CONNECT

THE MAGAZINE FROM THE GÉANT COMMUNITY | ISSUE 24 2017

GROWING THE COMMUNITY

CONNECT INTERVIEW:
TALKING TRUST & IDENTITY WITH KLAAS WIERENGA

PREVIEWING TNC17:
A LOOK AHEAD TO THE NETWORKING CONFERENCE

TESTBEDS SERVICE:
BRINGING RESEARCHERS AND TECHNOLOGY TOGETHER

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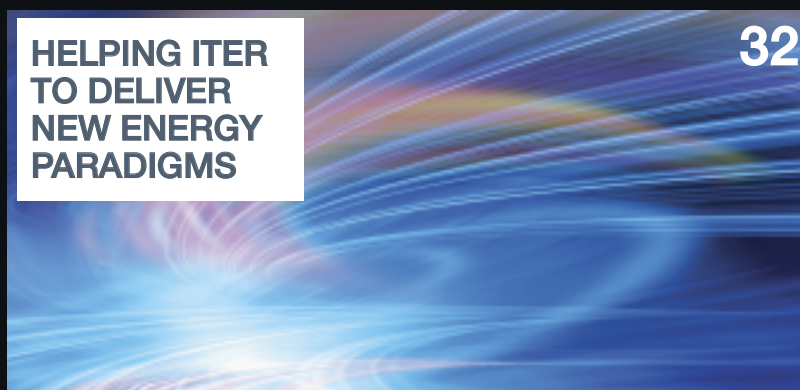
CONNECT is the quarterly magazine from the GÉANT community; highlighting the activities of Europe's leading collaboration on e-infrastructure and services for Research and Education. We give insights into the users who depend on the network, and the community that makes GÉANT what it is. We welcome feedback at **paul.maurice@geant.org**

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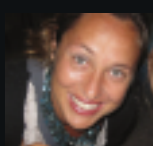
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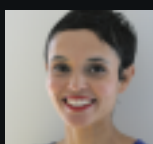
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WELCOME FROM CATHRIN STÖVER

The 24th edition of the CONNECT magazine, which you are reading online or holding in your hands contains several interviews which I would like to particularly bring to your attention. We hear from the Managing Director of SWITCH and GÉANT Board member, Andreas Dudler and also from Klaas Wierenga, who has recently re-joined our community as Chief Community Support Officer and member of the GÉANT Executive Team. I am pleased that CONNECT could catch up with both Andreas and Klaas and that we can share their insights and plans for the future with all of you. We also hear the voice of Deirdre Carabine, Professor at the Virtual University of Uganda, who gave a fascinating talk at last year's UbuntuNet-Connect Conference on how ICT and Collaboration with

NRENs are changing the face and pace of Higher Education in Uganda.

Community is our strength and we are proud that this community is extending. This CONNECT magazine highlights the work carried out by EGI and OpenAire and gives updates from our regional partners around the globe: from the Eastern Mediterranean, to West and Central Africa, Asia, Central Asia and the Eastern Partnership countries.

And we are gearing up for TNC17! CONNECT has caught up with the host and members of the programme committee who promise that the conference will light up our creative side from 29 May to 2 June this year. I hope to see you all again, when we get together in Linz.

Cathrin Stöver, GÉANT

FIFTH CONSECUTIVE TOP RANKING FOR THE GÉANT PROJECT

In November 2016, key staff from the GÉANT Project (Coordinators, Activity Leaders and several Task Leaders) attended the annual European Commission review, presenting the GN4-1 Project's wide range of work to a panel of subject matter experts appointed by the EC. The result was quickly delivered: the Project achieved the highest possible rating for the fifth consecutive year, extremely rare in the context of such a large project.

This particular review covered the period of May 2015 to the end of April 2016, focusing on the key areas of network evolution and cost-optimisation, service development and delivery, and working with NRENs, industry, e-infrastructures and end-users. CONNECT took a closer look at the highlights of GN4-1 to better understand the impact of this EC-funded project.

