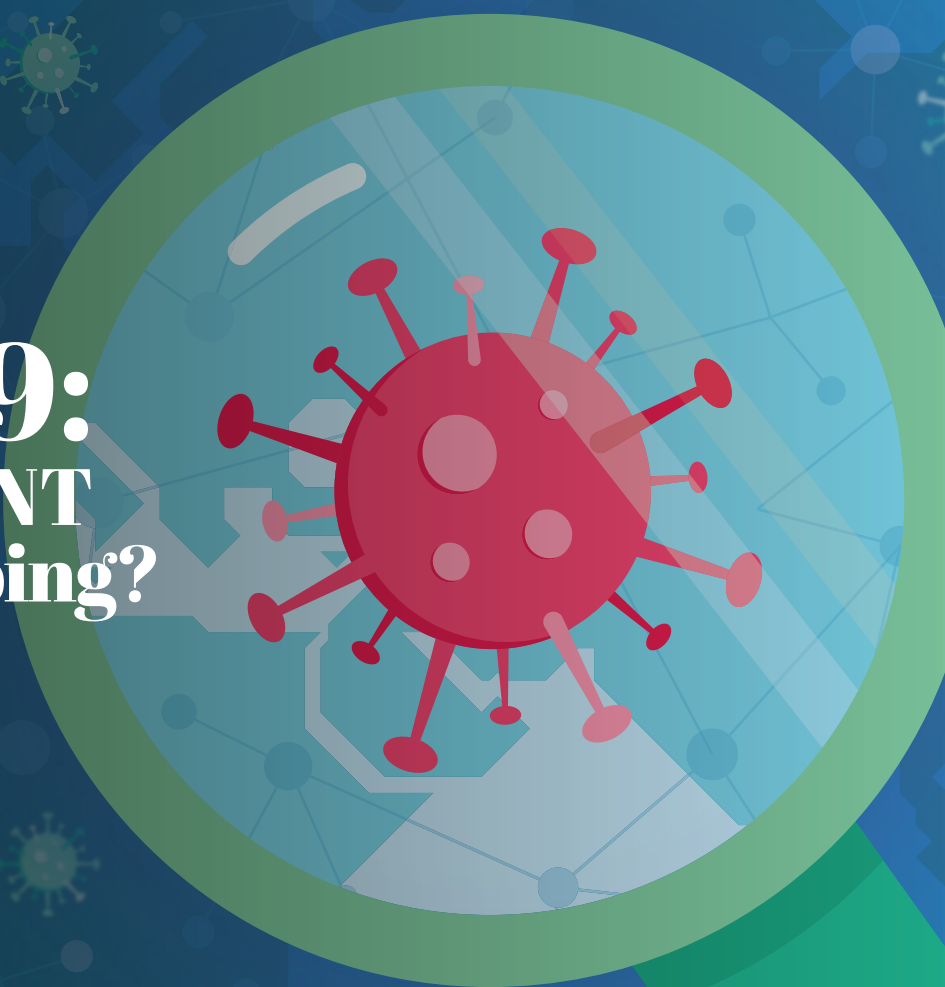


CONNECT

THE MAGAZINE FROM THE GÉANT COMMUNITY | ISSUE 34 2020

COVID-19: How is the GÉANT community helping?



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CONNECT INTERVIEW:
RENÉ BUCH, CEO
NORDUNET

AFRICACONNECT3:
CONNECTING AFRICA
TO UNLIMITED
POSSIBILITIES

CONNECT INTERVIEW:
ROLF APWEILER,
DIRECTOR EMBL-EBI



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Welcome from Cathrin Stöver

In CONNECT issue 33, I wrote: 'Like never before, the world in which we live is subject to endless threats wherever we are and no matter how safe we feel within the confines of our institutions.' At the time I was referring to cybersecurity.

How little was I prepared for 2020! The COVID-19 pandemic has turned all of our lives upside down and is challenging and testing us in an unprecedented way. Yet at the same time it serves to remind us every day of the wonderful, inspiring community we are all part of. So yes, we are #missingTNC. And yes, virtual meetings (even with pets) are maybe efficient, but also rather lame. And of course, we are still just at the beginning of this "new normal". But to see the way in which our community continues to step up, continues to excel, and continues to make such a difference to the scientists, researchers, teachers, students and many more who rely on us all is really quite something. We have highlighted several of these efforts in this issue and many more on our connect.geant.org website, and I draw your attention in particular to the excellent interview with EMBL-EBI's Rolf Apweiler who explains the COVID-19 research platform and stresses the need for open science and FAIR data.

Elsewhere in this issue, we hear from NORDUnet CEO René Buch and his views and passions; we highlight the launch of AfricaConnect3, the next phase in the successful AfricaConnect project; we explain how the GÉANT community is supporting the United Nations' Sustainable Development Goals; and we shine a light on this year's Community Award winners – the perfect way to illustrate our inspiring community! Stay safe, and enjoy the issue.

Cathrin Stöver, 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 GÉANT Association, the GN4-3 project, and from our NREN and regional partners. The planning, production and editing is performed by a small team highlighted below.

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This magazine is published by GÉANT, as part of GÉANT Specific Grant Agreements: GN4-3 (No. 856726), GN4-3N (No. 856728), and BELLA-S1 (No. 731505), which have received funding from the European Union's 2020 research and innovation programme under the GÉANT2020 Framework Partnership Agreement (No. 653998).

The following projects mentioned throughout the magazine also receive funding from the European Union: AfricaConnect3, CAREN3, and Asi@Connect (DG DEVCO), EaPConnect and EUMEDCONNECT3 (DG NEAR).

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GÉANT and our NREN partners in the fight against COVID-19

As countries across the world have watched in horror at the spread of the coronavirus, scientists across the world have come together, stronger than ever, focusing their considerable resources on understanding and fighting the virus.

Underpinning this worldwide collaboration and data-intensive research, GÉANT and our NREN partners have continued to deliver high-reliability, high-speed, high-bandwidth connectivity and vital access services that enable teams from different organisations, countries and continents to work together.

In particular, services are being provided for key COVID-19 research initiatives supported by the European Commission – including the European Molecular Biology Laboratory European Bioinformatics Institute (EMBL-EBI) COVID-19 research initiative, the 18 research and innovation

projects on coronavirus, the Research Data Alliance (RDA) COVID-19 Working Group and the Virus Outbreak Data Network (VODAN).

Alongside scientific endeavours, the demand for tools and services enabling real-time communications and remote learning has also been very clear. GÉANT and our NREN partners have met this demand both through their own offerings, accelerating and customising these where possible (e.g. eduMEET and openUp2U), and through facilitating commercial offerings.

The GÉANT community itself is also being proactively supported, through increased, focused Special Interest Group (SIG) and Task Force (TF) activity, such as the SIGs on Network Operations Centres and Marcomms and the newly launched TF on Educational Services and Activities, and through targeted communications and engagement, including the GÉANT Community Café, a regular virtual meeting place for all of our community where conversation, innovation, ideas – not to mention friendships – flourish.





It's why we exist

Whether urgent COVID-19 research, health and medicine more generally, particle physics, space, earth observation, energy, or arts and education – the GÉANT network underpins and is critical to all this work.

And the European research community depends on it – 100% of all high-performance computing runs on the GÉANT network – which although taken for granted, is a responsibility never taken lightly. GÉANT and our NREN partners will continue to support the pursuit of innovative research and education, remaining crucial to European and global research at all times and especially in times of crisis.

Stay safe, stay well, and stay connected!

Learn more

Stories of how the GÉANT community is helping

GÉANT (GN4-3) Deliverable highlights support for R&E during COVID-19 pandemic

How GÉANT and the NRENS support the European COVID-19 research platform

The importance of open science and open data in the fight against COVID-19 and the role of EMBL-EBI in supporting international research collaboration

Words: Rolf Apweiler, Director, EMBL-EBI is interviewed by Karl Meyer, GÉANT

Rolf, thank you for your time. Could you explain the history and role of EMBL-EBI?

In the 1980s we began with the world's first nucleotide sequence database: the EMBL Nucleotide Sequence Data Library at EMBL in Heidelberg, Germany. The original goal was to establish a central database of DNA sequences. What began as a modest task of abstracting information from scientific literature soon grew into a major database activity, with researchers submitting their data directly and an ever-increasing demand for highly-skilled biologists and informaticians to manage it all. High-profile genome projects brought more attention to the project, and the commercial sector began to see the relevance of public data.

The core philosophy, then as now, was that all data should be open and accessible as long as credit to the originators is given. In a sense this was a precursor to the concepts of Open Science and FAIR data.

In 1992 plans were agreed to establish the EMBL-European Bioinformatics Institute (EMBL-EBI) and locate it on the Wellcome Trust Genome Campus in Hinxton, UK, where it would be in close proximity to the major sequencing efforts at the Wellcome Trust Sanger Institute. In September 1994, EMBL-EBI was firmly established in the UK.

Since then, the EMBL-EBI has played a major part in the bioinformatics revolution.



So, what is Bioinformatics?

Life-science experiments are generating a flood of data every day, which is good news for researchers but poses practical challenges. The amount of data produced is often doubling quicker than computer storage and processing power, and this rate seems to be increasing. Bioinformatics makes it possible to collect, store and add value to these data so that researchers in many fields can retrieve and analyse them efficiently. EMBL-EBI is one of very few places in the world that has

the capacity and expertise to fulfil this important task. We now provide the world's most comprehensive range of molecular databases and offer an extensive user training programme. We also work with our international collaborators to share data, so that data uploaded in the USA or Asia is available to European users the next day, and European data is also shared overnight.

Last month we served over 1 billion data requests from 5 million IP addresses, so it is clear there is a huge demand for data.

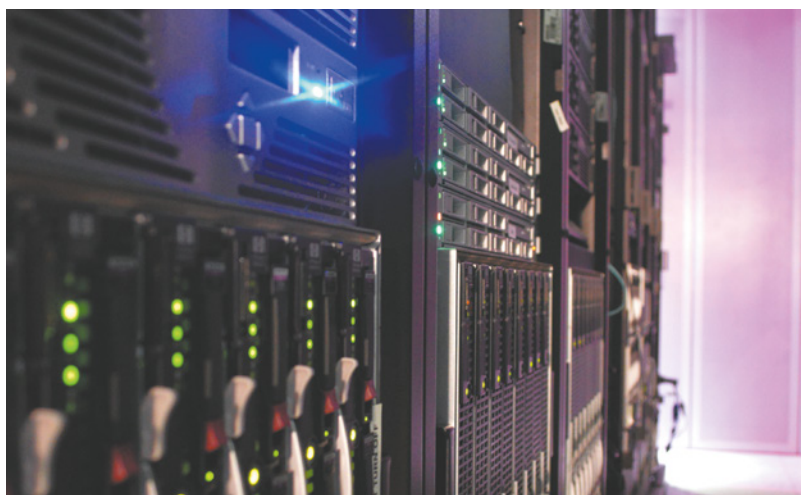


Of course, Biomedical Research is really in the headlines at the moment. How is EMBL-EBI helping with research into COVID-19?

EBI has developed the COVID-19 Data Portal which provides access to a range of data covering virus sequences, gene expression data, proteins and protein structures. In total there are already over 13,000 data sets from around the world accessible to researchers. This portal was created using the systems we had already developed with our deposition databases and the knowledgebases which are built on them, so we were able to produce this very quickly. <https://www.covid19dataportal.org/>

In many ways what you're doing in the Biomedical Sphere is very similar to the core concepts behind EOSC. Do you see EOSC as the future of Open Science?

Certainly, within EMBL-EBI, we have always seen academia and industry as equal partners and we can definitely recognise the benefits of openness in scientific research. However, with openness comes the need to manage access to data. For example, organisations are collecting gene



sequences from patients with severe and mild symptoms of COVID-19 to attempt to identify any factors influencing symptoms. This personal data, of course, needs secure federated access control and our work within ELIXIR (<https://elixir-europe.org/>) has shown us the benefit of federated systems to support open science.

Where do you see the future for EMBL-EBI and Open Science in general?

In the biomedical area I think we need to see more links to front-line healthcare to enable us to use their data to inform research. In fields such as oncology this is already happening, but with pandemics such as COVID-19, faster access to the data is needed.

In general, we're seeing an acceleration of research in relevant

areas with five year timeframes now shrinking to closer to two years. Of course, this is very exciting but will raise a lot of challenges for organisations around the world.

It certainly seems to be a very exciting time to be involved in Bioinformatics. Thank you very much!

For more information on EMBL-EBI visit: <https://www.embl.org/>

The COVID-19 data portal is available at: <https://www.covid19dataportal.org/>



The CONNECT Interview: René Buch

René Buch is CEO of NORDUnet, which operates a network and e-infrastructure service for the Nordic R&E community. With 15 years in this role and the wider NREN community, what is his perspective on NORDUnet, GÉANT and the potential of EOSC? CONNECT spoke with him to find out more.

Words: Interview by Laura Durnford, GÉANT

How is NORDUnet supporting NRENs and their R&E communities in these difficult COVID-19 times?

The Nordic Countries are very fortunate, because after launching videoconferencing in 2006, they collaboratively evaluated future technologies and agreed that Zoom was the right way to go. We established a long-standing relationship with Zoom where NORDUnet and the Nordic NRENs provide both infrastructure and value add through 1st and 3rd line support.

In November 2019 we had 5,000 concurrent users; now we passed 1.3 million licensed users and 110,000 concurrent users. All the Nordic universities can conduct their education, exams, teaching online.

We tried to help other NRENs by leveraging our relationship with Zoom. The problem is that, if you hadn't had

an agreement with vendors, it's very difficult to come in at the last minute and say "hey, I want capacity for hundreds or thousands of users", especially if you don't add any other value than being a broker/reseller. So I think the lesson here for NRENs is start early, look beyond where you are today.

We actually started our contingency planning for COVID in January, so were about a week-and-a-half ahead of our government. We very quickly moved into a virtual space. We saw a significant increase in work and that all staff are pulling at least their own weight. I am very proud of our team, because it's really been a team effort.

How do you see NORDUnet's role in the international NREN community?

NORDUnet has been a member of GÉANT for a long time and I think GÉANT is an important community. NRENs and GÉANT have a fantastic role

to play – especially if we keep looking ahead and predicting what's going to be the next need for the users.

Yes, a number of my staff members and I come from the commercial side and we see options for optimising and, of course, we push that on to all our partners.

The Nordics are only a small part of the global NREN community. I'm a strong believer that the prices we are achieving, the ways we are functioning, and the capabilities we have increase when we work together globally. We see that economy of scale and knowledge about telecommunications are really beneficial, but that means we need to think differently in terms of how we invest, how we operate things.

Despite the size of NORDUnet – we are a small organisation – by having a very active strategy, I think we put a big fingerprint on where collaborations go, on both the European and global scale supported not only by NORDUnet staff but also from our very active Nordic NREN's.

What value does GÉANT bring to NORDUnet?

I think the biggest thing that GÉANT brings to NORDUnet is the community efforts and collaboration, the way we collaborate with the working groups and the stuff that we do.

Part of it is the network also, but that is actually not the biggest thing for us; the biggest thing for us is that we have a collaborative effort, we have a forum for that and we can do projects together. I think that collaborative way, especially in terms of creating consortia between NRENs to tackle very large projects, that's a crucial way for the future.

What is your vision on the EU's plans around EOSC, EuroHPC etc. – and the role of GÉANT and NORDUnet in this?

If I look at EOSC, there are some very good elements. But we need to be careful that we are not creating a 'Godzilla' we can't necessarily control and that is unable to deliver the services that users actually need.

I think the EU has a very strong potential to make a very big impact, especially in the realm of digital sovereignty, because we are extremely dependent on non-European entities. That's an area where we should be much more active.

We should also more actively deal with changes caused by the monopolisation of cable and telecomms systems. Here the EU and some of the EOSC project have the potential to create value and a better European footprint. I think EuroHPC is a very good initiative, but the idea that we will build it solely on European technology is a phantom. Data is going to be key. As datasets become bigger, they will congregate towards fewer, bigger sites. I see the EuroHPC sites as computation clusters, not just for HPC

machines, but different grades. Both in EuroHPC and EOSC, I think we need a whole range from big fat computers that crunch huge numbers and can help solve international crises like COVID, but also we should give students and small research communities the ability to look at datasets without having to go through very big projects. I hope we would see small machines – the smaller and less expensive they are the easier to donate to a research group and give them access to the data. That's where we'd see real innovation and more European science coming out.

What do you see as NORDUnet's biggest achievement in the past 5 years?

I think we already touched one of them, that we have the capability to support research and education in tough times and actually transform it into a digital learning space. Another is the two very collaborative efforts that we've been drivers in – that's the ANA [Advanced North Atlantic] and CAE1 [Collaboration Asia Europe-1], which showed that Europe, Asia and Oceania together could create an infrastructure that would not have been possible 5 years ago. Seeing that these parts of the planet that were not traditionally working together, but seeing the benefit for everybody, that is a major achievement.

What is your vision for the next 5 years of NORDUnet?

