needs. There is no single way to follow the training either: while all courses include an introductory line, more advanced users can decide to engage with specific tracks and topics or to undertake independent units. Intermediate and advanced units always list all pre-required skills and knowledge in the first tab, and link to the units available to fill in possible gaps in those topics.

Navigation through the courses is easy and flexible. Interactive metro maps – a defining and now familiar feature of the Network eAcademy – accompany each course, serving as a visual companion tool and guiding learners through their self-paced learning journey across the different tracks.




Finally, all learning units contain indications about the overall time and commitment required, hands-on exercises, game elements, videos and supporting materials. Units are usually followed by a final quiz to test the knowledge gained and culminate in a certificate of completion.

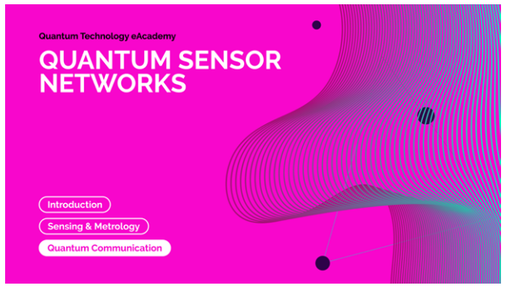
## Network Automation eAcademy – What's new?

Launched in 2021, the Network Automation eAcademy was the spark that ignited GÉANT's Network eAcademy initiative. The work initially started with a strategic focus on Orchestration, Automation and Virtualisation (OAV), responding to a need for a common OAV framework across NRENs, common terminology, architecture mapping, documentation and knowledge.

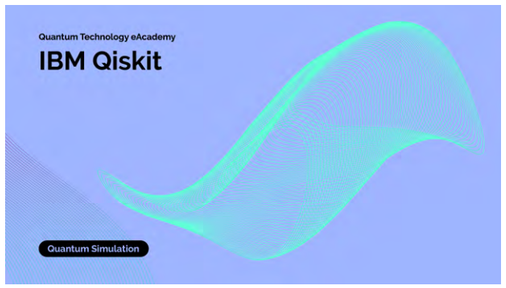
Since then, the Network Automation eAcademy has registered wide growth and uptake, playing a key role in the digital transformation of the R&E networking community. With new units being continuously released, the programme is now comprising **37 units** as well as numerous reports, whitepapers, mapping analysis and terminology documents produced by the team, plus external links and materials.

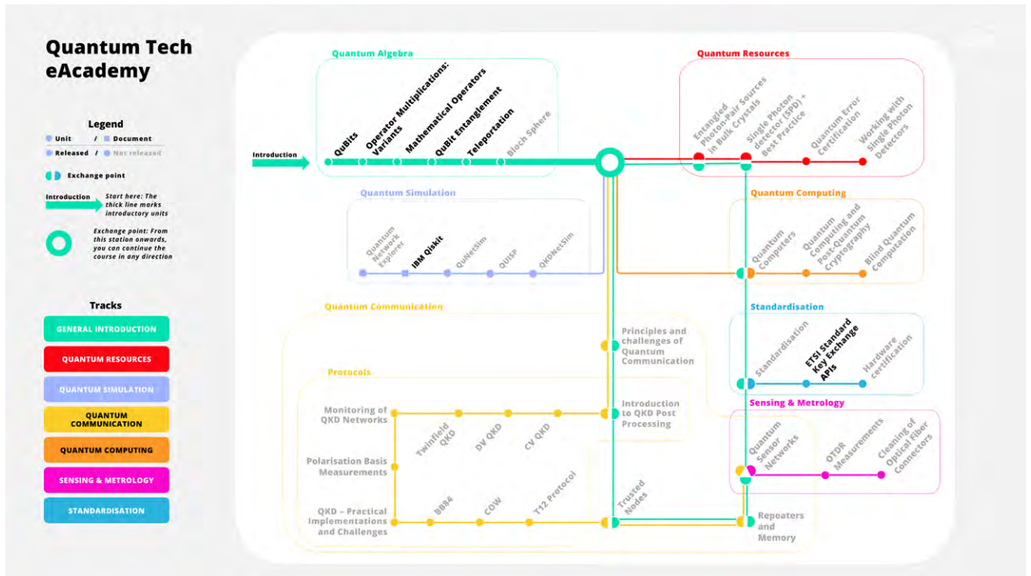
And that's not all – new sections and units keep being added, in line with the latest technology developments and dynamic community requirements. Most notably, the 'Intelligence Management' line has now been expanded with a new section of ten courses soon to be released covering the field of Artificial Intelligence.

In parallel with the training programmes, the Network Development team continues their work to enhance the community's OAV maturity by organising knowledge-sharing activities as Infoshares and workshops and developing fundamental resources. These include architecture mapping to the TM Forum Open Digital Architecture, Terminology documentation, service provider architecture, an OAV community portal, an OAV Maturity Model for organisations to self-assess their level of OAV maturity.





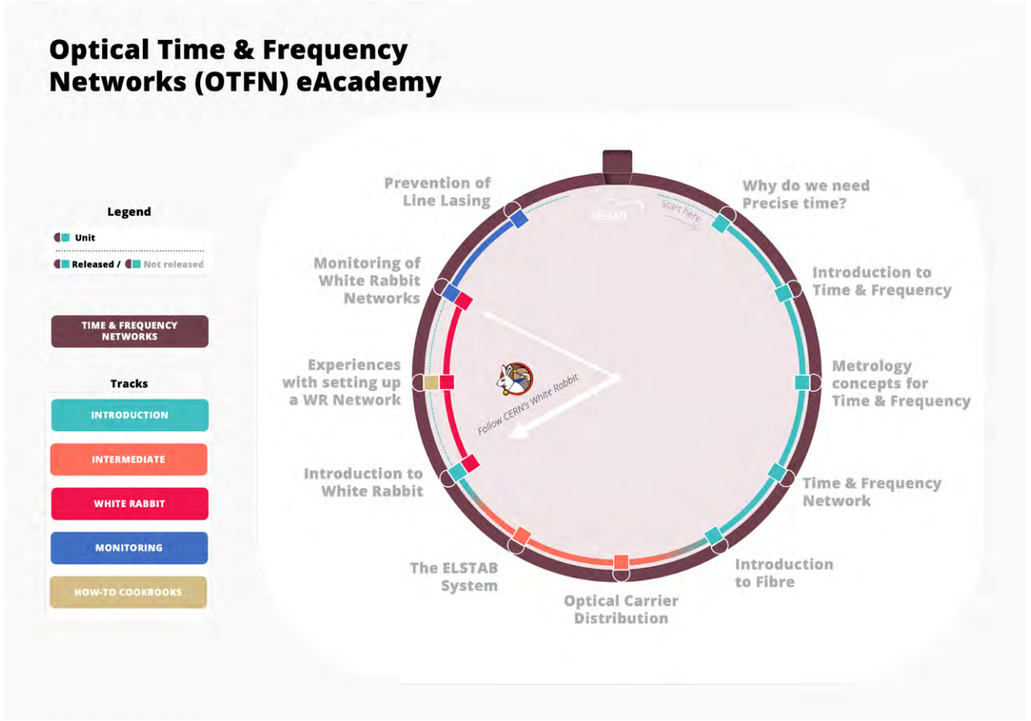

## Quantum Tech eAcademy – now out!

With this article, the GÉANT (GN5-1) Project's Network Development team is excited to officially announce the launch of the Quantum Tech eAcademy, a new training series entirely focused on Quantum technologies.

The training programme will cover elements of quantum communications, quantum computing, quantum simulation and resources, sensing and metrology, as well as standardisation. In perfect Network eAcademy style, the Quantum Tech course is also introducing its own brand-new interactive metro map to guide users across the different tracks and units.

An introductory block of five units is already available, covering the basics of Quantum Algebra, and specifically the theoretical principles of QuBits, their quantum entanglement and the process of teleportation. These aspects are the fundamentals used in quantum computers, quantum networks and quantum security, and as such we highly recommend starting your quantum learning journey from here and in the right sequence, to then proceed in the preferred direction after the exchange point marked by the big circle.