GÉANT (GN4-1) HIGHLIGHTS

The overall objective of GN4-1 was to provide a stable, though innovative, environment for the growth of GÉANT as the European Communications Commons for the European Research Area (ERA), providing the best possible digital infrastructure to ensure that Europe remains at the forefront of research. In doing so, GÉANT makes a vital contribution to fulfilling EC aspirations by providing e-infrastructures to empower European researchers, increasing creativity and efficiency of research and bridging the divide between developed and less-developed regions.

NETWORK EVOLUTION AND COST-OPTIMISATION

The period saw core IP traffic increase by almost 50%, which, when combined with dedicated services for larger users, resulted in total traffic volume of nearly 1.1 exabytes. Nevertheless, the operational excellence of established GÉANT services was maintained, and significant economies on the costs of the backbone network were achieved – leading to a €3.2M saving. This level of traffic/network growth is well anticipated however, and GÉANT continues to look to the future with a network evolution plan incorporating fibre sharing, software-defined networking (SDN) and packet optical integration. This demonstrates an efficient, high-performance network that supports/is equipped/provisioned to respond to both present and future demands of researchers. To learn more about GÉANT's network see **geant.org/Networks**.

> "The fifth, consecutive, top ranking for the GÉANT Project is a tribute to the commitment, expertise and passion of the hundreds of people from across Europe who have worked together to deliver world-class services and research in advanced networking to support Research and Education."
>
> Matthew Scott, Chief Programmes Officer, GÉANT

39 partners

164 FTEs

SERVICE DEVELOPMENT AND DELIVERY

GÉANT services are developed in line with to user requirements before they are transitioned to fully supported production services, within a portfolio covering networking, trust and identity, mobility, security and clouds. Significant progress was achieved in GN4-1, particularly in cost optimisation of network services, growing use of trust and identity services, and development of cloud services. In particular, a successful Infrastructure-as-a-Service (IaaS) tender was launched with the involvement of 36 NRENs, establishing a single digital market for the use of these services. Breakthrough agreements were negotiated with Amazon Web Services, to waive data traffic charges for R&E users, and with Microsoft, to directly connect cloud services to GÉANT via dedicated private ExpressRoute network connections. The use of key services such as eduroam and eduGAIN also grew significantly during GN4-1: eduGAIN reached 38 of a possible 43 federations, and eduroam grew by over 45%.
To learn more about GÉANT's services see **geant.org/Services**.

WORKING WITH NRENS, INDUSTRY, E-INFRASTRUCTURES AND END-USERS

By interconnecting Europe's NRENs and facilitating high-speed links with other global regions, GÉANT connects schools, universities and the world's largest research projects. This approach is only possible through close collaboration with NRENs, large user projects, international projects and e-infrastructures. Within GN4-1, part of this collaboration took the form of a joint user engagement workshop held at the high-profile SuperComputing 2015 (SC2015) event, an integrated approach to e-infrastructure liaison to progress a joint service portfolio, and closer links with industry. Elsewhere, the project's global reach and relationships enabled researchers' significant contributions to the InfiniCortex project – a galaxy of supercomputers formed by a worldwide network built on the InfiniBand networking communications standard known for high throughput and low latency. Part of GÉANT's outreach program also includes attending, presenting and exhibiting at key events – look out for us at several events throughout the year. To learn more about the groups we interact with, see **geant.org/People**.

eduroam
85 COUNTRIES
2,000,000,000 AUTHENTICATIONS

1083 Petabytes
total traffic volume

50%
growth in global traffic

€3.2M
cost savings achieved

TNC17 WILL LIGHT UP YOUR CREATIVE SIDE

The largest European research networking conference is prepping up for another inspiring key community gathering. Placed under the theme of "The Art of Creative Networking", the TNC17 programme is packed with sessions, demos and talks sure to stimulate your neurones.

Over the years, Research and Education networks have evolved from dedicated connectivity providers to pioneering above-the-net service designers and innovation enablers.

Empowering future generations to shape their own success and solve global challenges is at the heart of our shared mission.

Albert Einstein said "Imagination is everything. It is the preview of life's coming attractions." TNC17 will address ideas and creativity across many themes from Cloud technology and Big Data to the impact of innovation on our understanding of ourselves and of the world.