We are being extremely pragmatic, to see how can we save money by re-using, and maximising usage. If we are going to be more efficient, we need to be partners in fibre systems. We need to make more consortiums and ensure that we have capacity and bartering tools so we can reach everywhere on the planet. How do we as NRENs serve the IoT of sensors on the planet, in the middle of the Atlantic, the Southern Pacific, the North Pole or Antarctica?

How do we ensure that scientists can get data from their sensors back to the scientific stations? We have to find ways of dealing with the new wave of satellite providers and I think NRENs will need staff who are used to dealing with telecommunication providers. We need to work together as an NREN community so we can leverage our buying power, because otherwise we are going to pay high prices for buying in small bits and pieces. And I think we have an obligation to be smarter.

The NORDUnet conference was scheduled for September in Iceland – how do NORDUnet conferences complement TNC?

I really see them as complementary in many ways. This specific conference I have been really looking forward to – it's our 40th anniversary this year, and there have been so few NREN conferences in 2020! I think conferences should be where collaborative efforts take place so that we don't have to travel as much in between. We've become better at doing that, but I think still a bit of coordination could help.

After 15 years in this NREN community, what fact about yourself do you think will surprise people?

I think people might be surprised how passionate I am about collaboration and efficiency. I'm really not good at not striving for the best. I think it boils down to a deep desire to help others become better. That's why it's very difficult for me not to care and that's why I'm such a pain in the ass sometimes. People might interpret this as other things, but it's actually because I think we can do more and be even better.

EOSC taking big steps forward

On 4 June 2020 the European Open Science Cloud (EOSC) Partnership proposal was published to help take EOSC forward to the next stage.



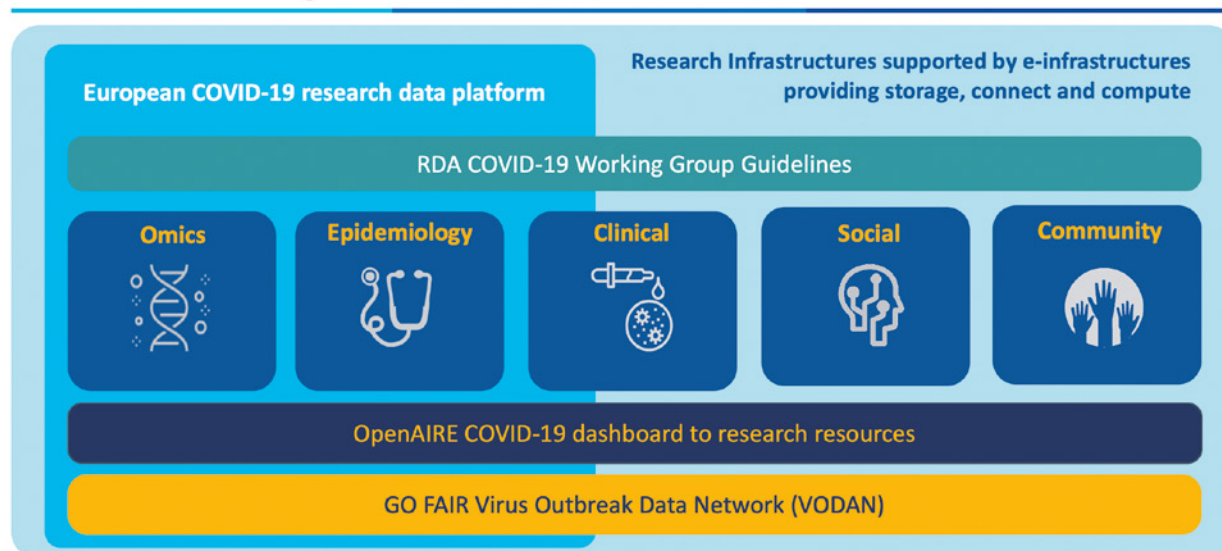
**EUROPEAN OPEN
SCIENCE CLOUD**

The EOSC Partnership will enable a trusted, virtual, federated environment in Europe to store, share and re-use research data across borders and scientific disciplines. It will bring together institutional, national and European initiatives and engage all relevant stakeholders to co-design and deploy a European Research Data Commons where data are Findable, Accessible, Interoperable, Reusable (FAIR). This European contribution to a 'Web of FAIR Data and Related Services for Science' will enhance the possibilities for researchers to find, share and reuse publications, data, and software leading to new insights and innovations, higher research productivity and improved reproducibility in science.

[Download the full partnership proposal](#)

How does EOSC support the COVID-19 Open Science Actions?

COVID-19 Open Science Actions



Sarah Jones moves to new role at GÉANT

GÉANT's EU Liaison Team is set to grow with the addition of Sarah Jones, who joins as EOSC Engagement Manager on 1 July 2020. Sarah joins from the Digital Curation Centre (DCC) where she was most recently Associate Director and has had a long involvement with the DCC's training and skills activities, including projects such as FOSTER+. The Research Data Alliance (RDA) has benefited from her co-chairing of working groups, contributions to task forces and involvement in the European RDA support project. The international community has also welcomed her positive contributions as co-chair of the EC's FAIR data expert group and now as an independent member of the EOSC Executive Board. Welcome, Sarah!





GÉANT and the Sustainable Development Goals

The development of modern communications technology has led to an increasingly connected world in the digital space. Because of this, research & education infrastructural projects such as GÉANT and the community of NRENs behind it are being linked as part of the solution to current and future societal challenges facing the globe. With the United Nation's Sustainable Development Goals (SDGs) having become a benchmark to strive towards a better world, GÉANT's activities can be matched to them through three areas of work.

Words: Hendrik Ike (GÉANT) and Silvia Fiore (GÉANT)

4 QUALITY EDUCATION



Ensure equitable quality education (SDG 4)

GÉANT's flagship Trust & Identity services, such as eduroam, eduGAIN and eduTEAMS assist students worldwide. With more than 10,000 eduroam hotspots available at universities, research centres, academies, many schools, and other research and education institutions in more than 100 territories around the world, eduroam is growing to more and more hotspots globally, including additional places such as libraries, museums and public spaces.

The eduroam Wi-Fi roaming service provides seamless internet activity to researchers and students and is free-of-charge to users. eduGAIN enables students to follow courses at universities other than their own using their existing credentials, and eduTEAMS enables research communities to securely access and share common resources and services.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



An inclusive infrastructure to foster innovation (SDG 9)

As the UN itself acknowledges, many developing countries lack basic communication technology infrastructure. Considering that the

GÉANT network is the most advanced and well-connected R&E network in the world, it serves to understand the standard and good practices of GÉANT's R&E infrastructure, not just within the European sphere but also globally.

GÉANT's role

GÉANT's role in Europe is unique: by interconnecting Europe's National Research and Education Networks (NRENs) it brings Europe's brightest minds together to collaborate virtually and accelerate research, drive innovation and enrich education. By also fostering this mindset with international partners, GÉANT directly and indirectly contributes to the global science economy worldwide.

GÉANT's network

The network that GÉANT operates is also projected to be more deeply situated at the intersection of European industry, innovation and infrastructure in the future. This can be seen in agreements to provide the backbone capacity between Europe's future High-Performance Computing (HPC) centres, as well as future connectivity to ITER, the world's largest nuclear fusion project being constructed by the French Alternative Energies and Atomic Energy Commission in Southern France.

GÉANT and its Members already connect and support research infrastructures that have a global reach, such as CERN, the European research organisation that operates the largest particle physics laboratory in the world.

17 PARTNERSHIPS FOR THE GOALS



Implementing global partnerships for sustainable development (SDG 17)

GÉANT has been a trusted partner of the European Commission (EC) for many years, as the coordinator of network

projects co-funded by the European Union (EU) and NREN organisations in Europe, and by those in other world regions. Within such partnerships, GÉANT has planned, procured and implemented networks in Europe and around the world, and led collaborative innovation, federated service delivery, and support for knowledge-sharing, to the research and education community.

GÉANT's global partnerships and projects include the AfricaConnect and CAREN projects; and EaPConnect and EUMEDCONNECT projects, generously co-financed by DG DEVCO and DG NEAR respectively. These projects help bridge the digital divide across different territorial regions. The GÉANT project itself is a truly pan-European collaboration between 39 partners, including 37 European NRENs, NORDUnet (representing five Nordic countries) and the GÉANT Association itself.

For GÉANT and European NRENs specifically, the association of over 40 European Members (including national, representative and associate members) has been formed over twenty years by precursory organisations via an opt-in, consensus driven approach. The primary principle for collaborative technology work is based on the reciprocity of service provision, utilising a trust-based approach. Governance mechanisms such as the GÉANT General Assembly serve to safeguard the interests of all Members as a whole. The principles of reciprocity, consensus and trust have 'spilled over' to other collaborative institutions, such as the Global eduroam Governance Committee.

The future after COVID-19

On 3 May 2020, the EC issued a press release that was co-authored by various heads of state in order to articulate a global response to the COVID-19 pandemic. The coordinated 'rally' around science and solidarity is set to be primarily guided by the Sustainable Development Goals.

During these times GÉANT and its community of NRENs will look to support all appropriate measures aiming to combat and contain the COVID-19 virus in Europe and across the world with global partners. The connection between the pandemic and the SDGs serve as a positive reminder that the GÉANT community has the expertise, knowledge and trust to continue serving those at the forefront of research and education at the current time and in the future.



Up2U supports digital education in K12 and beyond

The 41-month-long Up to University (Up2U) project finished this May, but hopefully the results and outputs of this project will live on. Up2U was coordinated by GÉANT and the consortium that consisted of NRENs, universities and private companies was working towards closing or eliminating the digital gap between secondary and higher education.

The project envisioned a learning platform, namely the Next Generation Digital Learning Environment (NGDLE)-Up2Universe, a set of tools to enhance the digital maturity of high school students. Besides providing Up2Universe, the project elaborated a Continuous Professional Development programme for secondary school teachers, to help them master the use of the toolset and incorporate the pedagogical scenarios in their upgraded classrooms.

Words: Gytis Cibulskis (KTU), Mary Grammatikou (NTUA), Barbara Tóth (KIFÜ)

Getting students ready for university

University as a Hub (U-Hub) has been one of Up2U's central initiatives to expand students' opportunities to engage with challenging content beyond the classroom once the school day is over. In Greece for example, the School of Electrical and Computer Engineering from NTUA made available two undergraduate courses (Network Management and Queuing Systems) and one postgraduate course (Stochastic Processes and Optimization in Machine Learning) as part of this initiative.

Despite the fact that these courses are mostly focused on university students, high school students can also

comprehend the basic aspects of these topics. These lectures can help students to understand how the Internet works and how they can use some services like Jupyter Notebooks (or SWAN) for basic data analysis. The lectures' content (video, audio and accompanying screens) is synchronized and provided by SeLCont (Synchronized e-Learning Content), which is also a service provided by the Up2Universe.

University levelling courses on Mathematics, Physics, Chemistry and Informatics opened for graduate students in Lithuanian is another example of U-HUB. Kaunas University of Technology invited high-school students to learn those basic subjects from best university teachers and to make sure they are ready for studies at university.

Lockdown, not shutdown: our NGDLE is open for all European educational institutions and schools!

In the period of COVID-19, education needs support and improvement based on advanced digital technologies, in order to continue the real work in academic and school communities on an international level. The openUp2U portfolio provides the tools to revolutionize the teaching method and motivates students to benefit from the latest technology. openUp2U is based



on a Next Generation Digital Learning Environment (NGDLE) that integrates the formal and informal learning spaces for secondary schools and academic communities who wish to develop and enhance their teaching and learning skills as it should be to the university standards.

The advantage of openUp2U is that it provides an integrated environment consisting of four tools in order to make it possible for its users to create their courses, store their content and also attend and participate in the online courses remotely. Students and teachers/professors will be able to create (Moodle), share & collaborate (SWAN/Jupyter Notebooks), attend (eduMEET) and store (Cernbox) the digital multimedia content produced in an international level.

openUp2U is building a community that can support the new trends and methods of digital teaching and learning. In openUp2U we have created the aforementioned selected number of tools and services that can support high schools, universities, teachers, and students to improve their teaching and learning practices in a safe and secure environment. These tools allow greater ease of communication inside and outside of the classroom, improving interactions and providing new ways to access knowledge in the digital age.

The innovation action leading to these results has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 732049 - Up2U.



CONNECTING AFRICA
TO UNLIMITED POSSIBILITIES



AfricaConnect: a past, present and future success story for African Research and Education

At the end of 2019 and following the success of predecessor projects EUMEDCONNECT, AfricaConnect and AfricaConnect2, Africa's three Regional Research and Education Network organisations (RRENs): the UbuntuNet Alliance (UA) in Eastern and Southern Africa, the West and Central African Research and Education Network (WACREN) and the Arab States Research and Education Network (ASREN), in partnership with GÉANT, signed a €37.5 million contract agreement with the European Union (EU) for a successor project, AfricaConnect3. The project will extend the reach of RRENs and continue to provide high-speed internet connectivity and a broad range of e-services to NRENs and their communities across Africa. With Africa's 38 NRENs accounting for around a third of the world's total, the potential of AfricaConnect3 cannot be overestimated.

Words: Silvia Fiore (GÉANT), Effah Amponsah (WACREN), Hastings Ndebvu (UbuntuNet Alliance) and Yasmeen Alkouz (ASREN)



The EU's contribution of €30 million falls within the joint EU-Africa agenda. As Stéphanie Truillé-Baurens, International Cooperation Officer at the European Commission, said: ***"With AfricaConnect3, the European Union is proud to reaffirm its commitment to support NRENs in Africa. Since 2004, significant progress has been made in improving access of African higher education and research institutions to affordable and secure broadband connectivity. Under AfricaConnect3, the partners will further exploit the potential of digital technologies as transformation tools for quality education and science collaboration between the EU and Africa, in line with the EU Digital4Development strategy."***

A continuing success story...

Between 2011 and 2014, the EU co-funded AfricaConnect project helped establish the UbuntuNet backbone, a regional gateway for collaborative research and education in Eastern and Southern Africa operated by the UbuntuNet Alliance.

In 2015, the successor project AfricaConnect2 supported the creation, development and use of high-capacity Internet networks for research and



A vision...
to connect **Africa** to
a world of **vast knowledge**
through **high speed,**
reliable connectivity.



development, adopting a pan-African approach including the two other regions, West and Central Africa, and North Africa, alongside Eastern and Southern Africa.

As a result of AfricaConnect and AfricaConnect2, 19 countries are currently connected to the three RRENs in Africa: Burundi, Kenya, Malawi, Mozambique, Rwanda, Somalia, South Africa, Tanzania, Uganda, Zambia and Zimbabwe as part of the UA; Côte d'Ivoire, Ghana, Nigeria and Togo, members of WACREN; as well as Algeria, Egypt, Morocco and Tunisia under the ASREN umbrella.

Since its start, AfricaConnect has changed the status of connectivity and enabled countries to be active members of research networks.

- In Uganda, it has enhanced academic services and the entrepreneurial skills of the country's youth.
- In Tanzania, it has connected university students and staff while enabling collaboration with sister higher education institutes (HEIs) around the world.

Picture
Click the play icon to view the AfricaConnect3 video



- In Kenya, AfricaConnect provided remote training and knowledge exchanges to strengthen geoinformatics expertise to support sustainable development.
- In Zambia it accelerated data-intensive modelling and mapping to monitor soil degradation and to develop sustainable land management. It enabled scientists to quickly monitor and notify asthma sufferers of sandstorms in Egypt and opened up career opportunities for women in STEM across Africa.
- AfricaConnect projects have made connectivity more affordable by decreasing bandwidth prices by 94% in Zambia and 60% in Somalia since 2011.