Additionally, two other units are already available beyond the introduction, covering IBM Qiskit, an open-source toolkit helping to schedule and run quantum programs, and ETSI standard key exchange APIs.




## Networks (OTFN) eAcademy – Coming soon!

Looking ahead, we are excited to unveil an upcoming third programme in the GÉANT Network eAcademy, which will be covering Optical Time & Frequency Networks (OTFN).

As Optical Time & Frequency (T&F) transfer as a service keeps gaining interest, and with many European NRENs now either supporting or planning to support T&F services for their users, the need for shared knowledge on these technologies and services is becoming clear. As such, experts working on OTFN in the GÉANT (GN5-1) Project's Network Development team started working on new training resources for the OTFN eAcademy, building on the same approach used for the Network Automation and Quantum Tech eAcademies.

While the first units of the OTFN eAcademy are currently under development, we are now ready to pre-announce the course structure and map, which is still following the popular metro-style, but this time in a "clock format". The course will include eleven units, covering different types of T&F services, monitoring, how-to cookbooks, and a specific focus on CERN's White Rabbit technology.

Join the Infoshare on 17 December 2024, at 13:00 CEST, to hear more about all updates in GÉANT's Network eAcademy: **events.geant.org/e/NeA**

Read more about different areas of GÉANT's Network eAcademy in the NetDev wiki: **wiki.geant.org/display/NETDEV**

And access all courses in the GÉANT eAcademy at **eacademy.geant.org** - simply via your home institution credentials using eduGAIN, or alternatively with your social media accounts.

Keep an eye on GÉANT's social media channels and on the CONNECT website and newsletter for updates on new units and courses in the Network eAcademy! And stay tuned: GÉANT's eAcademy platform is gearing up for other exciting developments beyond the Network eAcademy!


# Bridging the Mediterranean: Insights on the EUMEDplus Project

Launched on 1 September 2024, the EUMEDplus project represents a significant step forward in enhancing digital connectivity and research collaboration across the Arab Mediterranean countries and Europe. In this interview, Eng. Yousef Torman, Managing Director of the **Arab States Research and Education Network** (ASREN) and Tom Fryer, Head of International Relations at GÉANT, share their reflections on the lessons learned from previous projects like **EUMEDCONNECT** and **AfricaConnect**, the strategic alignment with the EU's Southern Neighbourhood Agenda, and the transformative role EUMEDplus is poised to play in supporting National Research and Education Networks (NRENs). Together, they explore the project's long-term vision for regional cooperation, the promotion of gender equality, and its impact on researchers, students, and institutions across the region.

**Interview by:** Nisreen Al-Kouz, ASREN and Silvia Fiore, GÉANT

EUMEDplus
Bridging the Mediterranean

**Pictures**
Left: CNRST hosting a workshop at their premises during ASREN bi-annual meeting in Rabat, Morocco, 31st May 2024

Right Yousef Torman, Managing Director of the Arab States Research and Education Network (ASREN)

Bottom right: Tom Fryer, Head of International Relations at GÉANT

**With a four-year timeline and a budget of €13.334m – of which €12m is contributed by the European Union – the EUMEDplus project is coordinated by GÉANT with key partners including ASREN, the American University of Beirut, the Centre National pour la Recherche Scientifique et Technique in Morocco, the Cyprus Research and Academic Network, NORDUnet, and SESAME in Jordan.**

**ASREN has a long-standing history of supporting NRENs in the North African and wider Arab world, especially given its involvement in previous EUMEDCONNECT and AfricaConnect projects. What are some of the lessons learned that you will bring to EUMEDplus?**

**Yousef**: Indeed, for two decades, ASREN has supported numerous Arab NRENs, with a particular focus on Arab Mediterranean countries, facilitated thanks to the EU support through the EUMEDCONNECT and AfricaConnect projects as well as GÉANT's continuous efforts and support. Both projects were instrumental for the establishment of ASREN and for the development of NRENs in the region by providing connectivity to the R&E communities in addition to building and enhancing capacities, empowering NRENs to deliver better services. I can summarize the lessons learned in three points:

1. Governmental and national support in terms of funding, sustaining and empowering NRENs remains the main challenge as an NREN can be better utilized by the country to achieve its national agenda and digital transformation, for example.
2. NRENs have to engage directly with scientists, researchers and students to identify their needs and address them collectively as well as promote their technologies and services.
3. NRENs must look ahead and rethink their roles, responsibilities and engagements as this is very important for securing funding and ensuring their sustainability.

**EUMEDplus is aligned with the Agenda for the EU's partnership for the Southern Neighbourhood. What does this mean for the partners and beneficiaries involved?**

**Tom**: One of the key elements in the new Agenda for the Mediterranean is the digital transition, which is naturally at the heart of the EUMEDplus project. This will come in a variety of guises, from improved connectivity for all beneficiaries including Medusa connectivity for North Africa; to the delivery of trusted authentication solutions so that end users can access data and resources seamlessly; to improved access to HPC resources, etc. For the partners and beneficiaries in the Arab region, this will increase their relevancy for their end user institutions. Tied to this is a focus on sustainability development for ASREN and the NRENs in North Africa and the Eastern Mediterranean, with the aim that all will be strategically placed to continue supporting their institutions and end users beyond the end of the project.

**Yousef**: EUMEDplus project, with its slogan, "Bridging the Mediterranean", aligns with the EU's partnership agenda for the Southern Neighbourhood. At ASREN, this means working to bridge the research and education communities with a focus on commonalities like engaging with CERN, EUMETSAT, Copernicus, LifeWatch ERIC etc... This aligns with the EU's vision by encouraging shared growth and development across borders. It also involves enhancing partnerships between NRENs through NREN twinning and exchange of practices and governance models, contributing to the EU's goals of regional cooperation and digital transformation. There will be efforts to establish common services delivery mechanisms and engage with EU Open Science initiatives, benefitting all parties involved.


**In the project, there is a big focus on gender equality and women empowerment initiatives. Could you give us an example of what is planned?**

**Yousef**: Women's empowerment and gender equality have always been key priorities for ASREN and our community, and as part of the EUMEDplus project, we are launching initiatives to support women and amplify their voices. One such initiative is the Women in STEM track to be planned along our annual conference, e-AGE, each year of the project. It will be a platform for interactive discussions, workshops, and knowledge-sharing sessions focusing on providing valuable insights and skills.

This year at e-AGE24 we will conduct a panel discussion, featuring women from the Arab region who will share their personal and professional journeys highlighting their success stories and how they navigate challenges to inspire other women in the field. The details shall be announced soon.

**Fast forward to 2028, how do you see the role of the NRENs and institutions involved in the project evolve?**

**Tom**: EUMEDplus will benefit from the expertise of project partners in the Arab region (AUB in Lebanon, CNSRT in Morocco, SESAME in Jordan) and Europe (CYNET and NORDUnet) in delivering the project outcomes. In addition, the beneficiary NRENs will be involved in delivering new or improved connectivity for institutions in their countries. This level of involvement gives ownership in the project to all involved for the benefit of all. I would like to think that this will help strengthen the sense of community within the project participants and beneficiaries and place the ASREN membership in the driving seat for the region beyond the end of the project.

**Yousef**: The current engagements of NRENs entails that our NRENs are evolving already. I am quite confident that they learned from the previous EUMEDCONNECT and AfricaConnect projects, and of course from COVID-19, that they have to take responsibility and to be proactive. Undoubtedly they face numerous challenges, many of which I trust that EUMEDplus project partners will address, especially the activities related to developing the governance of NRENs and engaging with policy- and decision-makers to further develop the national R&E infrastructures to utilize the Medusa capacity provided to each country in North Africa.

**What would you say to researchers and students in the Arab world directly benefitting from the project's impact? What can they expect?**

**Yousef**: Through ASREN and the Arab NRENs, EUMEDplus will be building the infrastructure, services and Open Science principles that will enable you to collaborate with colleagues nationally and internationally and carry out your research more effectively. Your contribution to driving solutions for your region's challenges is vital, and EUMEDplus together with your local NREN and ASREN are there to enable you in this.

My message to the researchers and students is different. Over the last two decades, ASREN and NRENs have worked to provide the connectivity you need to collaborate. Later, we realised the importance to enhance our services to meet your demands. Today, we are more engaged with you than ever, with the aim to better understand your needs so we can align our services and engagement accordingly. My message to you: help us define our future!