THE WORD OF THE HOST

Christian Panigl, Head of ACOnet and Chair of TNC17 Programme Committee is looking forward to welcoming you in Linz. Here are his reasons why you should come to TNC17:

- TNC17 is a unique opportunity to meet all key stakeholders in Research and Education networking; from e-infrastructures programmes to research institutions, network suppliers or funding bodies everyone you need to meet is there.
- It is the place to find out about the latest trends happening in Research and Education networking, from all regions of the world.
- You will be able to take part in workshops to advance your work, offer or technology.
- Discover all that Linz, UNESCO "City of Media Arts", has to offer, starting with the Ars Electronica Center – home of the famous Ars Electronica Festival – which is a pioneering place for creative technology.

KEYNOTE SPEAKERS

Through keynotes speeches from renowned specialists, TNC17 presents participants with a unique opportunity to discover new perspectives from around the world in both Research and Education networking as well as its applications. This year's keynote speakers are:

GERFRIED STOCKER

Artistic Director and Managing Director of world famous Ars Electronica Center and Festival will give us an insight on how ideas come together to produce innovative solutions.

BIKASH KOLEY

Google's Director of Network Architecture, Engineering and Planning will share with us his experience of SDN and its evolution at Google over the years.

HANNES GREDLER

Expert in routing software and Chief Technical Officer at RtBrick, Hannes Gredler offers an alternative point of view on network design and reinforces the relevance of router-technology.

COLE NUSSBAUMER KNAFLIC

Cole Nussbaumer Knaflic will change the way you look at data. Cole is the author of "Storytelling with data: a data visualization guide for business professionals" and writes the popular blog www.storytellingwithdata.com.

INSIDE THE PROGRAMME COMMITTEE

TNC17 Programme Committee is an international group of experts in Research and Education networking eager to provide a 360 degree-forum for our community to collaborate and advance science for the benefit of all.

They had the difficult task of building the backbone of the conference programme out of over 150 submitted papers reflecting the latest trends of Research and Education networking. The exercise reached its final stage in the SURFnet offices in Utrecht mid-January where the Committee members gathered to design the final sessions, after three weeks spent co-reviewing the individual papers online.

The one-day Programme Committee meeting was conducted by GÉANT event organiser Gyöngyi Horváth and culminated in the selection of 60 presentations, split into 24 thematic sessions. The sessions will explore the possibilities of Cloud, SDN, Open Source collaboration and more and provide an ideal environment for ideas to germinate into future innovations.

Rod Wilson from Platinum sponsor Ciena and member of TNC17 Programme Committee, about the possibilities offered by TNC:
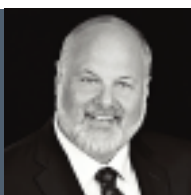
"TNC provides us at Ciena with a great opportunity to engage with the NREN community through demonstrating our latest innovations, sharing some of our leading research, and supporting the committee work. Participants at TNC always bring fresh and new perspectives to help us look into the future of where the industry is going – and what we need to develop next. Ciena's past TNC success has encouraged our long term sponsorship and we are proud to be a platinum level sponsor at TNC17."

Vice President of Community Engagement at Internet2 and Programme Committee member, Ana Hunsinger, highlights the importance of learning from each other in a fast-paced environment:

"Internet2's long term partnership with GÉANT is extremely important. Research and Education is very much global and our networks have to evolve in the same way. These opportunities for global collaboration give us new perspectives in understanding our users' needs and challenges, as well as identifying and designing the best technologies that can support their work. GÉANT's TNC in Europe and Internet2's Global Summit in the U.S. support a common goal: to help advance global Research and Education for our communities. Our work together can help us solve global challenges quicker."
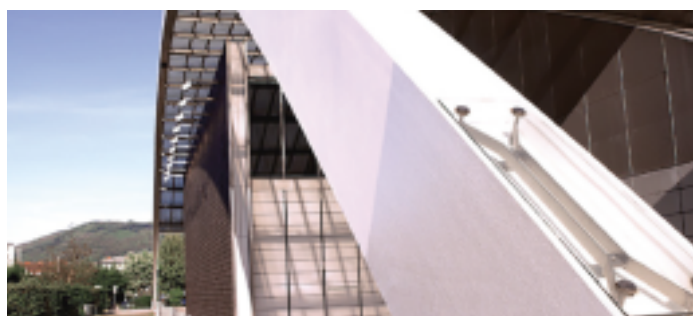
Inspiring demos and surprises are also on the agenda. And like every year, the GÉANT Community Awards will honour notable contributors to Research and Education networking.