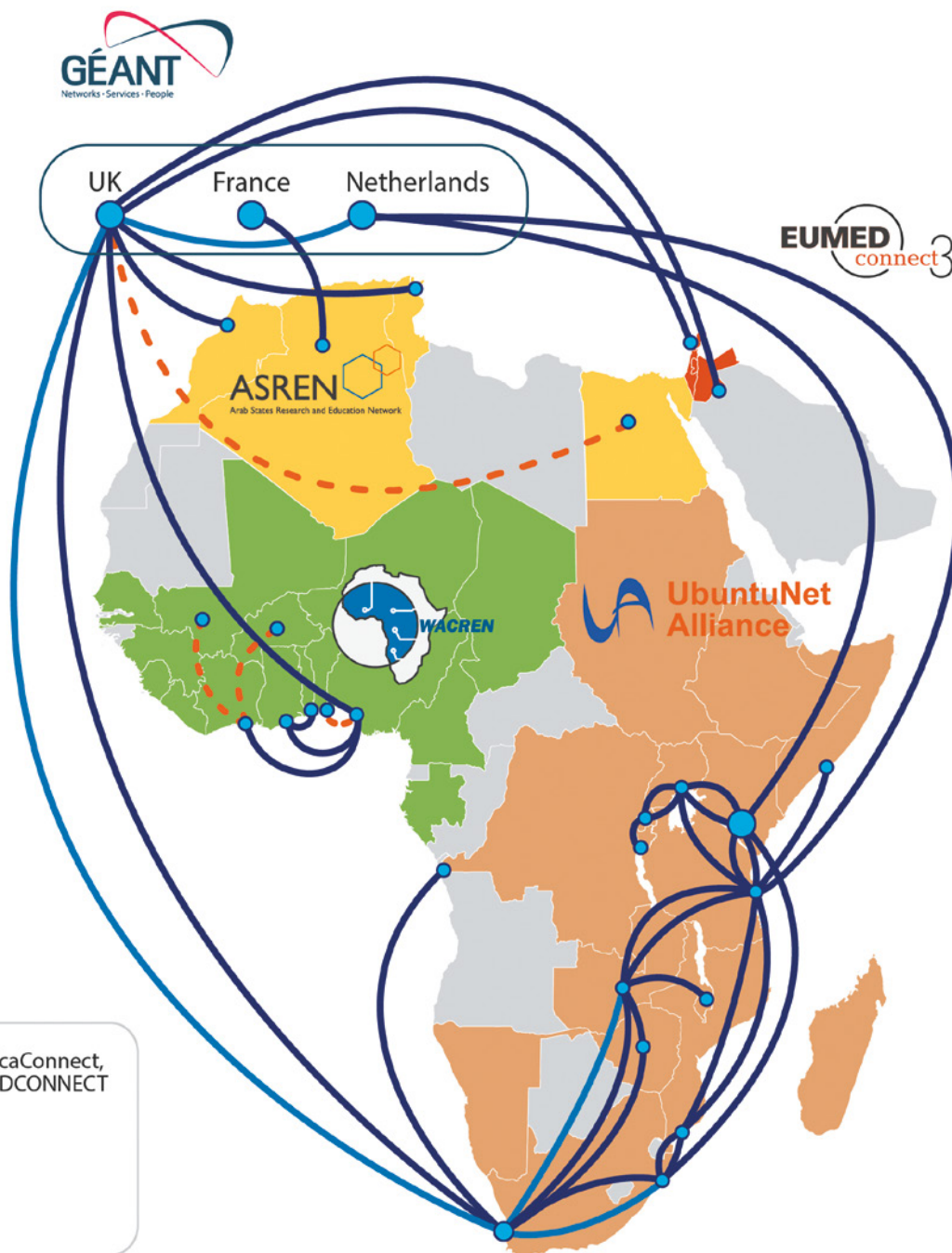
The achievements of AfricaConnect and AfricaConnect2 serve as a basis for the African partners to further expand the regional networks under AC3. As Boubakar Barry, CEO of WACREN says, **“With AfricaConnect3 our target is to connect six more countries. At the end of the project, we aim at covering around 700 higher education and research institutions with approximately 5 million users”.**

WACREN is also leading two initiatives key to AfricaConnect’s expanding community: Women-in-WACREN, which has seen 300 women trained in ICT-for-development, and the Library Support for embedded NREN Services and e-infrastructure (LIBSENSE) aimed at establishing frameworks for scholarly communication and research infrastructures.

As AfricaConnect3 calls for more collaborations worldwide, Leila Dekkar, GÉANT’s AfricaConnect3 Project Manager, explains the organisation’s role in facilitating R&E community expansion: **“GÉANT has been supporting and advocating for research and education networks globally for more than two decades, and we are pleased to contribute to the further expansion of our R&E community in Africa. Today’s science breakthroughs are shifting and are more and more the result of international research collaborations. At GÉANT we firmly believe that by providing high quality, affordable and dedicated bandwidth and services to researchers in Africa, they will be able to contribute to the world greatest innovations.”**

The African partners have empowered NRENs through capacity-building, knowledge-sharing and participation in regional and international fellowship programmes, connecting 6.2 million researchers and students in North Africa, 3.5 million in Eastern and Southern Africa, and over 400,000 in Ghana and Nigeria. With the new phase of the project, **“AfricaConnect3 will also create more opportunities to train more university campus and NREN engineers as well as facilitate NREN staff exchange visits to enhance the sharing of knowledge and best practices within the region,”** in the words of Matthews Mtumbuka, CEO of the UbuntuNet Alliance.

With all North African NRENs re-joining the international R&E networking community, ASREN sees AfricaConnect3 as an opportunity to allow a wider development of user and community-based services. Representing African RRENs, ASREN will continue leading the engagement with user communities in Africa with a focus on AfriGEO and GMES and African communities. As Yousef Torman, Co-Managing Director ASREN



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says, ***“We will pay more attention to the needs of national and regional communities in terms of connectivity, access and services. We will promote open science and open access in the region, make use of the European Open Science Cloud (EOSC) and coordinate with the African Open Science Platform”.***

AfricaConnect3 differs from the two previous phases of the project in that it introduces a novel aspect to the project: advocacy and donor engagement. GÉANT, UA, WACREN and ASREN collectively aim to support the project's regional partners in raising awareness

around the benefits of NRENs and RRENs to various stakeholders and to simultaneously attract new donors and re-engage with previous ones. In previous phases of the project, the African partners received different level of support. This new aspect of the project seeks to tackle this hurdle and will prioritise stakeholder engagement and outreach. Similarly, the project intends to reach out to European NRENs alongside other aid institutions in order to coordinate project funding. European NRENs and other organisations have previously shown their commitment to the development of NRENs in Africa,

with NSRC, GARR, GRNET, RedIRIS, RENATER, CyNet and SURFnet being associate partners in the AfricaConnect3 project. Above all, GÉANT will adopt a supportive role and will primarily seek to amplify the voices of its partners and their respective NRENs.

See also:

www.africaconnect3.net

https://twitter.com/AC3_News



EaPConnect reviews achievements as new phase dawns

A second phase of the EU-funded EaPConnect project will start in July, bolstered by a renewed EU-Eastern Partnership (EaP) policy commitment to a strong digital presence in the EU's Eastern Neighbourhood. Key among EaPConnect's achievements in the past 5 years are greater integration with GÉANT activities, services and networks, and benefits to research, education and wider society in Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine.

Connectivity is key

Before EaPConnect, connectivity between EaP countries and the GEANT pan-European network was indirect, low-capacity or non-existent. Now all countries are connected with a tenfold capacity increase in Georgia, Azerbaijan, Moldova, Ukraine and Belarus and around 7-fold in Armenia. Procurement in collaboration with GÉANT succeeded in reducing Internet connectivity prices by around 60% in Belarus and Ukraine, and by around 80% in the South Caucasus countries.

Connectivity improvements are critical for data-intensive research. For instance, Ukrainian and Belarusian high-energy physicists are helping unravel fundamental secrets of the universe, using data from CERN's Large Hadron Collider experiments. The Institute for Nuclear Problems of the Belarusian State University used fast connectivity to the GÉANT network to become a fully functional part of the Worldwide LHC Computing Grid. At the Kharkiv Institute of Physics and Technology in Ukraine, Alexey Kurov is part of his country's only team able to process LHC CMS experiment data. "I take pride in my involvement in the outstanding scientific results obtained."

In Azerbaijan, the Republican Seismic Survey Center (RSSC) sensor network gathers large amounts of data on frequent earthquakes. Seismologist Ruqiyya Karimova says: "We process the information within 10 minutes and send it to the Presidential Office. Uninterrupted Internet is essential. AzScienceNet's collaboration with us and GÉANT through EaPConnect has improved our work a lot."

Services and support

Around 800,000 students, researchers and staff at universities, research institutes and other connected institutions can access EaPConnect partner networks and services. During the project, the number of connected institutions grew significantly in Georgia (17%), Armenia (26%) and Azerbaijan (58%). The number of services on offer, including from the GÉANT portfolio, has grown too. While eduVPN, FileSender and eduGAIN rollout is still small, the eduroam educational roaming Wi-Fi service can now be found in around 275 locations and is a focus of collaboration between some partners and the Erasmus+ programme.

Revaz Shanidze, Associate Professor at Tbilisi State University, has used eduroam extensively: "GRENA performs outstanding work



by introducing eduroam in Georgia. TSU is a leader in terms of international cooperation and a huge number of students go abroad to study with the support of Erasmus +. eduroam is the most beneficial resource for them."

The provision of online meeting and learning tools was stepped up in response to COVID-19. RENAM added eduMEET and openUp2U to its offer and is working with the Ministry of Education, Culture and Research to ensure learning continues in Moldova during the crisis. In Ukraine, URAN very rapidly set up eduMEET, which soon attracted around 100 concurrent users. Roman Yatsenko, Head of the E-Learning Tools Department at Simon Kuznets Kharkiv National Economic University was among the first to try it. "I prefer eduMEET over other services. I am grateful to URAN for implementing this platform, its simplicity just wins me over."

Partners' cloud services have also grown - 126 organisations are now using them; for example, for academic publishing in Ukraine, climate change prediction in Georgia, extreme weather forecasting in Armenia, and medical imaging handling and analysis in Moldova and Belarus. In Belarus too, clouds have supported a local history app and the creation of a CLARIN (Common Language Resources and Technology Infrastructure) knowledge centre. Yuras Hetseвич, head of the Speech Synthesis and Recognition Laboratory of the United Institute of Informatics Problems of the National Academy of Sciences of Belarus says: "Many of these fruitful steps became possible due to the support of BASNET and EaPConnect."

Community and collaboration

EaPConnect has built productive human networks between its EaP partners, other NRENs and e-infrastructures. Ten European and 3 non-European

NRENs have been associate partners; a mentorship scheme to create practical technical collaborations has already resulted in an Armenian computer emergency response team. Formal agreements have been signed: for example, in 2018 between AzScienceNet and the Minister of Education of the Republic of Azerbaijan regarding use of the networks and international scientific collaborations; in 2019 between GRENA and the Shota Rustaveli National Science Foundation regarding use of cloud infrastructure; and in 2019 between the Armenian and Belarusian project partners, IIAP NAS RA and UIIP NASB, building on their EaPConnect partnership.

Four project 'EaPEC' conferences attracted around 530 people from 50+ organisations and featured 22 projects selected under the project's Enlighten Your Research programme. 30 training events and workshops gave around 500 participants the opportunity to meet and learn together. These events helped create and strengthen relationships with researchers, national ministries and institutions, and to raise partners' visibility with local and national media. EaPConnect also supported participation in GÉANT and other international events and community working groups.

Erik Huizer, GÉANT CEO says: "EaPConnect has strengthened the bonds between its partners and the GÉANT community, project and association, with positive effects on both sides. I look forward to these collaborations developing further in the coming years."

More information

www.eapconnect.eu

www.inthefieldstories.net/network/eapconnect

Pictures

Clockwise:
Lika Megrelidze, National Environmental Agency of Georgia, researches climate impacts using GRENA cloud services, under agreement with Shota Rustaveli National Science Foundation.

Valentyna Lukianenko, Igor Sikorsky Kyiv Polytechnic Institute in Ukraine, publishes 'Advanced Education' journal with support of URAN Publishing Service and virtual computing infrastructure.

2018 Enlighten Your Research winner Vassili Kovalev, National Academy of Sciences of Belarus, uses high computational power accessed via BASNET to overcome legal, ethical and security challenges in the generation of medical images for research.

Alexey Kurov, Kharkiv Institute of Physics & Technology in Ukraine, accesses data from the LHC Compact Muon Solenoid (CMS) experiment using improved international connectivity organised via URAN.

2019 Enlighten Your Research winner Artur Gevorgyan, Hydromet Service of Armenia, uses numerical weather prediction models to reduce impacts of extreme weather, using ASNET-AM cloud services.

Revaz Shanidze, Tbilisi State University, is an enthusiastic user of eduroam provided in Georgia via GRENA.

Supporting culture in the Eastern Partnership



Creating cultural collections online

A digital library to capture and preserve 300 years of Armenian cultural history has already created more than 80,000 digital objects, thanks to support from the NREN ASNET-AM and the EU-funded EaPConnect project. In Ukraine and Belarus similar efforts are under way.

Key to this work is a close relationship with the Polish NREN, PSNC, which has been a partner in the EaPConnect project since its early days. Specialists at PSNC created dLibra software to support e-publication from start to finish. dLibra is now widely used in Poland by academic institutions, public libraries, museums and archives to create digital libraries. In 2019, the PSNC experts provided training to project partners and winners of the 2017 EaPConnect Enlighten Your Research (EYR) programme whose projects aimed to create digital libraries for research (Armenia) and cultural heritage (Ukraine).

EaPConnect has provided high-tech digitising equipment such as a new specialist scanner for use in Ukraine by URAN Association. URAN has created a centre for the digitisation of cultural heritage based on the Igor Sikorsky Kyiv Polytechnic Institute library (dlibra.uran.ua). Their digitised materials are being stored in a virtual digital library provided by PSNC. In this way, the historical and



academic archives of Ukraine are online and becoming available to people even in the furthest corners of the country.

In Belarus, the NREN BASNET is now finishing work on localisation of its digital library (dlibra.basnet.by), providing a hosting service for the dLibra library developed in PSNC. Its work to fill the library has started with the digitisation of a few items from the 15th Century. The goal is to create around 30,000 digital objects from rare books of cultural significance.

In Armenia, work on a pan-Armenian digital library (arar.sci.am) is more advanced. The 80,000 digital objects created so far include books, newspapers, articles etc. On a technical level, this means that ASNET-AM is providing a virtual server with disc space of 256GB, to be enlarged with another 512GB. ASNET-AM staff are responsible

for maintaining arar.sci.am, providing user registration, system back-ups, website maintenance, importation of materials and liaison with PSNC experts, as well as consultation to the library editors.

This Armenian digitisation effort has been achieved in around just one year. ASNET-AM plans to ultimately create an open access repository of Armenian research outputs, and a database about the victims and survivors of the Armenian Genocide that will include audio and video testimonies. With effort from the 2017 EYR winning project, there will also be digitised collections from the country's regional museums as well as material from all the major Armenian museums and libraries.

Digital libraries and the number of objects they contain are certainly set to grow!

Pictures

Top left: Armenian cultural materials (courtesy of ASNET-AM).

Bottom left: Belarusian cultural materials (courtesy of BASNET).

Right: Kristi Mühling and Ibrahim Babayev perform the world premiere of 'Mystic' on the traditional Estonian kannel and the Azerbaijani tar.

Far right: Paolo Girol at 'Connecting Traditions'

Bottom right: Videos about the 2017 and 2019 concerts are available at <https://bit.ly/EaP-videos>



Cultural and technical 'firsts' with LoLa

A world premiere, a record-breaking distance, a high-level audience, and 'firsts' in three Eastern Partnership (EaP) countries – 'LoLa' concerts organised by the EU-funded EaPConnect project and its partners have achieved these cultural, creative and technical goals.

LoLa (low latency) technology, developed by the Italian NREN GARR in collaboration with Conservatorio di Musica Giuseppe Tartini, Trieste, was introduced to the EaP NREs early in the EaPConnect project. Coupled with advanced R&E networks, LoLa allows geographically-distributed performing artists to work together in real time without significant distortion or delay.

This was really put to the test in September 2019, when top choirs in Yerevan, Armenia and Venice, Italy, sang together via a record-breaking 5000 km of networks that crossed 7 countries. This 'Connecting with Culture' concert used musical techniques invented by C17th Venetian composers for choirs singing across the large space within St. Mark's Basilica, where sound is delayed by around 40 milliseconds - nearly identical to the network delay between Venice and Yerevan. The event forged a collaborative relationship between the Italian and Armenian NREs, GARR and ASNET-AM, the choirs and the music academy, and strengthened the connection between Armenia and the Armenian diaspora in Italy.

A world premiere of new music for traditional instruments was the heart of 'Connecting Traditions', the LoLa concert held in Baku, Azerbaijan and Tallinn, Estonia in December. The event

and new composition were organised by AzScienceNet in connection with the 2018 EaPConnect Enlighten Your Research (EYR) programme winner the MIRCO project. MIRCO intends to create an EaP LoLa user community and renew the heritage of national instruments. MIRCO project leader Paolo Girol (Estonian Academy of Music and Theatre) says that, by allowing musicians to give online masterclasses about their national instruments and to meet and practice together over the networks, MIRCO will help "meet important EU policies such as digitisation, preservation of heritage and digital mobility".

The first EaPConnect LoLa concert, back in 2017, showed Ministers and Ambassadors from around Europe what LoLa and networks can do. For that 'Music without Borders' event, Estonian and Armenian musicians in Tallinn performed with Belarusian and Georgian artists located in Minsk, Belarus, with the support of the Belarusian, Georgian and Estonian NREs, BASNET, GRENA and EENet of HITSA.

All these events were the first concerts of their kind in these countries, helping the NREs and music academies involved to develop their international partnerships. There have also been musical masterclasses and LoLa workshops to develop the experience of technicians and performers, and EaPConnect partners' participation in international events such as the Network Performing Arts Production Workshops and the 2018 Sound & Music Computing Conference.

With the Moldovan NREN RENAM set to acquire LoLa in the very near future, we can expect further musical adventures among the EaPConnect partners.