**Picture**
NRENs & GEANT at ASREN bi-annual meeting in Rabat, Morocco, 29th May 2024

# Orchestrate with Precision: Unlock Network Success Through Data Mastery

Imagine running a successful restaurant without a well-organised kitchen. Chaos would ensue: misplaced ingredients, delayed orders, and a compromised dining experience. Now, envision your network as that bustling kitchen. Just as a chef needs an orderly kitchen to deliver meals efficiently, network administrators rely on well-organised data for effective orchestration and automation. Efficient data organisation is akin to having a meticulously arranged kitchen - it streamlines operations, minimises errors, and ensures smooth functioning.

**Words:** Karl Meyer, GÉANT

Efficient data organisation is crucial for successful network orchestration and automation implementation. In network orchestration, accurate and real-time data about network components, their configurations, and performance metrics are essential for making informed decisions. Properly organised data ensures that network administrators and automated systems can quickly retrieve and interpret information, leading to more responsive and accurate management of network resources and services. For example, well-structured network topology data enables automation tools to easily identify and address configuration issues or optimise resource allocation without manual input.

In complex network environments, multiple tools are used for monitoring and management. Efficient data organisation combined with well-designed APIs (Application Programming Interfaces) allows for seamless integration and interoperability. APIs facilitate data exchange, enabling automation systems to access and manipulate information from multiple sources. This integration is crucial for automating complex network tasks and ensuring systems operate with consistent and accurate data.

## Organisation is Everything

Data integrity is vital for maintaining operational efficiency. Automation processes depend on predefined rules and data-driven logic to perform provisioning, scaling, and incident management. Structured and up-to-date data ensures automation tools work with reliable information, reducing errors and improving network reliability. Deduplication further supports this by maintaining a clean and accurate dataset. Even the best and most advanced tools for network service orchestration and workflow definitions will not meet expectations if the data is not well-managed.

One of the central components addressing the requirement of well-organised network data for orchestration and automation is a Source of Truth tool which describes the correct network state. NRENs already recognise the importance of using a Source of Truth tool by leveraging their in-house developed solutions or open-source tools such as NetBox or Nautobot.

**"One of the goals of the Network Development team within the GÉANT (GN5-1) Project is searching, testing and showcasing new network orchestration and automation solutions, including tools, APIs, data models and practices, to provide the community with the knowledge about the trends and approaches that could be applied in their implementations and operations."**

Ivana Golub, PSNC, GÉANT (GN5-1) Project Work Package Leader

The Network Development team, based on extensive experience and feedback from seasoned network engineers, developed Maat (named after Ma'at the Egyptian goddess of law, order, justice and balance) — a new single Source of Truth tool that addresses gaps in existing solutions and provides a standardised API and flexible data model grounded on data integrity and efficiency. Designed to enhance network management and automation, Maat's approach to data organisation includes advanced features that effectively handle complex and evolving network environments. Hence, the Polish NREN has chosen Maat as the single Source of Truth for their PIONIER network.

**"Maat showcases how structured data, combined with advanced tools and practices, can lead to more effective network management, network planning and reduced amount of mistakes and configuration errors at the operational level."**

Tomasz Szewczyk, Senior Network Engineer at PSNC

In conclusion, efficient data organisation is foundational for successful network orchestration and automation implementation. It ensures critical information is accessible and accurate, supports reliable automation processes, and facilitates integration among management tools through APIs.

By applying the principles of data integrity and powerful APIs, you can transform your network management into finely tuned orchestrated operations, much like turning a disorganised kitchen into a five-star culinary heaven.

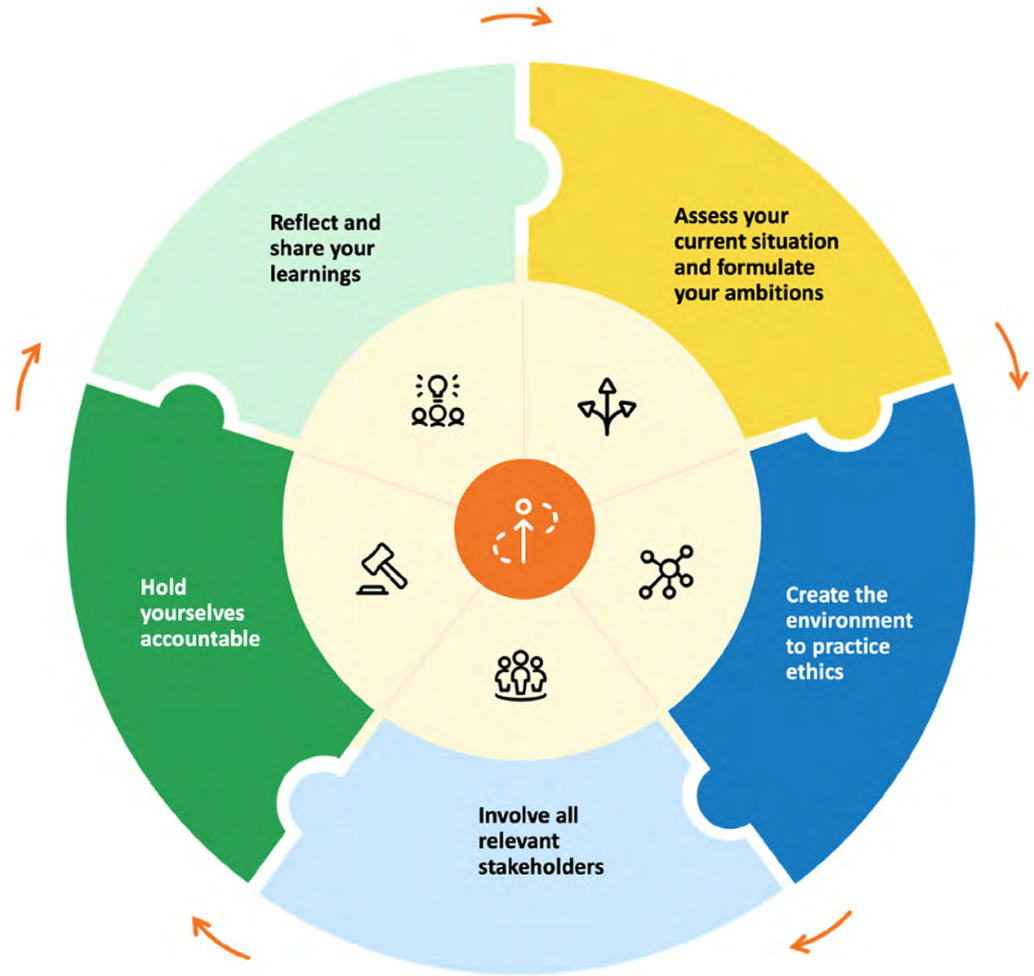
Learn more about Maat or try a demo at **geant-netdev.gitlab-pages.pcss.pl/MaatDocs**

# Responsible tech:

## how to ensure that new technologies meet public values

How do we deal with new technologies responsibly, in a way that respects public values? Discussing this can shape technologies that preserve autonomy, justice and humanity. The SURF publication Responsible Tech provides tools you can apply immediately. And our latest paper zooms in on quantum; a rapidly evolving technology that brings both amazing possibilities and significant risks.

**Words:** Duuk Baten & John Walker, SURF




Responsible Tech: On Public Values and Emerging Technologies explores responsible decisions in the digital transformation of education and research. This is needed as the growth of artificial intelligence (AI) and extended reality (XR) sets in motion massive changes. With this paper, we aim to facilitate the conversation. What is desirable for the near and distant future of education and research? And where do we as the education and research sector collectively want to go?

### Using emerging technologies with an eye on public values

Emerging technologies are innovations whose development paths and potential applications are still uncertain. In a world of increasing digitalisation and vendor dependence, it's not a given that these technologies are being developed with an eye on safeguarding our public values.

Public values guide us and help us make the right decisions in preserving autonomy, justice and humanity. Responsible tech looks at how we can achieve that. It merges the discussion around public values with the specific challenges posed by new technologies.