The Design Centre in Linz is an exceptional venue that will provide the right setting for collaborative inspiration. Do not miss this opportunity to shape the future of Research and Education. See you in Linz from 29 May to 2 June!

Learn more at **https://tnc17.geant.org**

ARTUR SERRA HURTADO

Deputy Director of the i2cat Foundation and Research Director of Citilab in Catalonia, Spain, Artur Serra Hurtado is passionate about empowering citizens. From the first Citilab to the European Network of Living Labs, he has collected powerful insights into creative thinking as well as human and physical networks.

LAURIE GOODMAN

Editor-in-Chief of the international Open-access Open-data journal GigaScience, Laurie Goodman will discuss data publishing and scientific credits and explain why we critically need large databases with solid infrastructure.

MARTIN BRYNSKOV

Associate Professor in Interaction Technologies at Aarhus University, Denmark, Martin Brynskov will show us how horizontal optimisation between existing systems can help us shape a more human-centred connected future.

SEBASTIAN CHAN

Chief Experience Officer at ACMI, the Australian Centre for the Moving Image, Sebastian Chan will talk about the empowering possibilities offered by the networked museum and the museum as an engine of curiosity.

VOICE OF THE GÉANT BOARD

In a new series of Board member interviews, CONNECT spoke to newest member **Andreas Dudler** to understand his views on community needs, and what he hopes to bring to the Board.

Andreas Dudler has been Managing Director of SWITCH since May 2012. He is responsible for the deployment of technology and the operation of all SWITCH services. Even before being appointed Managing Director, Andreas Dudler has given SWITCH and the Swiss academic community many years of commitment alongside his main job. As Chairman of the Foundation Council from 1999 to 2011, he was instrumental in establishing and expanding the foundation and its Education and Research Network.

In addition to his work with SWITCH and GÉANT, Andreas also works with ROKJ - a private Swiss social programme helping children suffering from poverty and social exclusion develop to their full potential.

Andreas, welcome to GÉANT. How do you see R&E networking and in particular the roles of the NRENs evolving over the next 2-3 years?

Thank you, of course networking was the core driver of the development of NRENs and this is still very important and will remain very important for a long time to come. However other elements will, I feel, become much more high profile and significant to NRENs and their users. For example security. One big advantage the NRENs can offer is integrated security to their networks as they can more easily identify, manage and mitigate threats and there is some exciting work happening in GÉANT and the NRENs in this field.

Perhaps the most visible change will be in the area of Trust and Identity. For most users the real need is not networking, it's collaboration – the ability to connect and share. For this identity management and access management are key.

In terms of other infrastructure and services, then the NRENs will be increasingly involved in procurement and also working more with the other European e-infrastructure projects (for example EUDAT, EGI and PRACE) and we will need to make the user experience of all of these services as seamless as possible and ensure that access to services has the same stability that is expected from the network.

The NRENs have a long tradition of working together to support the community and I feel we will increasingly need to provide integrated support from GÉANT to the NRENs and from the NRENs to the customer.

What do you believe GÉANT can do to support this evolution and support the NRENs?

GÉANT can do a lot – the problem is identifying the priorities! From an NREN point of view, GÉANT is a powerful community we can contribute to and rely on – not only within the project but in delivering shared service. GÉANT can collect common requirements to help develop common platforms. It can also work with the NRENs to develop business development and marketing materials which can be adapted to the individual needs of the NREN – helping the NRENs not have to start from scratch.