More information

www.eapconnect.eu/

<https://bit.ly/EaP-videos>

The CONNECT Interview: Paul Shelswell

Paul Shelswell is GÉANT's Programme Manager for the ambitious GN4-3N network implementation project that will future-proof European research and education networking for the next 15 years. CONNECT met with Paul to learn more about his background and the project.

Words: Interview by Paul Maurice, GÉANT

Paul, tell us about your background?

I have nearly 35 years' experience in telecommunications network implementation starting from some of the first mainstream long-haul fibre transmission networks for British Telecom in the mid-1980s, to project management of 2G, 3G and 4G mobile network builds in the UK, Brunei, UAE, Portugal, Hong Kong, India, Taiwan and the United States. Prior to joining GÉANT in 2019, I spent the last 12 years project-managing the build of new fibre access networks, delivery and upgrade of 3G/4G mobile access and core networks and implementation/upgrade of IP/MPLS networks (using subsea dark fibre IRU and leased capacity) for a full service operator covering Jersey, Guernsey and the Isle of Man.

What has happened so far with GN4-3N?

Since its official start in January 2019, the majority of the activity has related to finalising the new GN4-3N network topology and the design and procurement of the Open Line System (OLS) equipment and dark fibre connectivity.

The network design activities have built upon the great work carried out in the regional workshops and market engagement activities that were carried out before the project officially started. Design work completed to date has allowed procurement to progress the



dark fibre connectivity for the Iberian Peninsula (Lisbon/Porto/Bilbao/Madrid/Paris) and the first five routes to replace the existing GÉANT dark fibre network covering Madrid/Marseille/Milan/Geneva/Frankfurt.

Procurement of the OLS has included several stages including pre-qualification, outline proposal, face-to-face vendor dialogue sessions, NMS functionality webinars and final bid submission. Many of these activities

have been carried out with support from our NREN partners in the technical evaluation of the proposed solutions.

The outcome of the OLS procurement has resulted in Framework Agreements being awarded to Infinera, Ciena, Nokia and ECI, with Infinera awarded the contract to build the new GN4-3N network.

Key to the project success thus far has been the creation of a new multi-stage Dynamic Purchasing System (DPS) set up by our procurement team to enable a high number of connectivity providers to be pre-qualified for the supply of terrestrial and subsea connectivity. Once accepted in the DPS these providers are then able to respond to published tenders for dark fibre, managed capacity and spectrum connectivity. The DPS system has already been used to procure connectivity covering short term terrestrial and subsea managed capacity for the current GÉANT network, dark fibre connectivity for the new GN4-3N network and terrestrial connectivity for EasPConnect.

How does decision-making work in GN4-3N?

The Network Infrastructure Advisory Committee (NIAC) was formed in April 2019 and is central to the project. Formed of ten NREN subject matter experts, its objectives are to build and sustain consensus during the infrastructure planning and implementation phases and to advise the Project Management Board on strategic policy, topological and technical issues and on financial consequences related to the procurement and implementation of IRUs, spectrum sharing and alternative solutions.

The GN4-3N project team has also spent time defining and preparing a set of tools for use in managing the complex deployment of the new network, migration of services, and decommissioning of the existing line system equipment.

Detailed project plans and task builds are housed in the GÉANT JIRA system with a comprehensive set of tracker and dashboard reports using the Smartsheet suite of collaborative tools. With the OLS vendor and first connectivity providers now selected, more detailed deployment planning is now being integrated into the overall project plan.

Has the schedule been affected by COVID-19?

It has already impacted GN4-3N in many ways. For example, connectivity providers need more time to respond to procurement tenders; travel restrictions and lack of access to key sites has hindered site surveys and audits, in turn affecting last mile fibre planning and solutions; co-location providers have delays in their ordering systems; and we are of course experiencing extended lead times from equipment providers.

Whilst it's difficult to define the total impact of COVID-19 on the GN4-3N programme, it's clear that the deployment of the first new routes will be delayed and this will affect efficiencies in the rollout. We currently estimate the total delay over the project could be in the order of three to six months.

What should the second half of 2020 bring?

We should see deployment of new Infinera FlexLS DWDM and Groove G30 transponder equipment in the GÉANT Test Lab, allowing technical acceptance and validation testing to take place. This will also support integration of the new network equipment into the existing GÉANT operational environment and the new Inventory Management System. This integration testing needs to be completed before live traffic is carried over the new Infinera FlexLS network for the first time later in 2020.

We should also see delivery of the first new dark fibre routes as part

of the GN4-3N network in the Iberian Peninsula, with the first route to be deployed from Lisbon to Porto using dark fibre connectivity and co-location services provided by the local NREN, FCCN. Other routes to be deployed in 2020 are Porto to Bilbao, Paris to Bilbao and Lisbon to Madrid with these routes being deployed using a combination of commercial and NREN dark fibre connectivity.

This period will also allow for completion of dark fibre connectivity procurement for the 15 routes that make up the existing GÉANT dark fibre backbone network so that the first of these routes can be upgraded during the first quarter of 2021.

What stage are you most looking forward to in the project?

Given the time to get to where we are and navigating the unexpected challenges that COVID-19 has introduced, I am really looking forward to completing the deployment of the first new route between Lisbon and Porto. Being able to issue the first cease notice for existing leased connectivity and migrate services across to the new fibre backbone delivered under GN4-3N is something I'm also very much looking forward to!

However, I'm also looking further forward to early 2022 when we can start to plan the expansion of the GÉANT fibre backbone eastwards to connect locations such as Bucharest, Belgrade and Sofia, enabling the South East European (SEE) NRENs to benefit from the GN4-3N network expansion project.



GÉANT releases GTS V7: Offering researchers a flexible, distributed testbed environment

The GÉANT Testbeds Service (GTS) offers researchers virtual environments in which they can develop technological innovations without having to go through lengthy processes to put their testbed network in place. A researcher running an experiment can simply build a test topology by selecting the required resources from a graphical user interface. The system then sets up an automatically provisioned and virtual network for the user.

GTS is now a production service with pods deployed across eight European locations: London, Amsterdam, Hamburg, Prague, Paris, Milan, Bratislava and Madrid.

The service offers an environment for users to test their applications and create a virtual network using different types of resources:

- Virtual Machine
- Virtual Links
- Virtual Switches
- Bare Metal Servers

Via the intuitive GTS interface, users can create a virtual network themselves, leveraging the GÉANT connectivity services to dynamically create layer 2 services across the GÉANT backbone. Users can also specify (within their allocation) servers in designated locations in order to simulate real-world network performance or GTS can allocate Virtual Machines according to availability.

In April 2020 the latest iteration of GTS was released (Version 7) offering an improved user interface, faster deployments and improved onboarding of users. For example, users can now define a testbed topology then exactly replicate it to enable representative comparisons of new software or alternatively the Virtual Machine specifications can be adjusted to perform load testing comparisons.

All of this can be accomplished through the user interface without the need to purchase or manage physical hardware. Users benefit from full admin rights to the VMs used to enable custom configuration and a range of operating systems are available.

The recent updates have greatly enhanced the capability of GTS to support innovative research into networking and distributed application development.

GTS In Action

The GÉANT (GN4-3) Project Work Package for Network Technologies & Services Development (WP6) has been using GTS extensively for various different tasks, including software development and testing. For example: WP6 uses the GTS Service as a platform for continued development of the Service Provider Architecture (SPA).

- WP6 is setting up a DTN testbed on GTS to investigate DTN-related software tools and their performance.
- WP6 is currently also working with the GÉANT Operations Centre on developing the GCS service (E2E L2 connectivity) in the GÉANT network infrastructure, where some of their components are tested in a GTS testbed before deployment in the production VMs.
- WP6 also uses a GTS testbed for its incubator work on novel network service monitoring approaches built on top of Linux, Juniper and Cisco monitoring features, all installed on GTS, with a view to their applicability to NREN/R&E environments.
- WP6 also considers GTS as an example of a virtual network environment in its investigations of future network architectures and their impact on network orchestration, automation and virtualisation.

The key advantage of GTS during the COVID-19 pandemic is that all hardware and connectivity is created and managed remotely without the need to visit or work in confined computer labs making it ideal for socially distanced development! Team members from around the world can collaborate on the platform from their home laptops without the need for complex and expensive hardware.

For more information about GTS, visit the **GTS website**.

Case Study – SCION

The internet has grown over the past 30 years from a limited, low speed network largely centred around the USA to the massively distributed ultra-high-speed complex network we see today. Therefore, the fact that some of the core technologies have remained virtually unchanged yet still operable is a testament to those original designers of the networks and protocols. One of these protocols is BGP (Border Gateway Protocol) which allows network providers to exchange routing information and enables efficient cross-network communication. In fact, BGP is one of the unsung heroes of the internet, enabling us to reach services hosted on other providers anywhere in the world.

However, this venerable protocol is starting to show its age with the need to both increase its performance (including the ability to prioritise different routes according to the needs of the application) and to reduce the security threats that BGP faces (particularly DDOS and Spoofing attacks).

Enter SCION and GTS

SCION provides a path-aware and multi-path communication architecture with transparent and verifiable security built in from the ground up. This can provide huge benefits to network providers faced with the complexity of current and future networks. However, in order to test a distributed high-performance network protocol, you need to build a high-performance distributed network and be able to simulate a range of scenarios across that network. By using GTS, SCION is able to test and retest across a representative network without having to build such a network and without risking live user data.

For more information about SCION, visit: <https://www.scion-architecture.net/>

eduVPN

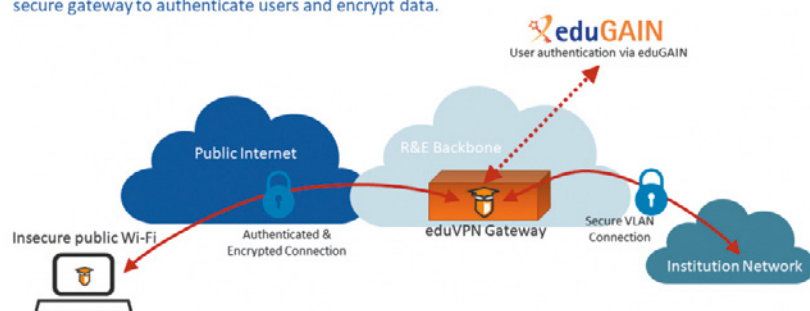


– Supporting Safer Remote Learning

With so many staff and students working from home, the need for safe and secure WiFi access is paramount.

Secure remote access

eduVPN provides easy-to-use client software and a secure gateway to authenticate users and encrypt data.



eduVPN aims to offer both secure access to campus networks as well as the ability to be safer when using the Internet, when eduroam is not available and you are relying on insecure WiFi networks to connect.

The essential eduVPN user experience should be: “open your laptop and be securely online”. eduVPN service instances offered by NRENs or universities, research labs and other institutions allow students, researchers and staff from participating institutions to obtain a VPN connection on their devices to known end-points.

It offers two different usage types, depending on what is needed where you are: institutional access and secure internet access.

Institutional Access

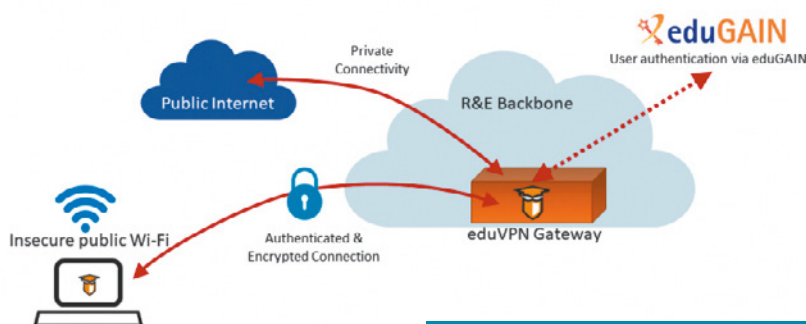
Today many thousands of students, staff and researchers work away from the main campus yet still need access to central services and data. Until now, providing this type of secure access has been either difficult or very expensive with the need to purchase and support commercial VPN solutions and software.

Institutional Access provides access to private networks: a ‘corporate’ VPN solution as it were, where end-users can access internal resources within the internal network of their university. In this case, eduVPN has similar functionalities as a typical VPN concentrator box. The service can also be used to connect different campuses or networks (VLANs) within a single institution.

Using eduVPN allows secure eduGAIN authenticated access for students and staff in a cost-effective, scalable manner.

Secure internet access

Privacy enhancing internet access



Secure Internet Access

With the rise in public WiFi, more and more students and staff are accessing information across potentially insecure networks, risking their data being accessed and shared.

Secure Internet provides secure and privacy-preserving access from public networks: by providing secure gateways to trusted networks that end-users can tunnel to when using insecure networks, in particular public WiFi hot spots.

eduVPN provides a low-cost, secure way to preserve privacy when using public networks using easy-to-use software on laptops, mobile phones and tablets.

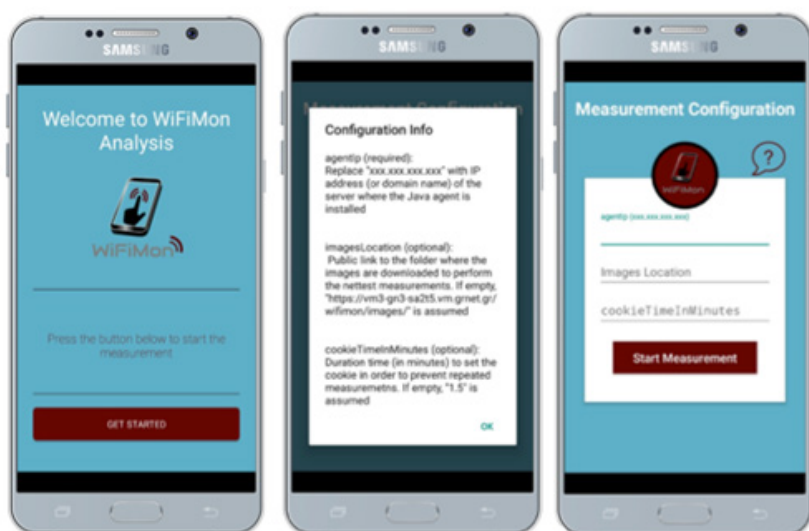
eduVPN Growing Rapidly

Following the recent widespread lockdown measures, more than 40 eduVPN installations have been created around the world to help support safe, private access for research and education.

Learn more at edupvn.geant.org



Wireless Crowd-Sourced Performance Monitoring and Verification



What is Wi-Fi Mon?

Wi-Fi Mon is a distributed performance monitoring and measurement service, using a crowd-sourced approach with probes installed on mobile phones or tablets. The app measures the real-life performance of WiFi by checking access speeds against well-used sites (for example the webmail service) to provide realistic and repeatable tests across different users and different access points.

This approach provides a high volume of measurement points to give the organisation a very granular near real-time assessment of performance.

Wi-Fi Mon – a Hybrid Approach

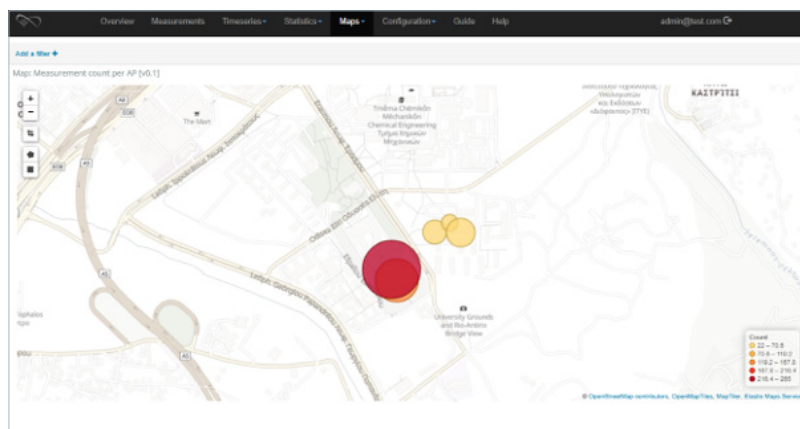
In addition to the client-based approach, Wi-Fi Mon offers a dedicated probe based on low-cost, readily available hardware – the Raspberry Pi. All that is needed is a Raspberry Pi 3 Model B+ and a micro SD card with at least 16GB memory.

WiFi access (and eduroam access in particular) is now accepted as an essential part of the wider campus experience. Not being able to connect to network resources can damage user experiences and can result in users having to use mobile 4G data connections rather than WiFi.

Most WiFi monitoring services merely provide information on the availability (an 'Up' or 'Down' status) of WiFi and can't measure the actual performance of the service. A poorly performing WiFi service affects user experiences and can also be a trigger for IT to investigate wider performance issues. But how can performance monitoring work in a situation where users are by definition mobile?

Within eduroam facilities the situation can be even more complicated as users can have multiple eduroam access points within range – making the reporting of problems harder. Dedicated probes are normally in fixed locations and so, within a campus environment, can be prohibitively expensive.

It is for this reason that GÉANT have developed Wi-Fi Mon.