### Get started with responsible tech

How do we ensure that the applications we develop and use work according to our values? How can we take responsibility for the impact of applications on end users? And how do we make sure we include these questions in our innovation processes?

Our discussion paper outlines the current situation, where we see both rapid advances and high risks. It also provides a clear step-by-step approach with which education and research institutions can shape their own responsibility and make an informed start with responsible tech.

Here, responsibility is not a theoretical concept, but a practical skill. For every step towards responsible tech, the paper offers hands-on tools that you can immediately try out in practice.

### The impact of quantum on research and education

Quantum technologies are rapidly evolving, and SURF plays an active part in developments such as quantum computing and quantum internet. These technologies present both amazing possibilities and significant risks. Our latest report Towards Responsible Quantum Technologies: Where to look when preparing research and education for quantum technology? explores how we can responsibly embed these technologies in research and education.

By addressing key questions around security, accessibility, and ethical responsibility, this report helps us prepare for the potential impacts of quantum on scientific practices, data security, and educational systems. In line with our commitment to responsible tech, this report is a first step in understanding and shaping the future of quantum technology to ensure it aligns with public

### Find out more

Do you want to dive deeper into responsible tech? Download the **discussion papers** on SURF's website. Or watch **Duuk Baten's presentation** on Responsible tech at TNC24. If you have questions, send an email to **responsibletech@SURF**.

cesnet

# Pushing the boundaries of distance: CESNET's MVTP technology enables real-time music collaboration over distances of thousands of kilometres

During this year's Network Performing Arts Production Workshop (NPAPW), held at the Lithuanian Conservatory of Music and Theatre (LMTA) in Vilnius, two unique musical performances were presented over the GÉANT network using the low-latency MVTP (Modular Video Transmission Platform) technology developed by CESNET.

**Words:** Dr. Ing. Sven Ubik, CESNET

## A Jazz Duo and Classical Trio Showcase MVTP's Capabilities

The first performance, the Global Jazz Café, connected a pianist Jan Pudlák at HAMU (The Academy of Performing Arts in Prague, Music and Dance Faculty) in Prague and a trumpeter David Spencer in Vilnius, who performed several music pieces together. The second performance brought together musicians from three academies. The piece by the famous Czech composer Bedřich Smetana - Piano Trio in G minor Opus 15, third movement - was performed together by pianist Jakub Klánský at HAMU in Prague, cellist Tomáš Jamník at JAMU (Janáček Academy of Performing Arts) in Brno and violinist Jakub Pronskus at LMTA in Vilnius.

Another distance collaboration between musicians over the GÉANT network will take place this October between MDW in Vienna and HAMU in Prague. The joint concert will also be broadcast live to the music festival in Hong Kong.

Last year, the longest real-time collaboration at NPAPW took place in Memphis, where David Spencer in Memphis and Jan Pudlák in Prague performed together using MVTP technology over a distance of 8,000 km. The presented jazz ballad, with the provocative title The Nearness of You, added a playful touch to the performance.

**Pictures**
Top right: Testing connection before the performance

Bottom right: Rehearsal for musicians and technicians

## Award-Winning Innovation in Low-Latency Technology

Following its recognition with the Europa Nostra Award in 2020, CESNET's MVTP technology was also honoured with the Czech Head Award in the industry category for the most innovative product developed in the Czech Republic.

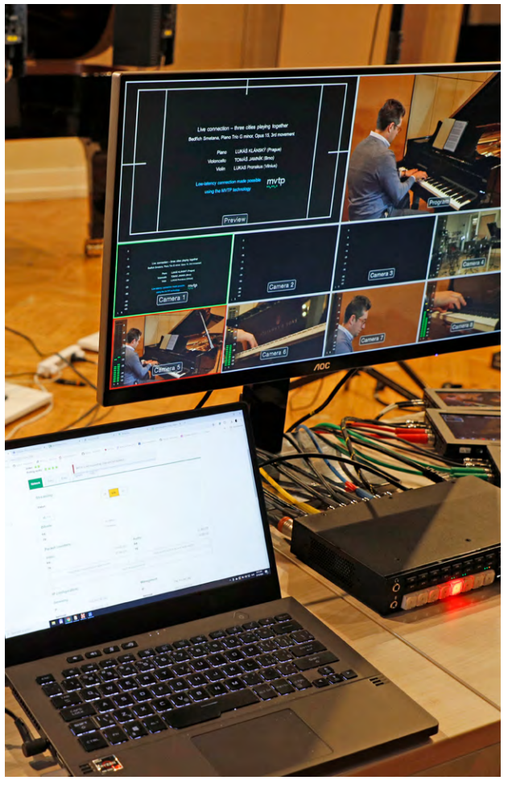
## Minimal Latency, Maximum Quality: How MVTP Brings Musicians Together

The current version of CESNET's MVTP technology allows multipoint audio-visual connections with the added latency of approx. 3 milliseconds. Together with the network latency over GÉANT, the total latency corresponds to the acoustic sound propagation over a distance of just a few metres. Musicians in several different cities and countries can thus perform together as if they were on a common stage. The advantages are the ease of use and the possibility to use multiple cameras in each location. Two or four cameras can be transmitted simultaneously, depending on the type of MVTP device. Additional cameras can be switched in real time. It is thus possible, for example, to transmit a separate channel for the musicians and switch multiple cameras for the audience, which makes the performance more attractive.

## Inside the Technology: MVTP's Key Features

The technology is based on the Field Programmable Gate Array (FPGA), which allows minimal added delay in both audio and video processing. The image is transmitted with JPEG XS compression, which provides quality visually indistinguishable from the original with a latency of only a few tens of image lines. The device also allows for automatic image correction at the codestream level when packet losses occur, with no additional added latency. Two versions are available for sale or trial, with HD and 4K resolution, the latter is upgradable to 8K. A third simpler version with a lower price will be available shortly. We will also be happy to assist music academies and musicians in arranging your distance connections.

More information about the technology and examples of its use over the GÉANT network can be found at **mvtp.cesnet.cz**.



# GRENA Unveils Groundbreaking Project to Revolutionise OpenStack Cloud Management

The Georgian Research and Educational Networking Association (GRENA) is excited to announce the development of the Business Platform for OpenStack Clouds (BP-OSC). This innovative, all-in-one solution is designed to transform OpenStack cloud management, making it more accessible and efficient for both private and public sectors.

**Words:** Tamara Gvenetadze, GRENA


**Picture**
Nino Tsulaia, Senior Developer at GRENA

## What are the benefits of BP-OSC?

BP-OSC simplifies operations as it integrates essential features like customisable web interfaces, robust billing systems and comprehensive analytics into a seamless, user-friendly experience. It's highly customisable as cloud providers can easily incorporate their corporate identity through visual branding and flexible pricing models, ensuring services align perfectly with business needs.

As a Software as a Service (SaaS) platform, BP-OSC eliminates the need for additional hardware, allowing organisations to focus on their core activities without the burden of complex infrastructure management. In addition, BP-OSC maintains strict adherence to OpenStack standards, ensuring compatibility and reliability. Developed by GRENA with the support of the GÉANT Innovation Fund, BP-OSC is tailored to meet the specific needs of the GÉANT R&E community and beyond.

## Potential impact

BP-OSC is set up to drive significant innovation in the cloud services landscape, enabling organisations to deliver advanced cloud solutions more cost-effectively. In addition, by offering a ready-to-use, customisable, and highly efficient cloud management platform, BP-OSC opens up new revenue opportunities for cloud providers. The platform will be particularly beneficial for research and educational organisations as it will facilitate the seamless delivery of cloud services to their customers. Nino Tsulaia, Senior Developer at GRENA, comments: "The objective of the BP-OSC project is to develop an all-in-one solution for OpenStack cloud management. The project will deliver a powerful platform for organisations, particularly for GÉANT (GN5-1) Project participants who have deployed or are willing to deploy OpenStack clouds. The goal is to facilitate the seamless delivery of cloud services to customers, primarily research and educational organisations. The platform is open to all interested organisations planning to utilise OpenStack cloud as their preferred cloud solution." Years of participation in the EaPConnect project as a beneficiary partner have enabled GRENA to develop a cloud platform consistently in demand by Georgian research and education institutions. The successful bid for funding through the GÉANT Innovation Fund testifies that the project's impact will extend beyond its duration, fostering the growth and sustainability of GRENA.