GÉANT also has a 'political' role in overcoming the digital divide between the NRENs. No NREN is a leader in all the many fields of technology and service and each has strengths and weaknesses. GÉANT can help share knowledge and best practice to shorten the learning curve that NRENs face. It can also act as a community forum and meeting place to give NRENs a 'marketplace' to share services and skills.

From your experience in the community and within SWITCH what do you hope to bring to the GÉANT Board?

SWITCH is different from many other NRENs in that it is not subsidised from government for running services and so our universities pay the full cost of the services they use. This business model is different from many other NRENs. The community and GÉANT are, I feel, currently too dependent on EU money and we should try to find means of becoming more independent.

In the future our priorities and those of the EC may diverge and we may need to find a way to manage this gap. We need to learn how to 'sell' services to customers. I feel SWITCH's experience may help bring a more sustainable long term business model to GÉANT and the NRENs.

Do you have a personal message for the GÉANT community?

The GÉANT community has achieved a lot and should be proud of those achievements. Nevertheless the world is changing and the way the Higher Education community operates is changing and so our community should be unafraid of change. We should accept that this will happen and have the self-confidence to accept this change and work together to embrace it.

BOARD OF DIRECTORS

Christian Grimm (Chair)
Marko Bonač
Andreas Dudler
Erik Huizer
Sabine Jaume-Rajaonia
Ivan Marić
Valter Nordh
Dorte Olesen
Raimundas Tuminauskas

SPOTLIGHT ON: GÉANT OPERATIONS CENTRE (GOC)

CONNECT visited the GOC to learn more about its vital role

AT THE HEART OF GÉANT

The GOC is a core part of our organisation, always busy, but seldom in the limelight. Put simply, it handles the day-to-day management of every aspect of the GÉANT network. It's the first point of contact for the connected NREN partners and their respective operation centres.

When service problems are reported, it's the GOC that responds, diagnosing network issues and overseeing repairs. The GOC also resolves glitches in GÉANT's supported services whilst monitoring network health and coordinating planned maintenance.

Located in a dedicated building close to the Cambridge office, the GOC is active 24 hours per day, 365 days per year!

THE WATCHFUL GUARDIANS

The GOC set-up comprises two levels of support. The first line service desk deals with the majority of communications with the NRENs and a growing number of R&E related commercial customers. Currently outsourced in a UK service centre, it is a valuable resource employing dedicated engineers who are perfectly integrated with the Cambridge team.

The second line team is made up of 7 Cambridge-based engineers, all full-time employees of GÉANT. They triage and resolve complex issues ensuring that network services are always available and operational coverage is maximised. Looking after the GÉANT network is like managing the main motorways in a road system where a limited number of very high capacity roads carry the largest part of a country's road transport, consequently any fault has enormous impact. Imagine that the total loss of dual connectivity for a NREN could culminate in the complete isolation of a national network, or try to guess the consequences of the isolation of a major POP such as Paris!

Thanks to the high redundancy levels of the network, the first line service desk is usually able to deal with 95% of incidents reported during the night or to gather sufficient information to be able to effectively brief a second line engineer. On average, the second line desk will receive an escalation in the middle of the night just once a week, a record to be proud of!

TOOLS OF THE TRADE

The GOC utilises a combination of commercial off-the-shelf and bespoke tools. 8 large monitors are a big feature of the office, they light it up with their colourful displays whilst providing a snapshot overview of the network and of the services provided. Support for services and applications has increasingly become significant in the last couple of years, and our engineers have been continuously learning new skills to cater for this requirement.

BUSY TIMES

The GOC team typically deals with more than 500 tickets a month, though 90% of faults fall outside the realm of GÉANT. Communication with the connected NREN members is key: all incidents affecting their service and resolution time need to be relayed promptly, clearly and effectively. Indeed, our strict published Service Level Agreements underline that recovery and service maintenance are the GOC team's primary role.