To find out how to provide Wi-Fi Mon to end users visit www.geant.org/wifimon

GÉANT eduMEET service launched early to support communication needs during the COVID-19 lockdown

International R&E requires the collaboration of many researchers who work for different institutions and may also be spread geographically. Video Conferencing (VC) is an essential support tool and although many commercial solutions exist, the problems of ease of use, cost, reliability and trustworthiness can be barriers to their use within the R&E community.

During the COVID-19 crisis and resultant lockdown measures, R&E needs a low-cost, open and transparent alternative VC solution that requires no special software to operate and can be operated and supported from within the community. As a result, the launch of eduMEET was rapidly accelerated and the team have released an eduMEET Beta service.

What is eduMEET?

eduMEET is a WebRTC web-conferencing platform, designed and developed within the GÉANT GN4-3 project. The WebRTC approach results in a set of services that can support the education community with:

- WebRTC video conferencing service
- distributed STUN/TURN infrastructure to overcome firewall and NAT obstacles
- monitoring, statistics and testing modules to assess the performance of the service.

What makes eduMEET different?

The main aim of the eduMEET service is to provide an easy to use, secure, and affordable video conferencing service for the international R&E community as an alternative to commercial solutions.

eduMEET simplifies real-time communication and introduces a browser-based personal conferencing tool that runs without the need to install any additional clients or plugins. Only a web-browser, microphone and simple web-camera are needed. eduMEET can support both computer and mobile devices, so long as the web-browser supports WebRTC making it highly flexible and easy to roll-out to staff and students.

To learn more, visit
www.edumeet.org



Case Study: Supporting distance learning with eduMEET in Ukraine

Universities around the world moved to distance learning in response to the COVID-19 lockdown, seeking reliable tools for online lectures, seminars and meetings. In Ukraine education is assisted by the national research and education network, URAN Association, with the support of the EU-funded EaPConnect project. URAN staff rapidly set up eduMEET and has quickly become a popular tool attracting up to 120 users per day.

Roman Yatsenko (pictured above) was among the first to test eduMEET and was pleased with the result. As the Head of the e-Learning Tools Department at Simon Kuznets Kharkiv National University of Economics (KhNUe), he is responsible for the entire spectrum of electronic tools in the educational process, including distance

learning technologies. Here Roman talks about his extensive KhNUe experience in organising distance education and the new eduMEET service.

What experience did you have with distance learning before the pandemic?

We have gained good experience. First, in our department, we constantly record videos of lectures for offline courses for students to study on their own. Second, for several years at our University, extra-mural learning courses have been taking place online only. We have not stopped the educational process, it continues; almost all the classes take place online using different platforms, including eduMEET.

How do you decide which platforms to use?

From day one there was full democracy, so that a teacher has the opportunity to choose a platform themselves. For example, in the early days, I used Skype. Three popular platforms include Zoom, eduMEET, and Skype. Zoom offers many features for conducting webinars and online classes; we chose it and eduMEET as the base tools.

Why did you choose eduMEET?

After I received a letter from the URAN association about this platform I tested it myself. I liked it because it's easy to use and simple. There are five main features in eduMEET, including a chat

function. There is video, there is a screen demonstration. In fact, this list of features is the list you need. Conveniently, it requires no additional software - because very often, especially in the first online classes, students complain: "I connected - I didn't connect, I was able - I wasn't, I installed - I didn't install, I was on the phone, I was on the tablet..." And with eduMEET you don't need anything, only a link. It even turned out the link is permanent, it works all the time. For example, we have a room in eduMEET where the rectorate's meetings take place.

What else do you use eduMEET for?

For classes and simple meetings. Personally, I use eduMEET for teaching and I recommend teachers to use it when the number of participants is 20-30. Also, I support and consult teachers using eduMEET: I have a link to the room, I give it to the teachers and immediately communicate with them, share my screen, show how to do something with a computer. That is all. Very fast.

I prefer eduMEET over other services, for its simplicity. I am grateful to URAN for implementing this platform, its simplicity just wins me over.

More about URAN:
<http://uran.ua/>

eduroam is proud to be a founding member of the Wireless Broadband Alliance OpenRoaming initiative

Since the initial concept was developed in 2002, eduroam has been at the forefront of open Wi-Fi access. Its federated authorisation structure and security by design have enabled the service to grow rapidly and scale to incredible levels. From an initial pilot of six partners, eduroam is now available in 106 territories around the world as far apart as Greenland and Argentina, Alaska and New Zealand.

It supports access through over 60,000 hotspots and authenticates over 4 billion national and international roaming connections every year. This is a fantastic example of research and education collaboration on a global scale helping millions of students, staff and researchers work wherever they are.

eduroam Helps Provide Critical Connectivity across the USA During COVID-19

The nationwide shuttering of schools and businesses and stay-at-home orders have made network connectivity more important than ever to educational institutions, particularly those with staff and student populations who are under-served by existing broadband solutions or might also be economically disadvantaged.

Over the last several weeks many colleges, schools, and universities have, in compliance with state and local social distancing ordinances, made spaces such as building exteriors and parking lots available as eduroam-enabled hotspots for their communities. As Internet2 continues to work towards development of programs to serve regional and state networks with wider deployments of eduroam, we are also looking for ways to support existing eduroam connectors as they experiment with short term solutions like this in a sustainable way.

Read More at: <https://incommon.org/news/eduroam-helps-provide-critical-connectivity-during-covid-19/>



The success of eduroam, and in particular its ability to support large-scale federated authentications and complex heterogeneous physical infrastructures has been an exemplar for a range of similar concepts around the world including govroam and cityroam. This is why eduroam is proud to be a launch partner within the Wireless Broadband Alliance OpenRoaming initiative.

WBA OpenRoaming opens the door to create one global Wi-Fi network

On 28 May 2020, The Wireless Broadband Alliance (WBA) invited all organisations in the Wi-Fi ecosystem to join WBA OpenRoaming™ and become part of a globally available Wi-Fi federation that offers an automatic and secure connection of billions of devices to millions of Wi-Fi networks. WBA OpenRoaming provides a new global standards-led approach, removing public-guest Wi-Fi connectivity barriers and bringing greater convenience and security to the wireless ecosystem. WBA OpenRoaming removes the need to search for Wi-Fi networks, to repeatedly enter or create login credentials, or to constantly reconnect or re-register to public Wi-Fi.

For organisations and businesses, WBA OpenRoaming™ provides the opportunity to create new commercial business models and innovative services with speed and simplicity.

Declaring WBA OpenRoaming as “open for business” WBA CEO Tiago Rodrigues said: “Wi-Fi is already arguably the most successful wireless technology of our time, but with these globally agreed standards and policies, we



ONE GLOBAL WI-FI NETWORK



“eduroam has been doing federated Wi-Fi roaming since over a decade with many of the building blocks that meanwhile underpin Passpoint®. Now that Passpoint® and OpenRoaming™ provide a coherent vision and technology to enable inter-federation roaming in a scalable way, it is only natural for eduroam to join forces and take this exciting next step as a first-to-market pioneer participant.”

Paul Dekkers

Chair of the Global eduroam Governance Committee in GÉANT

can take public-guest Wi-Fi to another level in terms of ease-of-use and global availability. The WBA OpenRoaming creates an open framework for all types of players to join and develop their Wi-Fi services and create new business opportunities. We invite venues, vendors and operator/identity providers to join WBA OpenRoaming and revolutionise Wi-Fi usage around the world.”

WBA OpenRoaming simplifies Wi-Fi, much like the cellular roaming experience. Companies who join WBA OpenRoaming can allow end users to automatically connect on any Wi-Fi network managed by a federation member. No more SSID-password guessing games, insecure login credentials or reconnecting to public Wi-Fi. From enterprises to coffee shops, concert venues to connected cars, WBA OpenRoaming creates a world where Wi-Fi users move from one network to another without needing to constantly re-register or sign-in.

The pioneering companies – members of WBA – supporting the WBA OpenRoaming standards include: Airmesh, Airties, Aprecomm, American Tower, Aptilo, AT&T, Boingo Wireless, Broadcom Inc, Cisco, Cityroam, Comcast, Commscope, Deutsche Telekom, Eduroam, ElevenSoftware, GlobalReachTechnology, Google, GoZone Wi-Fi, Hub One, Hughes Systique Corp, Intel Corporation, IT&E, m3connect, Nomosphere, Orange,

Purple Wi-Fi, Samsung, Single Digits, Sun Global, Veniam, WifiCoin and Zephyrtel. Together these companies provide Wi-Fi services that reach billions of people and things.

WBA OpenRoaming defines the industry policies and standards that will manage the federation. The WBA OpenRoaming framework and standards are based on the following features:

- Cloud federation, consisting of a global database of networks and identities, dynamic discovery and the Wireless Roaming Intermediary Exchange (WRIX).
- Cyber security, consisting of Public Key Infrastructure and RadSec providing the certificate policy, management and brokerage services.
- Network automation, facilitated by an automated roaming consortium framework and policy and Wi-Fi CERTIFIED Passpoint®.

Companies who join WBA OpenRoaming are included in a federation of identity and network providers. Equipment vendors, identity providers, venues and operators – as well as private and public Wi-Fi networks – can join WBA OpenRoaming™ and immediately become part of the global ecosystem and help to shape the future of the federation.

“eduroam has been doing federated Wi-Fi roaming for over a decade with many of the building blocks that underpin Passpoint. Now that Passpoint and OpenRoaming provide a coherent vision and technology to enable inter-federated roaming in a scalable way, it is only natural for eduroam to join forces and take this exciting next step as a first-to-market pioneer participant.”

Paul Dekkers, Chair of the Global eduroam Governance Committee in GÉANT

To join or for more information, visit www.openroaming.org.



Providing high quality services to the GÉANT community

Human intervention in well-functioning eco-systems can often trigger unintended and unwelcome side effects. Just as well-intentioned cross-breeding led to the creation of 'killer bees' in nature, so the same principle can be observed in software engineering: just one malicious new line of code or one minor modification can destroy a smoothly running system.

Words: Michael Baierlein (DNF-LRZ), Bartosz Walter (PSNC), Stefan Kelm (DNF-CERT), Branko Marovic (UoB) and Marcin Wolski (PSNC)

Dedicated software testing

To respond to this challenge, a dedicated Software Testing and Analysis team within the GN4-3 project's Work Package on Operations Support (WP9) provides independent verification and validation tests at a system level to all GÉANT software projects. In collaboration with the Software Management and Processes team, guidance and assistance is provided to the software project teams to organise their own Quality Assurance processes.

The software verification process is supported by a combination of domain expertise and dedicated tools delivered through GÉANT's internal infrastructure. Chief among these is SonarQube, a web-based open-source platform used to measure and analyse several dimensions of the source code quality. It delivers comprehensive information about security, reliability and maintainability of software systems written in all mainstream programming languages.

SonarQube is complemented by WhiteSource, a tool that checks for known vulnerabilities, as well as verifying the open-source licenses of dependent libraries. Thus, WhiteSource determines mutual compatibility and compliance with GÉANT's policies. All these features reduce the risk of deploying broken, unsafe or untested code, particularly throughout the maintenance phase.

To support full collaboration with the software teams, the Software Testing and Analysis team offers services based on ITIL recommendations, with mutual expectations and commitments explicitly documented in a Client Document, which details the scope, schedule, KPIs and methods of communication between the review and the client team.

A range of service options

Within the broad range of potential software quality improvement measures, the Software Testing and Analysis team in WP9 is responsible for code quality reviews and security code reviews. The verification and validation are currently offered through four types of services, corresponding to the diverse needs of the client teams.

In its simplest form, the service relies on providing assistance in setting up the SonarQube, configuring it for the project and providing assistance in interpreting

the results. The foundation of this service is to hook up the development teams to GÉANT's leading-edge Quality Assurance infrastructure as quickly as possible and let the teams work based on their own rules and at their own pace.

In many cases, the fully automated review needs to be supported by in-depth knowledge, experience and intuition. Subject-matter experts who are specialised in software maintainability and security will validate SonarQube's findings or perform their own, independent review. Such reviews are offered by three other types of WP9 review services. They differ in review methodology and analysis granularity, which also impacts the time and effort needed to complete the review. At the final step of the software review, the output of the automated SonarQube scan and the findings from the manual review are combined into an easy-to-understand report. Apart from the results and their interpretation, the report also includes a list of recommendations on how to improve the quality of the code. For more details, please visit our Confluence site at [Software Review Requests](#).

Positive results

The advantages of a dedicated testing team became apparent at the end of the GÉANT GN4-2 project, when it was agreed that code quality reviews performed by independent experts were appraised as more objective and that some issues could be detected more easily from an outside perspective with related services and tools.

The Software Testing and Analysis team was set up as a dedicated project unit. By taking advantage of its review services, product owners can now be more confident about the quality of their products and that the services based on them will be more reliable. To date, a number of reviews of various types have been performed, helping teams to fulfil the requirements for passing the Product Lifecycle Management gates, as well as contributing to the quality of GÉANT's services.

An increasing number of review requests, together with positive feedback from clients suggests the team's approach is highly valued, and GÉANT's continued delivery of independent, robust and high-quality services is clearly benefiting from a dedicated Software Testing and Analysis approach.

Being well aware of this potential implication, a typical software development team spends a large amount of time and resources to address important questions such as, "Is my code easy to maintain and well-documented to allow easy and secure enhancements?", or "How can I objectively check the quality of the code?", or even "Is there a way to prove that my code is really secure and does not harm the entire system, or even infrastructure?"

The majority of these questions relate to software quality, software reliability and security.

Software quality relies on several pillars: software testing, optimised cooperation within development teams and software reviews can all have a decisive impact on the quality of services built upon software systems. GÉANT services that are developed for the European research and education community particularly need applications of the highest possible quality.

SAVE THE DATE

TNC21 JUNE 21-25

BRIGHTON, UK

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BRIGHTON

*tnc*21



TNC21 to take place in Brighton, UK

In March this year, as our lives started changing drastically due to the severity and impact of the COVID-19 pandemic, we made the decision to cancel TNC20 originally scheduled to take place in Brighton, UK on 8-12 June.

In this new reality where we started seeing borders closing, cities and entire countries in lockdown and seeing our concerns grow for the health and safety of our community, we had no choice but to address all our community plans.

The cancellation of TNC20 seemed extraordinary in view of the history of our conference (TNC19 was its 35th edition). We gave some consideration to the possibility to hold TNC20 as an online conference but decided against it in order to enable the TNC teams at NORDUnet, PSNC, Jisc and GÉANT to focus their support for research institutions, universities and schools. Now, more than ever, keeping science, innovation and education going is our community's most important goal.

We are now delighted to announce the dates for TNC21 which will take place on 21-25 June 2021 in Brighton, UK and inform you that Jisc is the confirmed TNC21 host. Meanwhile, we look forward to some more clement weather at the end of June and hope to catch a glimpse of the beautiful British summer next year.

Please mark your diaries, your agendas, your calendars and your wall planners! Stay tuned for more information in the coming months and remember that in order to receive TNC updates directly in your inbox, you can subscribe [here](#) to join our TNC-specific mailing list.

For any questions and clarifications, please contact:
tnc@geant.org

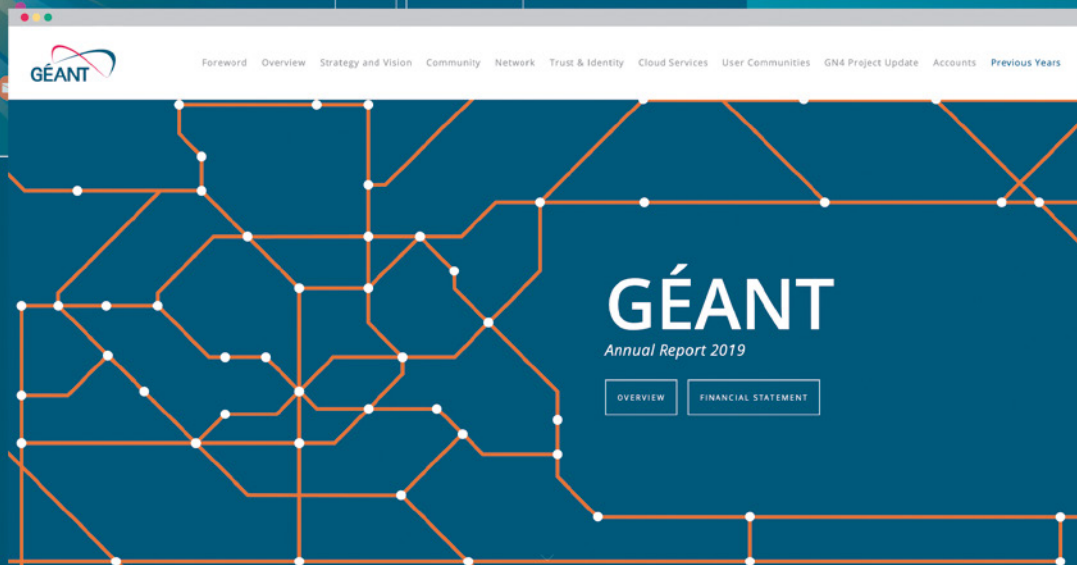


Picture
Kristina
Lillemets

Awards for TNC19

TNC19 received multiple awards by the Estonian Convention Bureau (ECB) at its yearly gala ceremony. TNC19 excelled in the Conference of the Year and Smart Technical Solution categories. Examples of the latter category were the innovative technical solutions adopted at the Tallinn Creative Hub, such as the creative use of screens on separate stages in two different halls during the opening plenary, plus the deployment of the largest digital display screen made up of 540 individual LED units. Kristina Lillemets Director of Infrastructure at EENet of HITSA and member of the GÉANT Board of Directors was awarded the title of Conference Ambassador of Tallinn, for 'her work in international networks and for bringing TNC19 to Tallinn'.