# From Crisis to Classroom: Teaching Crisis Management

CONNECT meets Vladislav Bidikov to learn how the experience of CLAW, the Crisis Management exercise for the R&E community, inspired him to design and develop a course for university students. Vladislav is a senior system engineer and cybersecurity expert at the Faculty of Computer Science and Engineering (FCSE) at Ss. Cyril and Methodius University in Skopje, North Macedonia.

**Interview by:** Rosanna Norman, GÉANT

Picture
Vadislav Bidikov

### Vladislav, how did you become involved in the CLAW workshops?

My first CLAW experience was in 2019 in Poznan and, although I joined as a regular participant, I was given the opportunity to be part of the actual exercise team. The rest, as they say, is history. Since then, I have been involved in the CLAW exercise and enjoy every single moment.

### Can you describe a particularly memorable or impactful moment from a past CLAW workshop?

There isn't just one memorable or impactful moment; there are so many over the years that I have almost lost count. I will highlight two: the first online CLAW during the challenging pandemic months and the first CLAW after the pandemic in Poznan. I was inspired by the enthusiasm and collaboration within the team, united by the objective to make the experience memorable, inclusive, and fun for all participants.

### How have you integrated the lessons and exercises from CLAW into your university teaching?

Last year, we included "Introduction to Cybersecurity" as part of the regular faculty curriculum and decided to adapt the CLAW 2023 exercise for student use. This meant adapting the scenario and materials to be conducted in parallel with multiple groups in a traditional classroom environment. The main tool, developed over the years with the code name Clawhammer, was central to the exercise's success. We also adapted the video material to compress the exercise into a shorter 90-minute slot. To further inspire our classroom, we involved our best students enabling them to play the role of exercise leaders. The event spanned over a week, repeating the improved CLAW FCSE version each day according to the groups' requirements. In the end, the week was a complete success.

### What feedback have you received from students who have participated in these exercises?

The students were very involved in the exercises, some of the most committed and interested are already planning and providing ideas on how we can improve the course for next year. They found the exercise fun and full of valuable experiences they can use in handling a crisis. They felt that it was quite realistic and that it seemed to recreate a real-life situation.

### Can you share an example of how a students applied what they learned from CLAW in a real-world situation?

As our students are still going through their higher education, I believe they have already used, and will use the experience from the exercise in their real-life faculty activities, especially during exams. As technology becomes more involved in the teaching process, they are now acquiring the skills to handle and cope with future crises. We also see interest from the more passionate students in further developing their skills in this area of cybersecurity and even selecting crisis management as their future career path.

### What has been the most rewarding aspect of your involvement with CLAW?

Since my involvement in CLAW spans several years, I see it as a perfect example of how an original idea has evolved into a tool that allows collaboration and the development of customised crisis exercises. I hope my participation continues as CLAW evolves, maintaining the ultimate goal to enable every NREN and educational institution to utilise and develop crisis exercises tailored to their needs. From the beginning of my involvement with CLAW to the present day, I remain impressed by the amazing team effort behind the organisation of this event, which is undoubtedly the most rewarding aspect of my participation.

For further information about CLAW 2024, visit: **security.geant.org/claw-2024**

# SUBMERSE Project Advances Data Management with Dynamic Planning

Picture
Credits to Tom Vierus and Ocean Image Bank

To manage a complex data flow, the SUBMERSE project employs an iterative approach to FAIRification and Data Management Plan creation, evolving with their growing understanding of the data and its dynamics.

**Words:** Anne Rahbek-Damm, DeiC

The SUBMERSE project is making significant strides in the collection and management of oceanic data. By utilising submerged fibre-optic network cables, the project streams and processes enormous amounts of initially unintelligible data from the ocean floor. This data, which includes sensitive information such as ship and submarine movements, is continuously analysed, filtered, and managed in real time. Most of it is discarded, some stored temporarily, and a tiny fraction preserved in FAIR (Findable, Accessible, Interoperable, Reusable) repositories.

**"This type of data collection is a great example for the need of interdisciplinary work and collaboration both on the researcher's side, where the same data is used by multiple different domains, but also on the technical side. The project includes specialists for network, computing, data management and security"**

Hannah Mihai, Data Management Consultant in DeiC

## The Necessity of a Dynamic Data Management Plan

To handle this complex data flow, SUBMERSE requires a Data Management Plan (DMP) that evolves with the project. As data understanding improves, the DMP is updated to reflect better management practices. This process involves representatives from various organisations within SUBMERSE who collaborate to transform raw data into intelligible "data products" such as rapid earthquake detections, tsunami warnings, whale migration patterns, and non-military shipping intelligence.

## Iterative FAIRification and DMP Development through Workshops

Supporting good data management practices, the SUBMERSE project engages in FAIRification, which enhances the Findability, Accessibility, Interoperability, and Reusability of its digital assets – the data. Given the impracticality of making all data FAIR, the focus is on gradually increasing the utilisation of valuable data by FAIRifying meaningful bits before submission to repositories.

FAIRification and DMP creation in SUBMERSE are iterative processes involving continuous debate and redrafting based on changes in data understanding and flow. This iterative approach was highlighted in two key workshops held towards the start of the project.

The first workshop provided a platform for researchers to articulate their instrumentation understanding and data needs while exploring strategic possibilities. Discussions emphasised the importance of secure data storage and the challenges of data management, particularly the scrubbing of sensitive data. Balancing data security with accessibility emerged as a key consideration.

In the second workshop, feedback was gathered to refine the DMP further. This session initiated discussions on potential uses of SUBMERSE instrumentation and the development of "SUBMERSE products" that the DMP should focus on. The collaborative effort led to the submission of the first SUBMERSE DMP towards the end of 2023, demonstrating a collective commitment to effective data management practices.

## Key Findings and Insights

The refined DMP emphasises secure data storage, short-term buffering, and evolving the scrubbing methodology to filter out sensitive information late in the data flow to maximise research potential. The DMP also recognises the diversity of metadata standards and file formats across varied research communities, ensuring inclusivity and usability.

## Future Directions and Ongoing Collaboration

Looking ahead, the Data Lifecycle task will continue to foster synergies with other project efforts. Collaboration with the Ethics and Security Task and the Security Advisory Board is prioritised to ensure that researchers' needs remain central, despite security considerations. The task will monitor scientific and technical developments to offer support and guidance on data management issues, adjusting the DMP as data transitions from unintelligible noise to valuable information.

As the project progresses, the iterative development of a robust DMP, continuously updated until the project's end, is essential to ensure that collected data is FAIR and can be used efficiently.

More on **submerse.eu**

# SUBMERSE project contributing to the UN Ocean Decade and UN Sustainable Development Goals

We find ourselves right in the middle of what the United Nations has declared the Ocean Decade running from 2021 to 2030 and recognising the – at first glance – slightly astonishing statement that the quality of our human life on land largely depends on the state and specifically the health of our oceans.