The team is also the first point of contact for the GÉANT Computer Emergency Response Team (CERT) whose importance has been growing steadily in the light of the increasing levels of sophistication of cyber security threats.
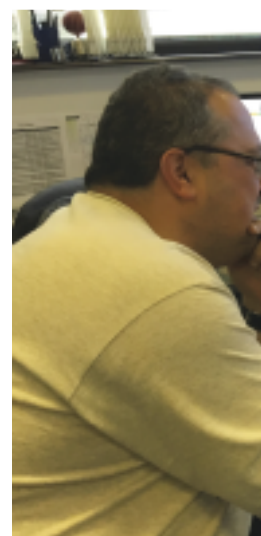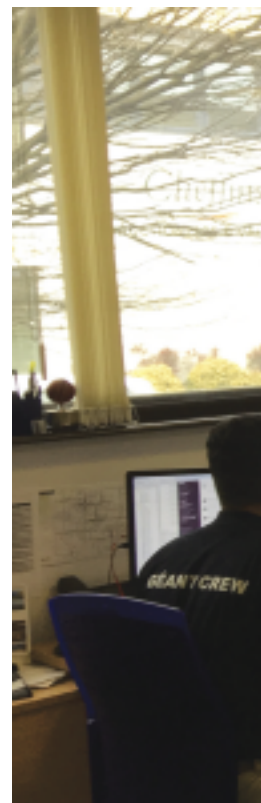
Pictures
GOC engineers at work
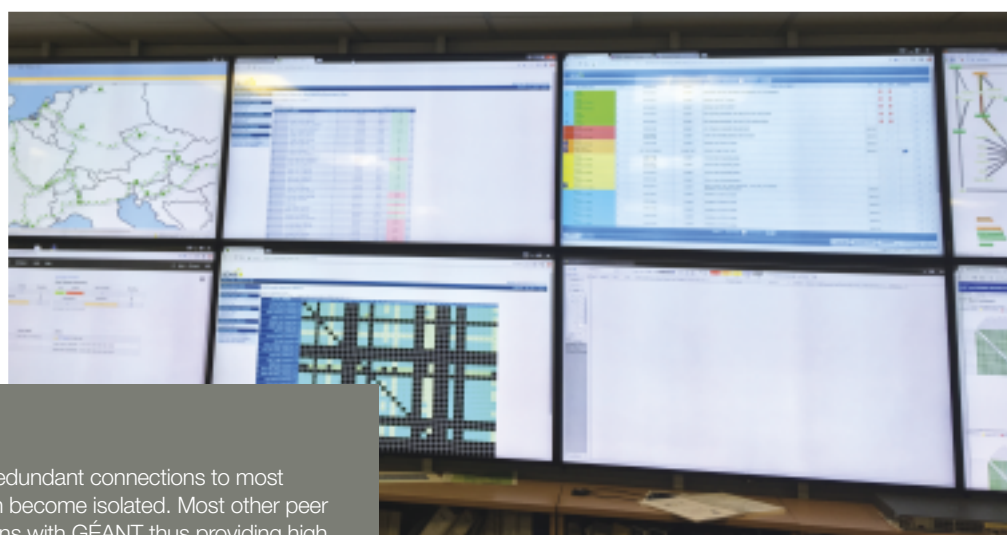
THE NETWORK

Thanks to careful planning GÉANT holds redundant connections to most NRENs, so it is highly unlikely that they can become isolated. Most other peer networks also have multiple interconnections with GÉANT thus providing high capacity and high availability networking for the millions of researchers across Europe and the world.

NRENs in Europe benefit from 3 (and soon to be 4) dedicated 100Gbps data circuits from diverse submarine cables between US / Canada and Europe with different landing points in the European continent. The GÉANT network is also programmed with back-up routing, an intelligent feature that reroutes optical circuits in the event of fibre cuts or breakdowns enabling the network traffic to recover to its status prior to the problem occurring. As a result, when failures do happen, NRENs members directly connected to our network rarely even notice any impact.

The first GÉANT network was launched in 2000 and remains one of the most advanced and best connected Research and Education network in the world. Here are some key facts and figures:

- Over 12,000 km of dark fibre
- 28 POPs in Europe
- Just under 200 amplifier nodes to ensure signal quality
- Over 250,000 km of network globally including transatlantic and managed circuits - enough connectivity to go around the world 5 times!