GÉANT Annual Report 2019: The importance of worldwide scale cooperation

GÉANT published its 2019 Annual Report during the General Assembly on 8 June. The report, available for the third consecutive year in digital format only, highlights the diverse activities and many achievements of the GÉANT Association in a dynamic and easy-to-navigate layout with the use of intuitive and informative infographics. In a very eventful year for the organisation, great progress has been made in the key areas of community, network, trust and identity, cloud services, user communities and the GN4-3/N Project.

In the Foreword, Christian Grimm, Chair of the GÉANT Board of Directors, reflecting on the evolution of the digital and political landscape in which GÉANT operates, highlights the organisation's relationship with the European Commission which places 'GÉANT in the limelight of new requirements coming from Brussels with an impact on 2020 and beyond'. Christian also reflects on how 'the start of new projects remains a constant for GÉANT. With GN4-3 and GN4-3N, GÉANT entered the last phase of its core project under Horizon 2020' and how the 'total funding of €128M until the end of 2022 enables GÉANT to establish a new network and make the European NREN community ready for the challenges of the EC's 9th framework programme.'

In the Strategy and Vision section Erik Huizer, CEO of GÉANT, reflects on the impact of the role of NRENs and the importance of open standards, open data and open-source and 'how this mindset towards open and sharing reflects the community we serve and helps to stimulate initiatives like shared research, online education and shared data.' His closing remarks have special resonance with the global community in the current climate: 'We believe that we need the help of all researchers and teachers in the world to battle the big societal challenges that we are facing. An outbreak like COVID-19 shows us that we can only win those battles if we cooperate on a worldwide scale, sharing our findings and building on each other's results. GÉANT and the NRENs are here to make that possible in an easy and secure way.'

For the full report visit:
ar2019.geant.org/

2020

GÉANT
COMMUNITY
AWARDS

Multiple celebrations

Despite the cancellation of TNC20 due to the COVID-19 pandemic, the GÉANT Community decided to go ahead with the celebrations for its prestigious award. On June 11, which would have been TNC20's last day, GÉANT hosted the 2020 Community Award in an online event open to its global community. Claudio Allocchio, Chair of the GÉANT Community Committee said: "At times like these it is even more significant to celebrate our unique community through the outstanding work carried out by some of its members."

This year's award panel selected three nominees, Ann Harding (SWITCH) and Leif Johansson (SUNET) in the category 'impactful contributors to the GÉANT project or wider community activities over a sustained period of time' and Niels van Dijk (SURF) in the category 'outstanding contributions to the project or community which have immediately led to significant and recognisable new ideas, developments or improvements over the last 12 months'.



Ann Harding

Ann was honoured for her work in the Trust and Identity field specifically for overseeing the growth of two services that are synonymous with GÉANT: eduroam and eduGAIN. In particular, her professionalism, determination and engaging manner were unanimously recognised as key to the ongoing success of such services.

Ann commented: ***“I’m really completely overwhelmed to receive this award. My time spent organising, advocating and fighting for our shared work over the last decade and more has been a real highlight in my life. I am grateful to those of you I have worked with who let me help carry your dreams. Thinking big, being open to others and allowing them to be part of a shared ambition is a real asset of this community. I am privileged to have experienced moments of joy but also of shared frustration and sadness with you over the years. Strong community ties are forged in adversity as much as with shared successes and this is reflected in the solidarity we find in our current times.”***

About Ann

Ann was a student of English and History whose e-mail didn’t work. Learning what was behind a broken email system was one of the steps on a journey that took her to study computers and to become Network Operations Manager at HEAnet. A change of country and NREN to SWITCH found her moving away from the packets and fibres into ten intense, amazing years of GÉANT Activity Leadership for Multi-domain Services and then Trust and Identity. She now leads the Infrastructure and Platform team at SWITCH and continues to believe in a moral imperative that NRENs must do good in what we do and how we do it.



Leif Johansson

Leif received the award for contributing with a considerable number of improvements in Trust and Identity and other technologies for the R&E networking community. In particular, the panel recognised Leif’s rare talent to understand a concept not only from a technical standpoint, but also to identify the legal and political aspects of its deployment along with its roll-out potential.

Leif said: ***“I am very proud and happy to have been selected for this award. Any success I might have is because I have the privilege to work with a team of exceptional people at SUNET and GÉANT. My deepest thanks to them and to all the GÉANT family.”***

About Leif

Leif has a PhLic in Mathematics from Stockholm University and has been working for SUNET since 2008. His focus has been digital and federated identity and he is part of the SUNET leadership team and currently heads the infrastructure services group.

This year’s panel of judges comprised Christian Grimm, chair of the GÉANT Board, Claudio Allocchio, chair of the GÉANT Community Committee, Valter Nordh, member of the GÉANT board, Sabine Jaume-Rajaonia chair of TNC20 Programme Committee and Erik Huizer, CEO of GÉANT.



Niels van Dijk

Niels was awarded for his innovative ideas that led to improved or new services for the GÉANT Community. It was recognised that Niels’ creativity has been instrumental in the initiation of a number of new activities in groups such as REFEDS and the GÉANT Project, as well as within SURF. His passion and knowledge are a great asset to the community.

Niels said: ***“It has been my great pleasure to work with all the people in the GÉANT community in the past years. GÉANT brings together amazing minds, highly skilled people and the opportunity to actually make their ideas reality, all in an open and collaborative community. This is a unique and wonderful capability which we should foster and support. By acting locally, but always with a global mindset, joint collaboration of the NREN community will deliver impact that reaches far beyond our national borders.”***

About Niels

Niels is a Technical Product Manager in the Trust and Security department at SURF.

In this role he is responsible for the development and innovation of SURF’s authentication and authorisation services. His focus is on enabling cross-border collaboration for research. He has been involved in many innovation and service development projects, both nationally and internationally. Combining over ten years of expertise in AAI with business development and privacy & data protection skills, he is able to deliver a holistic approach to the development of innovative services. When not at work, Niels enjoys the company of his wife and two boys, sings in a choir, and likes to tinker with all kinds of hardware.

Pictures

Left to right:
Ann Harding,
SWITCH;
Leif Johansson,
SUNET;
Niels van Dijk,
SURF

Vietsch Foundation awards Medals of Honour to Erik Kikkenborg and Bartłomiej Idzikowski

This year, the Trustees of the Vietsch Foundation are thrilled to announce that they have unanimously selected two outstanding individuals whose dedication and commitment have contributed enormously to the community. The 2020 Vietsch Foundation Medal of Honour goes to: Erik Kikkenborg and Bartłomiej Idzikowski.

Andrew Cormack, member of the Board of Trustees explains the rationale behind this year's award. "For many years, Erik and Bartek have led the team that broadcasts and records talks from the TNC conferences. Thanks to their work many thousands of people from around the world have been able to hear about advances in European research networking and join that community, even when geographical constraints meant they could not attend the conferences in person.

Providing high-quality video streams from a wide variety of locations, often over temporary networks that are installed only for the duration of the conference, requires a particular mix of human and technical skills. Everyone who has presented at TNC, attended the conference remotely, or watched the recordings afterwards, has reason to be grateful to them."

In the past few years, they have introduced innovative solutions at TNC combining artistic graphics, audio and video design with cutting edge technologies: high resolution, advanced audio, big range of cameras higher number of screens and dynamic content.



Erik Kikkenborg

Erik Kikkenborg is the NORDUnet Media Services Manager, working on the organisation and distribution of cloud-based hosted video services. He is also the technical project coordinator of a vast number of NORDUnet, DelC, SUNET, NeIC, GÉANT activities and TNC. For more than 20 years Erik has been active in audio visual and communications technology, from technician and project coordinator to manager and consultant on video communications, learning platforms and technology, online video and live streaming. For the past ten years Erik's primary focus has been collaboration with Nordic and International Research and Education institutions in the area of online platforms for learning and collaboration, in the context of European and global projects under the GÉANT events team, GÉANT (eduCONF), TERENA (NRENum), Global CEO Forum (GVA), (GRTC), Asi@connect and Up2University (Up2U). Erik's professional interests comprise the exploration of the potential of video as a way of communication in education with a focus on new tools and technologies. Currently he is working on how to change the educational landscape in developing countries applying online education platforms.



Bartłomiej Idzikowski

Bartłomiej Idzikowski graduated from the Poznan University of Technology in 2003 (Computing Science - Computer Networks and Distributed Systems). He became a PSNC employee in the organisation's Network Department. His research interests focus on video- and web-conferencing, high resolution video systems (4K, 8K), web-based applications, streaming technologies, network management and traffic monitoring. Bartłomiej's professional background includes long-term cooperation within different European and national projects, such as GÉANT's GN2, GN3, GN3plus, GN4-1, GN4-2, and GN4-3 projects, 6NET, Phosphorus, Porta Optica Study, VISIONAIR, ImmersiaTV and Immersify. He was a member of the TNC programme committee in 2011, 2012 and 2013 and member of the TERENA NRENum.net Task Force. Currently, he is the Task Leader of the eduMEET / eduTURN task in GÉANT GN4-3, technical coordinator of TNC, coordinator of the scientific TV team (Pionier TV) and steering committee member of the Special Interest Group Multi Media.

The mission of the

Vietsch Foundation is

to promote research and development of advanced Internet technology for scientific research and higher education. The Vietsch Foundation fulfils its goals in two ways: first, it contributes funding to specific research and development projects that demonstrate potential value to progress European and global research and education networking. And second, each year it awards a medal of honour to people who have contributed to the development of services or technologies of lasting value that are used by the networking community and its users in research, development and education. The Foundation was created through the last will and testament of Willem Karel Vietsch (1952–2014), a Dutch expert, a leader of the international Internet community, and also the Secretary-General of TERENA, a former association of European national research and education networks. For details visit: www.vietsch-foundation.org

Pictures

Left to right:
Erik Kikkenborg
and Bartłomiej
Idzikowski

More resilient to cyber crises with the OZON exercise



It's an ordinary day at the office for you as an ICT administrator. Suddenly you see that the mail server is handling a lot of traffic. What's going on? Then the printer server breaks down. The first emails from worried employees and students appear in your inbox. This is no ordinary malfunction. What to do? Who are you going to involve?

Words: Jan Michielsen, SURF



This is how OZON starts for the average participant. OZON is a large-scale cyber crisis exercise that takes place once every two years. Educational and

research institutions from all over the Netherlands then practice for one day to manage an ICT crisis. SURF took the initiative in 2016. Project manager Charlie van Genuchten: "We noticed that our affiliated institutions wanted to give more attention to cyber crises. The ultimate goal is to make the education and research sector more resilient to cyber crises, operationally, tactically and strategically."

Pictures

Top left:
Illustration by
Pixabay

Top right:
Anita Polderdijk

Right: Charlie
van Genuchten

Strength of collaboration

Of course, any institution can organise such an exercise for itself, but the power of OZON is precisely that institutions do it together. Charlie: "In OZON we can practice how the escalation of a crisis goes across sectors. How do fellow institutions react if all hell breaks loose at one institution? Who will be involved,

who will communicate with whom, how will they work together? In addition to 57 institutions, a number of educational umbrella organisations also participate. And the Ministry of Education, Culture and Science will also participate in the coming edition.

One does not organise such a big exercise just like that: preparation starts more than six months in advance. Charlie: "We start thinking about the scenario. What kind of disaster is going to happen? Which systems and processes will be affected? We also come up with the content of the media simulator: news and social media reports are placed there during the day, which makes communication workers and press officers sweat."

Coming up with your own story

It is not only SURF that is busy preparing, the participating institutions also have a great deal of work to do. Anita Polderdijk knows all about that. She is the Data Protection Officer at Windesheim University of Applied Sciences, and is a practice planner for OZON. In that role, she has already taken part in three of SURF's cyber crisis exercises.

Anita explains, "First we have a number of meetings at SURF about the scenario we are going to play. Then at Windesheim, we are going to look at how this scenario might affect us. We'll weave our own story into it and see which real users we can get to participate."

You need more than protocols to save you

Anita: "One of our main lessons learned from participating in OZON was that protocols alone are not going to save you. Even before OZON we had extensive protocols that tell who has to do what when an ICT crisis breaks out. But if things really go wrong, you also need people who set out the lines, put structure in place. When we really had a crisis situation a few days after OZON, this went a lot better."

"We are now going to take part in a cyber crisis exercise with SURF for the fourth time. We keep getting better at dealing with such crises, but it's important to keep practicing. Therefore, our Executive Board fully supports our participation in the OZON exercises."

But in addition to being instructive, it is also fun to participate in OZON. "It is always exciting and interesting. Every OZON exercise is a brand-new experience."

International activities

OZON is a great success in the Netherlands. A similar, large-scale cyber crisis exercise does not yet exist anywhere else in Europe. However, there is a lot of interest, from Belgium, Denmark, Finland and Ireland, among other countries. Charlie: "It's true that there is no OZON at a European level, but for the past few years we've been organising the two-day crisis management event CLAW, as part of the GÉANT GN4-3 project. There we exchange knowledge through training courses and presentations, and we hold a 'miniature OZON': a half-day table-top exercise in which a cyber crisis is simulated. I notice everyone learns a lot from this, every time. I also organise training courses for NRENs, in which I explain how they can organise their own table-top exercise."

Want to know more?

Everything about OZON:
www.surf.nl/en/ozon

Register for CLAW2020:
eventr.geant.org/events/3277

Training course 'Organise a table-top exercise yourself':
email Charlie van Genuchten at charlie.vangenuchten@surfnet.nl

Scenario OZON 2018: ransomware holds institutions in its grip

OZON 2018 started with a phishing mail to all participants. If you clicked on it, your computer was immediately taken hostage with ransomware. Pay or not? That question became even more pressing when the hacker threatened to make hostage data public if no payment was made. Twitter exploded and the press was on the phone all the time. It was quite a job for the 50 participating institutions to bring this crisis to a successful conclusion.





eduID: one digital student identity for Dutch education

In the Netherlands, students want more and more freedom to determine how they shape their educational career. eduID can help to realise this: it offers students a digital identity that they can use at any educational institution in the Netherlands, during and after their studies. What does SURF want to achieve with eduID, and where does the project stand? Peter Clijsters, eduID's product manager, and Maarten Kremers, eduID's technical product manager at SURF, explain.

Words: Jan Michielsen, SURF



Pictures

Far left:
Photo by Sicco
van Grieken

Left to right:
Peter Clijsters;
Maarten Kremers

To start with: what exactly is eduID?

Peter: In short, an eduID is a digital identity for students in Dutch education. An eduID does not belong to the institution where the students are enrolled, but to the students themselves. That makes an eduID much more widely deployable. With eduID, students are also given a privacy-friendly identity: they have control over what data educational institutions exchange about them, for example when they take courses at a partner institution.

How did you come up with the idea for eduID?

Peter: Students in the Netherlands increasingly want to study outside the institution where they are enrolled. They want to compose their own study programme and wish to follow courses at several institutions, for example to increase their chances on the labour market. So, we are seeing greater student mobility.

Maarten: Institutions usually offer the option for students to take courses at other institutions, but this is often accompanied by messy and opaque administrative processes. To really make this student mobility possible, a new concept was needed.

A few years ago, we were involved in the GÉANT project **eduKEEP**, which already focused on a student-bound identity. In this project, we researched the possibilities with SWITCH and GARR, among others. And more recently in the Netherlands we looked at various existing identities outside the field of education, such as **iDIN** (from the banks) and **DigiD** (from the Dutch government). But these turned out to be of no use to us: we really needed an identity specifically for education. So, we set to work ourselves.

What does SURF want to use the eduID for?

Peter: We already mentioned student mobility: following courses outside your own institution becomes a lot easier if you can be uniquely identified with your personal eduID by all educational institutions. Another application is life-long development: students want to continue to develop themselves after graduation. And employers also want them to do so now that the labour market is becoming more flexible. As students keep their eduIDs after their studies, they can also use it if they obtain extra certificates. Good examples are lawyers or doctors who need to keep up with their professional knowledge.

What experience has SURF already gained with eduID?

Maarten: Last year, we carried out a first important pilot with micro-credentialing: students can obtain so-called edubadges for completed courses that are linked to them via their eduIDs. Through their eduIDs, they can always show that they have obtained these credentials and thus create a digital portfolio.

Peter: We have now started a second major pilot, on student mobility. A number of universities are working together on this. They make it possible for students to register for courses at one of the other participating universities with just one click. We use eduID to uniquely identify students and to streamline privacy-friendly data exchange. This should make the enrolment process a lot easier, for both the institution and the student.