**Words:** Cathrin Stöver, GÉANT

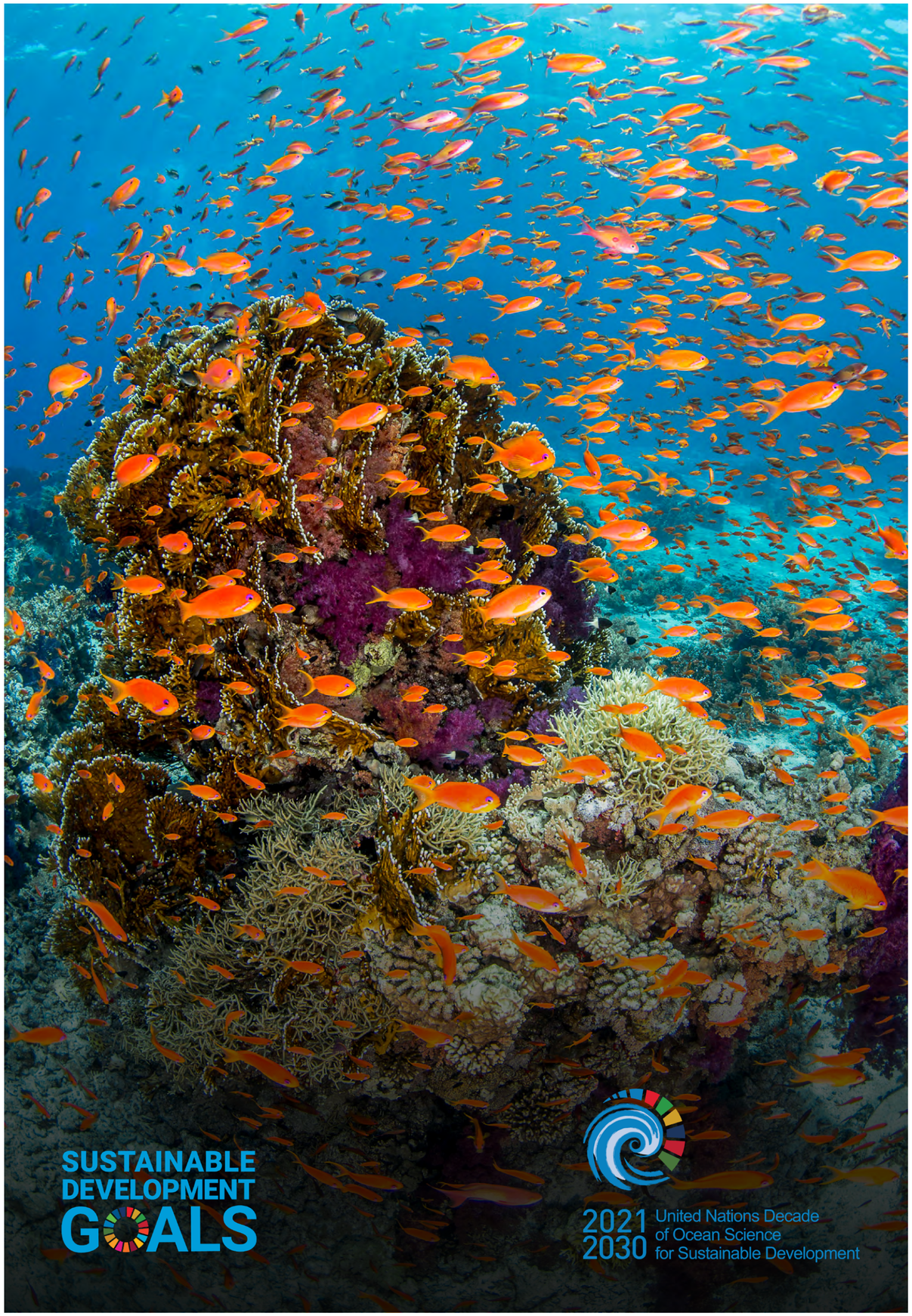
Looking at oceanic research, we realise that here scientists explore one of our last “new frontiers”. Deep sea exploration triggers our interest, confronts us with the unknown and the untamed as perhaps only deep space exploration can match. It is a fact though, that we know less about our oceans’ floors than we know of our moon.

The SUBMERSE project is uniquely situated to contribute to the Ocean Decade and the exploration of this new frontier by making oceanic data available that we have never been able to collect before. The project makes use of six distinct data collection sites across Europe: from the Ionian Sea to Svalbard and across the Atlantic, sensors have been installed on submarine cables owned by the project partners. At these data collection sites, SUBMERSE employs Distributed Acoustic Sensing (DAS), Polarimeter and the State of Polarisation (SOP) technology to collect entirely new research data sets for Oceanography, Seismology, Marine Biology or Tsunami monitoring.

And with this data collection SUBMERSE opens the door to contribute to Seismology research and Tsunami Monitoring in entirely new ways. An early example of the potential of SUBMERSE was highlighted when last October and immediately after the installation of DAS equipment in the cable landing station in the island of Madeira, SUBMERSE could prove itself by detecting seismic waves. Unlike traditional seismic stations which provide ground acceleration measurements, the DAS equipment allows the measuring of stretch and strain at many points along the cable, i.e. using the movement of the cable itself to detect these waves. Such data collected and curated will be feeding into vital Tsunami warning systems which in turn addresses at least four of the United Nations’ Sustainable Development Goals (SDGs).

Furthermore, SUBMERSE also meets SDG14 (Life Below Water) by providing seabed data with relevance to marine life, with relevance and effects to climate change and interestingly also of human activity close to the ocean floor. SDG9 (Industry, Innovation and Infrastructure) is supported by building the proof of concept for resilient detection systems based on submarine cable infrastructure, while SDG13 (Climate Action) is supported by adding data sets to foster the protection, conservation and responsible use of our marine resources.

Returning to the Ocean Decade and its 10 challenges for collective impact, SUBMERSE not only meets Challenges 5 (ocean-based solutions to climate change) and 7 (expand the Global Ocean Observing System), but very much also the ultimate challenge 10 – changing humanity’s relationship with our oceans, increasing our knowledge and building our awareness of the interdependencies between the health of our oceans and the sustainability of our life on land.




**Picture**
Credits to Renata Romeo and Ocean Image Bank

# The man who connected everything

During his lifetime, Buckminster Fuller became one of the most famous people in America, appearing on the cover of TIME magazine, receiving the Presidential Medal of Freedom and featuring in the famous 'Think Different' marketing campaign for Apple Computers. His friend and collaborator, the renowned British architect Lord Norman Foster, called him "one of those rare individuals whose way of thinking fundamentally influences the way that one views the world."

**Words:** Ezri Carlebach

Guest contributor **Ezri Carlebach** takes a look at the story of the man who connected everything

Richard Buckminster Fuller was born into a well-to-do family in Milton, Massachusetts, in 1895. At birth he was cross-eyed, a result of serious hyperopia – farsightedness – which was not corrected until he was four years old. As a result, in his infancy he literally viewed the world differently, seeing only blurry shapes in his close vision. Known as 'Bucky' from a young age, he acquired a passion for making things and loved to study machines and industrial processes. Despite being both intelligent and diligent, Bucky struggled with the constraints of standard educational settings, leading to a lifelong advocacy for curiosity over curriculum in teaching and learning. He was twice expelled from Harvard University because he skipped lectures to spend time in an engineering workshop. Yet he went on to receive 47 honorary doctorates and an Honorary Fellowship from St Peter's College, Oxford, among many other awards.

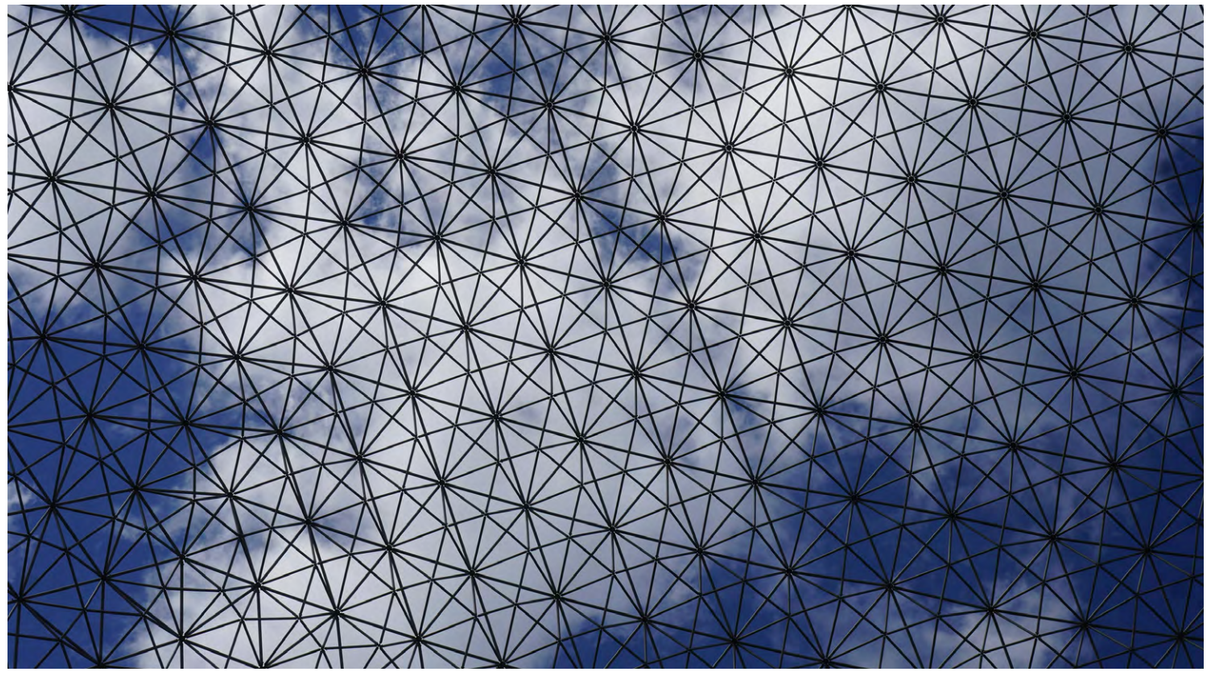
Fuller first made a name for himself with a radical design for industrially produced houses. Although never licensed to practice as an architect, he was inspired by the modernist philosophy of Swiss-French architect Le Corbusier. Fuller coined the term 'Dymaxion' to describe his vision of mass-produced, easily distributed and assembled homes. Dymaxion – a combination of 'dynamism', 'maximum' and 'ion' – is typical of the inventiveness he brought to his vocabulary, as much as to his design work and overall philosophy. Fuller also designed and built prototypes of a Dymaxion car, a sleek three-wheeled vehicle with exciting potential but limited stability. Although the car attracted great interest, a fatal crash involving the original prototype exacerbated Fuller's early financial problems. Investors were wary of the novelty of Dymaxion products, and, frustrated by the seeming inability of others to understand his concepts, he alienated wealthy backers who offered to help.