FUTURE READY

The landscape of R&E networking and technology is constantly changing. The GOC team is continuously adapting to these changes helping researchers connect with each other around the globe, driving our society forward into an exciting future.

COME TO SEE US

If you are in Cambridge and would like to come to the GOC, contact us on +44 1223 733033 to arrange a visit. The team is ready to welcome you! To learn more go to: **www.geant.org/Networks**

DELIVERING SOFTWARE TRAINING TO THE GÉANT COMMUNITY

TRAINING EVENTS

The Service Transition and Software Management task group within the GÉANT Project (GN4-2) Services Activities carries on the well-established tradition of delivering training for software developers and software architects involved in GN4-2. The training events, School for Developers and Secure Code Training, aim, through collaborative sessions, to strengthen the knowledge and skills in quality and secure coding.

School for Developers' (S4D) aims and objectives at a glance:

- To share technical knowledge of software development approaches
- To provide practical experience
- To facilitate exchange of expertise and good practice in software development
- To improve confidence of teams involved in the development process
- To leverage the quality of GÉANT software and services.

Secure Code Training (SCT) aims to enable developers:

- To have a clear understanding of specific major programming concepts
- To perform a threat and risk assessment in their development projects
- To develop secure web applications in programming languages widely used in GN4-2 (Java, PHP, Python)
- To use tools for assistance in basic revision of their own code.

BACKGROUND

S4D and SCT were both organised by the software engineers and security experts from the Poznań Supercomputing and Networking Center (PSNC): a group of software developers experienced in code audits. The PSNC experts encourage developers to introduce novel methodologies in software development, improve the quality of the developed products and

Words

Marcin Wolski, Maciej Łabędzki, Gerard Frankowski, Paweł Berus, Cezary Mazurek, Poznan Supercomputing and Networking Center, Poland.

Marina Adomeit, Academic Network of Republic of Serbia – AMRES.

increase their security and efficiency assessment. Over the years, PSNC expert teams have developed their skills and experience by taking part in a variety of projects, and since 2010 they have been sharing their expertise with other NRENs through GÉANT training events.

RECENT EVENTS

School for Developers 2016

The latest S4D focused on different innovative agile development methodologies extensively used across the software development community. This three-day workshop was attended by 20 delegates from 9 NRENs. The techniques covered have a significant impact on everyday development work in terms of product quality improvement, shortened release cycle and better requirements gathering. In addition, the school's social programme comprised a dinner, a museum trip and a visit to the PSNC technology laboratory which

provided extra opportunities for discussions with experts in a more informal setting.

Secure Code Training 2016

The most recent SCT event attracted 14 participants from 10 different NRENs; it covered topics such as secure upload mechanisms and data sanitisation methods. The event's practical part was devoted to the most dangerous OWASP Top 10 vulnerabilities, especially Cross Site Scripting (XSS) and SQL Injection.

HISTORY

School for Developers

The first S4D event was held in 2010 under the name of "Summer Developer School". Initially it aimed to support small development teams in addressing coding tasks or issues and each team worked to address such tasks and provided design and implementation solutions subsequently used for open discussions at a closing workshop. Since then, the S4D has evolved towards a technology-agnostic formula aimed to assist software engineers in solving more generic software development issues. Previous training events covered:

- Agile software development – Scrum, Kanban, XP
- Test Driven Development
- Behaviour Driven Development
- Specification by Example
- Use of design patterns in Java
- Dealing with legacy code
- Continuous Delivery.

The event organisers have always placed significant emphasis on consulting with the community to ensure that the training topics address real issues and reflect day-to-day activities. Attendees are invited to discuss their needs as well as to provide a more structured feedback via surveys.

Secure Code Training

SCT was first launched in June 2010 within the confines of the GN3 project. The first event was held at PSNC in Poznań, but it was soon clear that its two day format was not efficient. Following consultation with the Project Office, analysis of software security trends and the introduction of feedback questionnaires, SCT evolved and improved. Training events of this type are now better structured, last longer and take place in more central European locations to facilitate travelling.