Can eduID also be used outside the Netherlands?

Maarten: We are developing eduID specifically for Dutch education because that has its own characteristics. But we do exchange knowledge with other NRENs that are interested, and where possible we work together. And of course we keep an eye on developments in projects such as **MyAcademicID**, in which GÉANT is involved. Perhaps we can join in at a later stage.

What challenges do you still see?

Maarten: The implementation of eduID is not an isolated process; it is always part of a larger use case, for example studying across institutions. So, we cannot say to an institution: "Look, we've set up eduID for you, good luck with it." The challenge is to think about the larger end goal in which eduID is a cog.

Peter: Another challenge is the large number of stakeholders: our affiliated institutions, but also, for example, the Ministry of Education, Culture and Science. Together, they have to determine what form the flexibilisation of education will take, which includes student mobility, in the coming years. We are already developing eduID, which in fact anticipates national developments. So, we do not yet know what the concrete use cases will be in this area.

Want to know more about eduID and the pilots? Please visit www.surf.nl/en/eduID



Luxembourg NREN raises awareness about cybersecurity and data protection



Since 2018, the Restena Foundation has partnered with the University of Luxembourg to offer students and researchers across the country a series of annual awareness-raising events about two major topics: cybersecurity and data protection. Now in the third year of their successful cooperation, the partners continue to jointly organise CyberDay.lu and Data Privacy Day, two four-hours events that have become part of the national landscapes in their fields.

Words: Christine Glaser, Restena Foundation, Communications and Marketing Manager



The events are part of the curriculum for students of the University of Luxembourg doctoral school, and some high school students in cloud computing or network telecommunications attend CyberDay.lu as part of their studies. Both events also attract a wider audience, well beyond the initial sector of research and education. In late January 2020, for example, a substantial number of professionals from the finance and legal sectors and from public administration joined the Data Privacy Day which has, for the second year in a row, reached its maximum capacity.

Various national actors are contributing to the event. Some of them have even become regular speakers: the Luxembourg Safer Internet Centre and national awareness-raising centre BEE-SECURE, the National Commission for Data Protection, the computer emergency response team of the Government of the Grand Duchy of

Luxembourg (GOVCERT.LU) and SECURITYMADEIN.LU. Thanks to this wide panel of speakers, joined by local key players such as the Association pour la Protection des Données à Luxembourg (APDL), the events offer a diverse and complete programme mixing technical presentations, general awareness and practical demonstrations. The events are also an occasion to give the floor to the local research actors to share their best practices with their peers, with two main research institutes joining the latest Data Privacy Day event.

In addition to the live coverage on social media channels, CyberDay.lu 2019 and Data Privacy Day 2020 have been recorded by the University of Luxembourg's media centre. Recordings from the sessions as well as digital copies of the presentations are available online and can be accessed on the respective event websites: cyberday.lu and dataprivacyday.lu.

The next editions have already been announced and will be held again at the University of Luxembourg premises, in Esch-Belval, in the south of Luxembourg on 6 October 2020 (CyberDay.lu) and 28 January 2021 (Data Privacy Day).

Watch the live event streaming published by the University of Luxembourg on YouTube:

CyberDay.lu 2019 live streaming

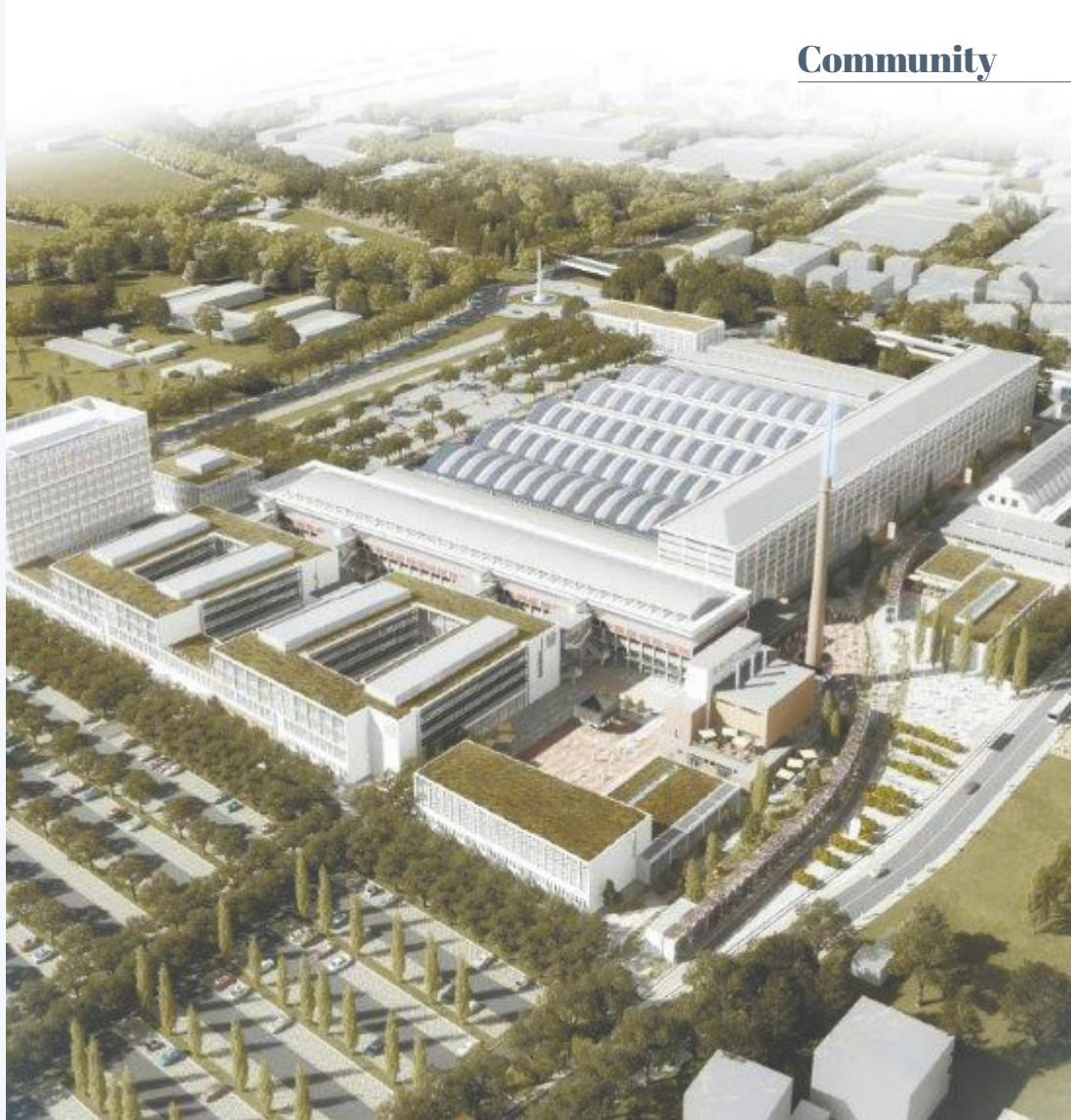
Data Privacy Day 2020 live streaming



European Centre for Medium-Range Weather Forecasts opens data centre in Bologna

The European Centre for Medium-Range Weather Forecasts (ECMWF), the most prestigious institute in the world in its sector, will be opening a new data centre in the Italian city of Bologna to support its headquarters in Reading (UK). The aim is to tackle the current meteorology needs and to anticipate its requirements for the next 30 years.

Words: Maddalena Vario, GARR



“We can say that Bologna ticked all the boxes!”, explains Hilda Carr, Head of Communications at ECMWF. “We launched an international call for proposals and in the final selection we looked at environmental impact, space and geographic location. Also, we took into consideration the relevant opportunities for synergies and technical and scientific collaborations that can be achieved in Bologna between ECMWF and the different institutes and research centres and institutes located in the city area. Bologna can be considered the Italian capital of Big Data and offers many opportunities for knowledge sharing. ECMWF headquarters’ current structure in Reading lacks the optimal characteristics for the

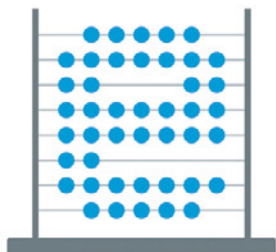
expansion required by its 2025 strategy. To achieve this goal, it is necessary to increase ten-fold the computing capacity in the new data centre: this requires both additional technologies and processors and as a consequence, significant infrastructure expansion. Therefore, the projects of seven European sites to host and build the new data centre were evaluated: Exeter (UK), Slough (UK), Luxembourg, Espoo (Finland), Akureyri (Iceland), Reading (UK) and Bologna (Italy).”

The data centre will be located at the Tecnopolo which is a former tobacco factory: an area of 9,000m² has been allocated with the opportunity of a further expansion of 6,000m².

Network at 100 Gbps

The highly energy-efficient facility will be connected to the GARR network at 100 Gbps, via two different PoPs that will guarantee network continuity.

In relation to the network requirements, ECMWF Deputy Director of Forecasts Umberto Modigliani explains, “we give high priority to speed and reliability because we receive millions of data every day from all over the world. We are talking about several dozen Terabytes that need to be processed several times a day to produce our forecasts. At the same time, we distribute in real time quantities of data in the order of 20-30 Terabytes per day and in the near future all this data will be distributed all over the world from the Bologna data center, thanks to the reliability and high speed of the GARR and GÉANT networks.”



e-Schools

DEVELOPMENT OF THE SYSTEM
OF DIGITALLY MATURE SCHOOLS

(II. PHASE)

CARNET

e-Schools: bringing digital transformation to the Croatian school system

The “e-Schools: Development of the System of Digitally Mature Schools” programme is one of the largest investments in education in Croatian history, which is in line with major national strategies related to education along with national curriculum reform. Worth more than €200 million and financed through the European Regional Development Fund, European Social Fund and the state budget, the programme includes all public schools in Croatia, thus bringing equal opportunities to all students in the country.

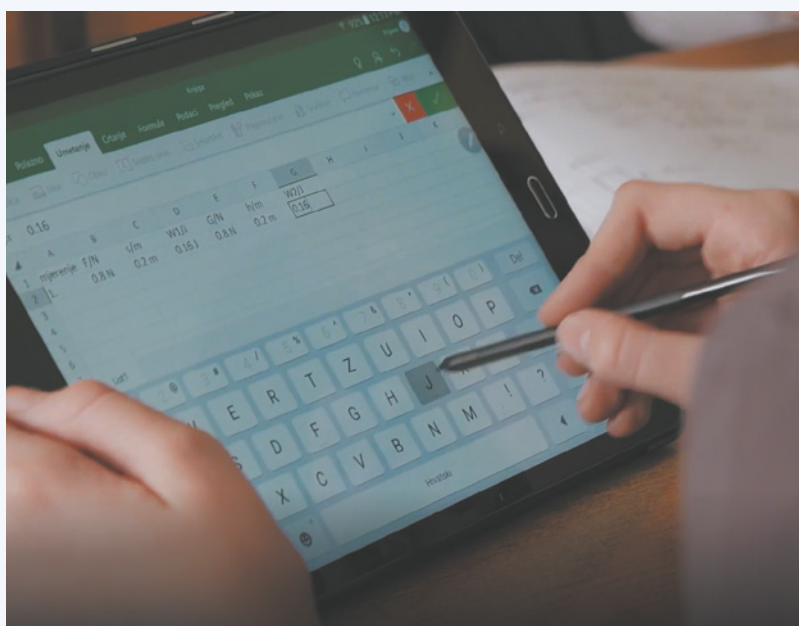
Words: Anja Korda, CARNET



The overall objective of the e-Schools programme is to contribute to the empowerment of the primary and secondary education system capacities while enabling students to become more active participants of the labour market, pursue further education and engage in lifelong learning. e-Schools are envisioned as digitally mature schools connected to ultra-fast internet, highly equipped with ICT, with digitalised teaching, learning and administrative processes. In such schools, digitally competent teachers and students use ICT in their everyday work, together with educational applications and digital education resources.

The advantages of such a systematic and comprehensive approach were demonstrated in the pilot phase of the programme, which ended in 2018. The pilot project was implemented in 10% of Croatian primary and secondary schools, resulting in increased digital maturity of schools and increased motivation among teachers and students.

In the second phase of the programme, by the end of 2022, all schools will be equipped with wired and wireless local area networks and the corresponding active network



equipment. Following the network, selected classrooms in each school will be equipped with modern ICT devices for teaching and teachers will receive a device to help them prepare and implement modern educational practices in their classrooms.

Also, to further facilitate and encourage the use of ICT, suitable digital educational content, other e-content and e-services are being developed. With this in mind, the crucial part of the e-Schools programme is the support and training of

teachers and school staff, because only digitally competent teachers will be able to use and further explore the benefits of the use of ICT in education. Furthermore, activities dealing with security aspects of the ICT implementation will also be implemented.

Finally, several types of research and evaluations, aiming to explore further the effects of the use of ICT in education will be conducted, providing valuable input for future national and international projects.

RNP develops solutions for biodiversity and climatic impacts in Brazil

Brazil is internationally known as the country of carnival and soccer but is actually one of the main hosts of biodiversity. The tropical territory of continental proportions holds the highest genetic variability in the world. It is estimated that 20% of the global diversity is located in the South American country. About 48,000 known species of fungi and plants, and 115,000 known species of animals compose the Brazilian flora and fauna.

Words: Stela Tsirakis Toti, RNP



Such biodiversity is explained by the high ecological and climatic variety with different regional characteristics. Totally, there are six types of climates and six different terrestrial biomes. For example, it is possible to observe the contrast between the equatorial rainy climate of the North, and the semi-arid climate of the North-East, with low rainfall indexes. And of course, the forest is a natural asset: the largest tropical rain forest in the world, the Amazon Rainforest; the largest wetland, Pantanal, and the tropical Atlantic Forest are in Brazil.

Now, consider the combination of all that natural wealth with science and technology. The last elements of this equation are intrinsic to Rede Nacional de Ensino e Pesquisa (RNP) [National Education and Research Network], which has been driving innovation, research and education in Brazil for more than 30 years. The combination of these components, in order to offer data and information to support public policies, structured two of the many solutions developed by RNP, with

support and coordination by the Ministry of Science, Technology, Innovation and Communications (MCTIC).

One of the ongoing initiatives is the Brazilian Biodiversity Information System (SiBBR). It is the first national technological infrastructure that integrates and provides scientific information on the variety of species and ecosystems coming from different sources in Brazil and abroad. SiBBR provides information on the 165 thousand known species, with more than 15.6 million records. On the online platform the accessed data can guide governmental decisions related to sustainability and promote knowledge about biodiversity.

In addition to RNP and MCTIC, the system has been supported by UN Environment Program (UNEP) and the Global Environment Fund (GEF) based on the Atlas of Living Australia Platform (ALA). Developed in open code, the platform uses international standards, which facilitate data sharing and can be adapted and evolved according to the needs of each country. Abroad, SiBBR is the Brazilian hub in the Global

Biodiversity Information Facility (GBIF), an initiative that congregates data on biodiversity from more than 60 countries.

In addition to biodiversity, Brazil is rich in climatic variety and centralises the observed and the planned impact of climate changes in the country on the ImpactaClima platform. It integrates information that enables progress of the analysis on the observed and the planned impact of climate changes on the national territory. This project is also carried out by RNP and MTIC and the Instituto Nacional de Pesquisas Espaciais (INPE) [National Spatial Research Institute] is also involved. With the proposal, decision-makers can evaluate the main variables and the cause-effect relations in the climate change context and propose adaptation measures.

Mayors and governors will be more able to contribute to the protection of biodiversity, foresee crises and natural disasters – such as drought, landslides, floods or desertification – in addition to developing more correct and conscious environmental, economic and social public policies.

The Solution Management Deputy Director of RNP, Antônio Carlos Nunes, who followed the project management, comments, “Both SiBBR and ImpactaClima enable fundamental information on biodiversity and climate, respectively, making it possible for researchers, public administrators and society as a whole to access to rich data on preservation and climate, with potential breakdown for the creation, analysis and structuring of public policies”. The projects contribute to sustainability and environmental preservation of the country's natural wealth which is not only a Brazilian asset, but a global one too.

Picture
Credit José
Sabino/SiBBR





How Huawei is helping its Education Customers during this time



Over 1.5 billion student are affected by school closures due to government measures in order to prevent the pandemic from spreading in campuses. Globally Universities, schools and research centers moved to the cloud to ensure the teaching continuity despite the closure during the times of pandemic prevention and control. Reliable intelligent solutions are needed in the education system to realize the connectivity and move towards an online and smarter education.

Huawei helps to provide network interconnection infrastructure for the cross-regional education network, helping our customers build simplified networks featuring on-demand deployment, intelligent O&M, converged innovation, and future-oriented development.

NRENs play an important role by connecting the higher education and research centers to effectively support the surging online teaching services. The network infrastructure used must be elastic to provide the right support for all the data transmission. On one hand, the hardware architecture (NetEngine 8000, OptiXtrans,

Campus OptiX) have large capacity and high bandwidth, and support smooth capacity expansion and continuous service evolution in the next 10 years. On the other hand, the network support minute-level network deployment and cloud scheduling based on global traffic, provide programmable paths to support the different SLA and low latency requirements.