In the 1920s and '30s he popularised the then little-known terms 'ecology' and 'synergy', and introduced the concept of 'ephemeralization' in his 1938 book, Nine Chains to the Moon. The unusual title is an indication of Bucky's divergent thinking. He calculated that the world population at that time, if standing on one another's shoulders to form a 'chain', would require nine such chains to reach the moon. Writing many decades before the advent of digitalisation, artificial intelligence, virtual reality, and so on, Fuller describes how "all progressions are from material to abstract, by which we mean intangibility, non-sensoriality, EPHEMERALIZATION." Efficiency means doing more with less; therefore, he argued, "EFFICIENCY EPHEMERALIZES" (the use of upper case letters is another distinctive Bucky trait).

The last three chapters of Nine Chains to the Moon are taken up by a remarkable science fiction story, in which an alien from the planet 80 XK 23 materialises through a radio hobbyist's set. The alien proceeds to explain a depersonalised, rationalist philosophy which will lead the people of Earth to abandon their competitive "you or me" dogmas in favour of collaborative "you and me" approaches. The story anticipates Fuller's declared mission statement, which was no less than to "make the world work for 100% of humanity in the shortest possible time through spontaneous cooperation without ecological offense or the disadvantage of anyone." Throughout his extraordinary career, Fuller maintained this optimism about humanity and technology.

He is now best known within academic design circles and among the high-tech cognoscenti, perhaps because he left a legacy so broad and complex that it can be hard to grasp all its connections. He met and influenced – to varying degrees – an astonishing range of people, including Albert Einstein, Amelia Earhart, Frank Lloyd Wright, Eleanor Roosevelt, Samuel Beckett, Marshall McLuhan, Indira Gandhi and Steve Jobs, to name a few. His ideas can be traced through everything from climate change science to mass communications, architecture, systems theory and design research. He was an early proponent of Universal Basic Income, wrote poetry to express

**Picture**
R. Buckminster Fuller stands in front of a depiction of his domed city design at its first public showing at a community meeting in East St. Louis, Illinois



the value of computers, and argued passionately for scrapping all military expenditure in favour of social and educational projects (he once pointed out that removing global energy distribution networks and industrial machinery would lead to mass starvation, while removing politicians and their ideologies would not cause anyone to go hungry).

But it was Fuller's interest in geometry which led to the design for which he is most famous – the geodesic dome. Fuller had worked on geodesic structures since the 1940s, sketching a curved lattice shell made of interlocking triangles in 1948. That year, he also began a teaching role in the experimental arts and design centre at Black Mountain College, where he encouraged students, most notably Kenneth Snelson, to develop the possibilities of geodesic domes for building projects. He also struck up a lifelong friendship with the composer John Cage, who was creating ambitious mixed-media performances at Black Mountain with choreographer Merce Cunningham. Fuller even acted in Cage and Cunningham's staging of Erik Satie's absurdist drama The Ruse of Medusa, and claimed that what he learned from the experience shaped his idiosyncratic public speaking style.

**Pictures**
Top left: Biosphere aerial geodesic dome in Montreal, Canada

Top right: Geodesic dome, based on a design by Buckminster Fuller, at the University of Surrey

As geodesic domes popped up in various settings (including a Berlin planetarium built in 1925, the influence of which on Fuller remains a subject of conjecture), Fuller's fame spread internationally, leading to invitations from governments, businesses, colleges and universities. In 1967 alone he lectured in Iraq, Lebanon, Mexico, Syria and the UK, as well as giving hundreds of talks in the US and overseeing the creation of a geodesic dome to house the USA Pavilion at Expo '67 in Montreal, Canada. Fuller wrote extensively about the future of education, notably the 1962 essay Education Automation in which he foresaw the potential of globally distributed educational systems, such as those we now take for granted thanks to the Internet. "You are faced with a future in which education is going to be number one amongst the great world industries," he declared, "within which will flourish an educational machine technology that will provide tools such as the individually selected and articulated two-way TV and an intercontinentally networked documentaries call-up system, operative over any home two-way TV set."

He also argued against the growing bias towards hyper-specialisation in advanced studies, offering comprehensive, design-led methodologies instead. This was evident in the term 'comprehensive anticipatory design science', which he coined in a 1955 conversation with Jonas Salk, developer of the polio vaccine, who asked him what name he gave to his wide-ranging interests. In assessing Fuller's legacy, philosopher Jonathon Keats – one of Bucky's many biographers – challenges the possibility of teaching comprehensive anticipatory design science as a subject, because it "simply isn't possible within a given head". Therefore, comprehensive anticipatory design science must 'infiltrate' education systems globally, so that a critical mass of people absorbs at least some of its tools and grasps its potential for transformational systemic change. At the same time, "committed design scientists", says Keats, must follow Fuller's path of "eclectic self-education".

Fuller's daughter, Allegra Snyder Fuller, and her family, have introduced Bucky's ideas to new generations through the Buckminster Fuller Institute (BFI), set up shortly after Bucky died in 1983. With a mission echoing Bucky's, "to make the world work for all of life, in the shortest possible time, through spontaneous cooperation", the BFI runs projects in education, research and activism. Describing the work of the Institute in a 1998 interview, Snyder Fuller noted her excitement at "the institute acting as a network within a network, within a network, within a network, connecting and interconnecting people." It offers an intriguing parallel with the work of GÉANT, which connects NRENs internationally as they connect their national universities, colleges and research institutions, which then connect the individuals within them.

In 1975 Bucky was asked to address the question, "where will the world be in 2025?" His response called for a shift in pedagogy from learning facts to becoming problem solvers. This, he argued, was necessary for 2025 to be a year of peace and prosperity at unprecedented levels. "Such words as politics, war, weapons, debt," he predicted, "will be only of historical significance." With 2025 almost upon us, the state of the world might make Fuller's optimism appear naïve. However, he showed that most, if not all, of the conditions needed for global peace and prosperity already exist. And he emphasised the role of each and every individual, above those of governments, institutions and ideologies, in achieving them. In my own work, I have encountered and encouraged both design-led policy and the use of design methodologies by civil society organisations, think tanks and professional bodies in their efforts to influence public policy. It strikes me, as we enter the second quarter of the twenty-first century, and inspired by Bucky, that we urgently need a movement for comprehensive anticipatory design science to replace, or at the very least form a significant part of, policy making, in every imaginable sphere.

Bucky was very quotable, yet if you search the Internet for 'Buckminster Fuller quotes' the most common result is actually apocryphal. Nevertheless, it could serve as a rallying call for anyone sharing Fuller's belief that humanity can use its unique capabilities to make the planet it inhabits peaceful, sustainable and inclusive of all living things. "You never change things by fighting the existing reality," he is reputed to have said. "To change something, build a new model that makes the existing model obsolete."

## Selected further reading

Details of all Bucky's books can be found on the website of the Buckminster Fuller Institute, **www.bfi.org/**. The following are particularly recommended: *Nine Chains to the Moon; Operating Manual for Spaceship Earth; Education Automation; Critical Path*.

Books about Buckminster Fuller:

Keats, J. 2016. *You Belong to the Universe: Buckminster Fuller and the Future*. Oxford University Press.

Kenner, H. 1974. *Bucky: A Guided Tour of Buckminster Fuller*. Morrow Paperback Editions.

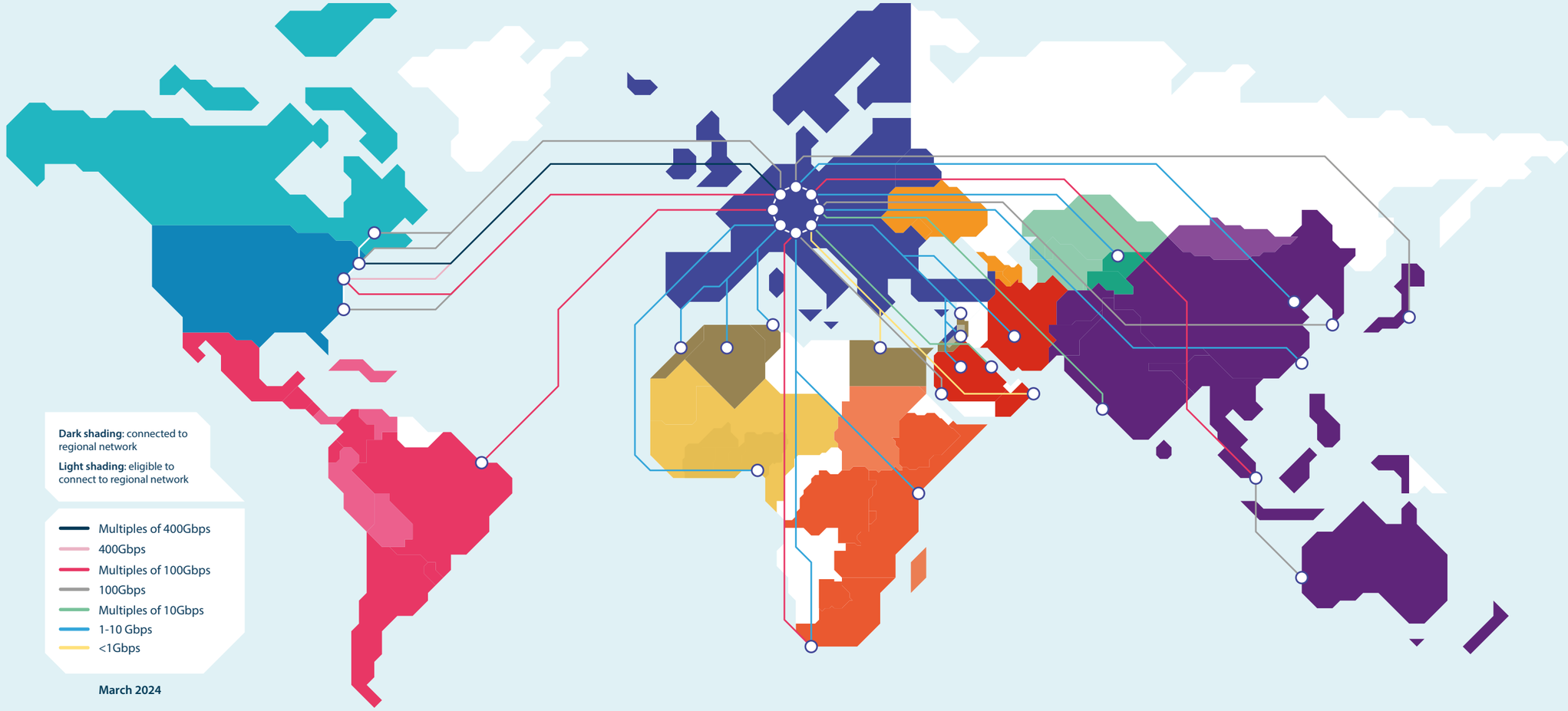
Nevala-Lee, A. 2022. *Inventor of the Future: The Visionary Life of Buckminster Fuller*. Dey Street Books.

Buckminster Fuller famously declared, "Call me trim tab". He believed that even the smallest decision can have a profound impact on the future, just like a trim tab – a small device which can completely change a ship's direction. Ezri explained the quote in an interview for the FIR business communications podcast. You can see a short extract from the conversation at **bit.ly/trimtabezri**.

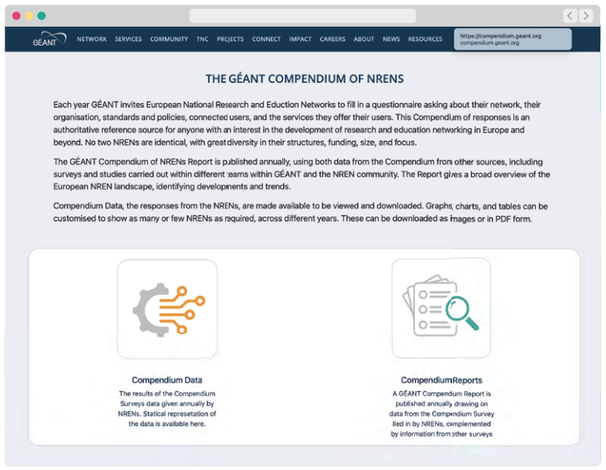
# GÉANT at a Glance

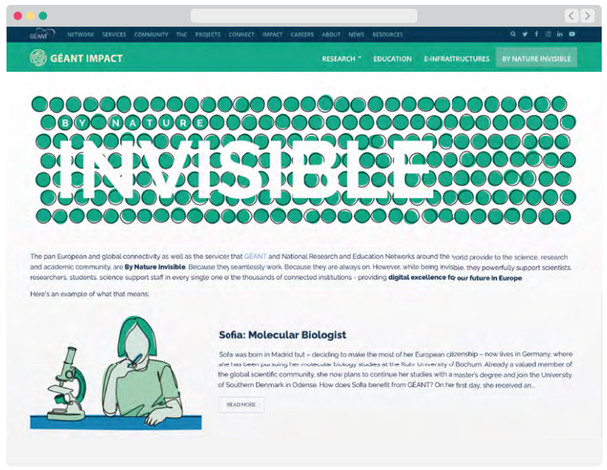
**We're bringing you greater content across a wider range of channels: from our Annual Report to showcasing the amazing research projects the GÉANT community supports. And CONNECT is online (connect.geant.org) and you can sign up to our weekly newsletter. You can also get involved on social media – see you online!**

GÉANT is Europe's leading collaboration on network and related infrastructure and services for the benefit of research and education, contributing to Europe's economic growth and competitiveness. We develop, deliver and promote advanced network and associated e-infrastructure services, and support innovation and knowledge-sharing amongst our members, partners and the wider research and education networking community. Together with our NREN partners, we interconnect 50 million users at 10,000 research and education institutions; and via extensive global partnerships and GÉANT-managed networking projects, reach over 100 countries worldwide.




March 2024




Canada & USA
Latin America
Europe
North Africa & Eastern Mediterranean
West & Central Africa
Eastern & Southern Africa
Central Asia
Asia-Pacific
Other R&E Networks

GEANT.ORG
@GEANTCOMMUNITY
LINKEDIN.COM/COMPANY/GEANTNETWORKS
GEANTtv
GEANT_COMMUNITY
@geant@mstdn.social

GÉANT
Networks • Services • People

www.geant.org

This magazine is published by GÉANT, as part of GÉANT projects GN5-1 and GN5-IC1, which have received funding from the European Union. The content of this magazine is the sole responsibility of GÉANT and can under no circumstances be regarded as reflecting the position of the European Union.

CONNECT/1024