Huawei has prepared a Webinar Series for tackling the emergency together through technology, please join us to learn more about our solutions during this special period.



Getting education right means putting people first



Dropbox research finds higher education must keep humans at the heart of innovation

Increased competition, digital innovation, and elevating student expectations are transforming the way students want to learn, and institutions teach.

To find out how you can future-proof your school to attract tomorrow's learners, Dropbox has spoken to 25 leaders across the sector to uncover how they're responding to the challenge.

The research identified three pillars for development, which we'll expand on in this article: meeting student expectations, creating future-ready institutions, and strengthening your brand.



Provide flexible teaching and learning experiences

There's growing pressure on schools to provide flexible teaching and learning environments for students. According to Dr. Claudia Mössenlecher, Head of Learning Solutions at the MCI Entrepreneurial School® Innsbruck, "[Students] want to know they can learn in a way that [...] fits around their life, and it's our job to enable that."

This means engaging students – and faculty – to understand their needs. "Universities must engage students in the technology road-map," says Marie-Odile Lhomme, Head of Digital Transformation and Information Services at Audencia Business School, one of France's top business schools. "This engagement will give you the information you need to adopt tools and processes your people actually want and need – rather than adopting those that won't work or will fail to get buy-in."



Craft future-ready institutions

Students don't pick a university based solely on reputation anymore – so it's crucial institutions stay up-to-date. That requires what Mark Brill, Senior Lecturer in Future Media, Birmingham City University, describes as "...a more radical re-think of how institutions utilise technology and people."

Being future-ready, doesn't mean filling your schools to the rafters with gadgets. It means keeping innovation front-and-centre in everything you do – and teaching the soft skills that will stand the test of time, and prepare your students for the world of work.

François Debois, Head of Innovation at CEGOS, put it simply: "Anyone can learn hard skills [...] We have to offer students something different, and that difference is soft skills."

Build brands that cultivate prestige

Schools must build a reputation for excellence, but with many schools offering a similar syllabus, "You have to [...] be on the lookout for new ways to differentiate," says Marie-Odile Lhomme.

According to the research, providing freedom for students, researchers and faculty is key – using technology to empower people, remove inefficiencies and improve collaboration.

Fabrice Bardèche, Executive Vice President at IONIS Education Group, sums up how to do it right: "Students will always learn and adopt technology quickly; it's second nature for them.... It's an uphill battle, but it can be won with the right approach. As soon as you demonstrate the value of new digital tools and innovations, you can begin to shift perceptions."

Future-proofing education is not a quick task – but it shouldn't be overcomplicated, either. Institutions who put people first, collaborate, and employ smart solutions will be ready for whatever the future holds.

To find out more on how education leaders are future-proofing teaching and learning, and what you can learn from their approach, download your copy of the Teaser Report [here](#), and automatically receive the full report once available in June.

Dropbox Business for education

Dropbox offers a range of solutions to facilitate collaboration and empower students and faculty to work how they want – all whilst rigorously safeguarding data:

- **Dropbox Spaces** brings students and faculty together with their favourite tools and content to create a safe space to collaborate on projects, set project timelines, and assign tasks. Whether sharing PowerPoints, videos, or design files, students and faculty can see everything that's going on, all in the context and conversations, all in the same course workspace.
- **Dropbox Paper**, a real-time collaboration platform used by University College London (UCL) to speed up research outcomes, gives students and faculty access to content and course materials on campus, remotely, and on mobile.



How Google Cloud is supporting COVID-19 academic research

As COVID-19 continues to grow in impact, academic and life science researchers are in a race to understand more about the novel coronavirus, and are increasingly turning to cloud technologies to aid them in their work. Google is so grateful for the work of these experts, and wants to support them with tools and technologies that can help them combat this pandemic. Today, we're sharing more on a number of initiatives that we're engaged with to support researchers and the organizations and communities they serve.

Words: Joe Corkery, MD, Director of Product, Healthcare and Life Sciences, Google Cloud

Helping researchers forecast COVID-19 spread and impact

The Laboratory for the Modelling of Biological + Sociotechnical Systems (MoBS) in the Network Science Institute at Northeastern University started running large-scale, data-driven model simulations on Google Cloud in January to estimate how mitigation strategies such as travel restrictions and social distancing policies would impact the spread of infection. The models are tremendously complex, containing dozens of parameters and huge amounts of data, and require enormous amounts of compute power, data processing, and storage.

By using Google Cloud's High Performance Computing (HPC) capabilities, including batch processing via the Cloud Life Sciences API, Northeastern University researchers have been able to simultaneously run thousands of preemptible Virtual Machines (PVMs) to power their work. This has reduced the time it takes to run complex simulations from days to hours. Furthermore, when the simulations are complete, they can then analyze the results using BigQuery and quickly share these insights with researchers and public health agencies around the world to accelerate the shared understanding of how the virus is spreading.

The benefit is tremendous. To date, Northeastern University researchers have been able to generate over nine

million different models and analyze more than 5,500 terabytes of resulting data. They also assessed the relative risk of importing cases (visualized using Google's free visualization tool Data Studio), and published their findings in *Science*.

"Developing data-driven models for predicting COVID-19 infection spread and potential impact is monumental as we race to slow the virus," said Dr. Matteo Chinazzi, Associate Research Scientist at MoBS.

Continuing to support critical research

Google is mobilizing \$20 million in Google Cloud credits to enable researchers to harness the power of the cloud in their fight against COVID-19. To administer these credits effectively, Google has partnered with the Harvard Global Health Institute to identify promising research opportunities and apply Google Cloud's capabilities to support them. Harvard Global Health Institute has gathered a team of scientific advisors from a diverse range of disciplines to review submissions. Researchers who need Google Cloud capacity for work on COVID-19 can submit proposals here — applications will be considered on a rolling basis.

"With academic researchers racing to discover potential treatments and therapies, collaboration is more important than ever. Our partnership with Google provides these researchers much needed resources to speed up the global response to COVID-19," said Dr. Ashish K. Jha of the Harvard Global Health Institute. "We're considering all different types of research approaches like clinical research, bench science research, drug delivery and therapeutics research, health services and policy research, and epidemiological research to address the urgency of the pandemic."

We are also supporting researchers at the University of Virginia Biocomplexity Institute who are running daily epidemic simulations on Google Cloud. The results of these simulations are datasets that help state, local, and national governments track the spread of COVID-19, assess the impact of interventions, decide on how and when interventions will be relaxed and make decisions on how and where to allocate resources.

Bringing data analytics and machine learning to more researchers

To make data more widely available and accessible for researchers, Google Cloud launched the COVID-19 Public Dataset Program which enables free querying of COVID-19 related datasets in BigQuery. This includes the widely referenced Johns Hopkins University cases data (which can also be visualized in Google Sheets as a dashboard), as well as datasets that may prove relevant in COVID-19 research such as the American Community Survey and Open Street Maps. Additionally, we have introduced seven new Social Determinant of Health (SDoH) datasets and Google Community Mobility Reports available in the program that can help researchers identify which communities in the United States are most vulnerable to the pandemic.

In March, the White House and supporting institutions called upon the AI community to develop new text and data mining techniques to examine the COVID-19 Open Research Dataset (CORD-19), the most extensive machine-readable coronavirus literature collection to date. To help, we asked our Kaggle community of data scientists to join the effort, and to also take part in additional challenges to forecast the spread of COVID-19. The contributions from those efforts, including an ML-curated literature review, can be found [here](#).

Accelerating drug discovery research efforts at lower costs

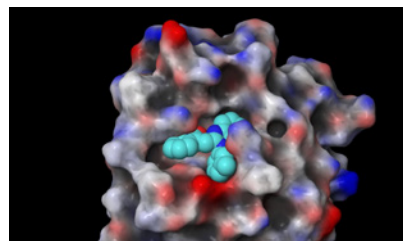
Researchers are working around the clock to better understand COVID-19 and minimize its impact on both our health and the global economy. By distributing their work across tens of thousands of virtual machines on Google Cloud, researchers are able to speed up their models and analyses, resulting in substantial savings in both time and resources. Google Cloud preemptible VMs are a great way to run these types of easily distributed, fault-tolerant research applications, enabling researchers to accelerate the computational portion of their research at a fraction of the cost of standard VMs.

With the goal of accelerating as many COVID-19 related research projects as possible, Google is expanding access to preemptible VMs through PVM specific credits to support COVID-19 initiatives, in addition to the general cloud credits mentioned earlier in this post. As we receive COVID-19 research proposals, Google will work with researchers to identify ways they can accelerate and scale up their work through the use of preemptible VMs, as is the case in the following example.

Developing a new drug in the United States typically costs between 2-3 billion dollars and takes about ten years. Teams at Harvard Medical School and Dana Farber Cancer Institute (DFCI) are using VirtualFlow, an open-source scalable virtual drug discovery platform running on Google Cloud that utilizes preemptible VMs, to more quickly and accurately narrow down promising drug targets to accelerate the discovery of therapies and treatments for COVID-19 patients. VirtualFlow is helping them target billions of drug compounds against SARS-CoV-2 proteins in a matter of days, greatly increasing their capacity to study and analyze potential therapies for COVID-19.

"The virtual testing approaches we are using have massively reduced the time required for drug and treatment discovery and will hopefully lead to faster development of therapeutics for diseases," said Christoph Gorgulla, a postdoctoral research fellow at Harvard Medical School.

"Leveraging the abundance of structural data available on the SARS-CoV-2 proteins we are using Google Cloud's technology to identify inhibitors of viral proteins. The use of hundreds of thousands of computational cores at Google Cloud, allows us to finish this task of screening a billion compounds, (~12 billion docking instances) in a couple of weeks. To accomplish this on a standard laptop would take 1500 years", said Haribabu Arthanari, who is an assistant professor at the Harvard Medical School.



SARS-CoV-2 main protease with a virtual hit compound docked into the protein active site

Once a short-list of promising pharmaceutical compounds has been identified, the team from Harvard Medical School will work with researchers at other institutions with facilities in place to begin testing. At the same time, the VirtualFlow team will run additional screens against databases of already-approved drugs to see if any contain these compounds. Harvard Medical School also has a number of other research collaborations running in parallel with other institutions to match the most promising drug compounds, which will allow their work to progress more rapidly.

Continuing to make data privacy and security a priority

Data is the cornerstone of educational and academic research, and the privacy and security of that data is critically important. Our Trust Principles ensure data on Google Cloud is handled in accordance with widely recognized patient privacy and data security practices, and businesses and organizations that use Google Cloud remain in complete control of their data.

Google Cloud's commitment to supporting educational and academic research is core to our DNA, and we'll continue to find ways to help researchers and organizations apply cloud technologies for the benefit of all.

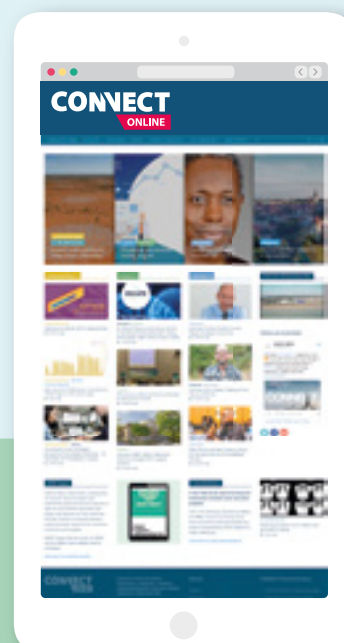
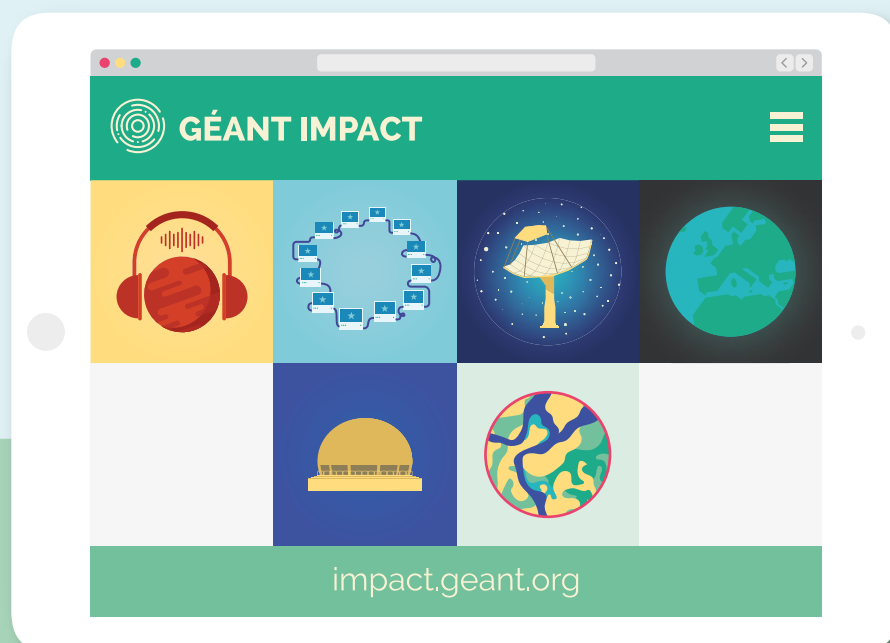
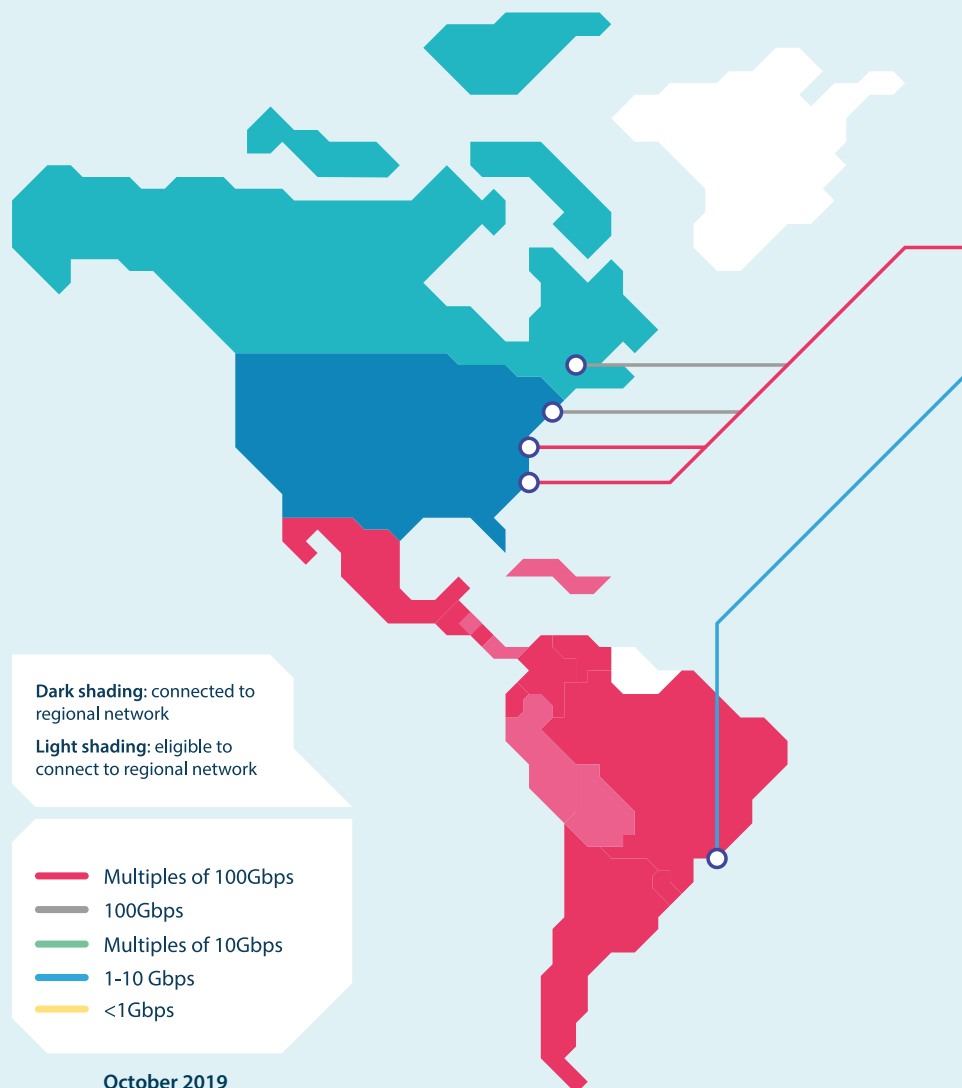
Apply for Google Cloud research credits

Google Cloud research credits can help advance your research by giving you access to computing power to make breakthrough discoveries. We're funding projects from modelling the outbreak of COVID-19 to predicting sepsis and discovering new planets. We look forward to supporting the next big breakthrough.

Find out more

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 now CONNECT is online with a new website (connect.geant.org) and 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.