SCT events so far have been hosted by the friendly teams of DFN (Berlin, Germany) - already four times - and CESNET (Prague, Czech Republic) and this year it will take place in The Netherlands, in Utrecht.

The three-day training event tends to adhere to a standard format: on the first day it starts with a talk on threat modelling followed by a practical exercise and a discussion on secure coding topics. The second day is purely practical: it focuses on web application coding vulnerabilities and closes with a HackMe contest where participants practise finding the security bugs they have been introduced to. The third and final day covers source code work, either through "find the bug" riddles or source code scanners.

Since 2010 SCT and S4D have respectively trained 69 and 73 developers from over 15 NRENs.

WHY SHOULD YOU ATTEND OUR TRAINING SESSIONS?

S4D gives developers an excellent opportunity to share software

engineering knowledge and best practice in development infrastructures and routines. From the start, S4D events introduced and deployed novel technologies and approaches in the software engineering domain, always widely accepted by the community of the GÉANT Project developers. Furthermore, attending these training sessions will give you the opportunity to meet in person your peers and counterparts from other NRENs, collaborate and build team spirit.

In addition, the training sessions help software developers to make GÉANT services more secure, cost-effective and cost-efficient from a maintenance stand point by showing patterns and anti-patterns in hands-on workshops, code riddles and even brief HackMe contests.

CONTACT US

We look forward to receiving your comments and questions about S4D and SCT's training topics, structure and methodology. We have learnt a great deal from all the training events delivered to date, but we believe there is always room for improvement. We really value your opinions, so keep them coming.

Please send your suggestions to Marcin Wolski at **marcin.wolski@man.poznan.pl**

NEXT EVENTS

Date and location of SCT 2017: 7-9 March 2017, Utrecht.

S4D will be held in the autumn of 2017.

If you are interested in attending either of these events please contact **marcin.wolski@man.poznan.pl**

THE CONNECT INTERVIEW: KLAAS WIERENGA

BUILDING STRENGTH IN TRUST & IDENTITY

Klaas Wierenga, creator of the eduroam service and well known in the global R&E community, has joined GÉANT as Chief Community Support Officer with a particular focus on the strategically important area of Trust & Identity. CONNECT caught up with him to learn more about his new post and plans.

Klaas, welcome to GÉANT and welcome back to the community. Many people will know of your extensive work on eduroam and federated identities but what brings you to GÉANT?

Thanks to you and many others in the community for the warm welcome, it has been overwhelming! I would argue that in reality I have never been really 'away'. In my 9 years at Cisco I have been involved in a number of EU projects with the community, was chair of TF-Mobility, chair of the TNC Programme Committee and Cisco's representative in the General Assembly, but I know what you mean. There are really a number of reasons. In the first place, I had been talking to Steve (Cotter, GÉANT CEO) for quite some time about the challenges at GÉANT after the merger, and I got increasingly enthusiastic about being part of and shaping the transformation of the organisation. Secondly, over the past years my role at Cisco had changed to be less about innovation and more about sales. Since I am primarily motivated by the ability to apply new technologies, the choice was really not that hard.

You've spent time working with Cisco – do you feel that this experience of the commercial sector will be useful in helping drive the R&E community forward?

Yes, absolutely. In fact I have said on multiple occasions that I feel that most R&E staff would benefit immensely from working some years in a commercial setting. Not because everything is better in the commercial world, but because the feedback loop is much shorter.

No matter how clever your idea is or how great your product, if it doesn't sell, it ends pretty quickly. I certainly hope to bring in a bit more of "business case" thinking, without sacrificing what the R&E community is good at: pushing the needle and do the right long term thing.

What do you see as the key opportunities and challenges within the community and the organisation?

Well, I believe that we as an R&E community have become the incumbents, with a vested interest in maintaining the status quo. In order not to be commoditised, we have to keep innovating and develop new business models, in order to address the (emerging) needs for our community. If we don't, others will. If I look at the area where I have spent most of my working life, Trust & Identity, in R&E we have by far the most wide-spread use of federated identity, and it is very tempting to lean back and admire the view from the top. At the same time we see that the large commercial identity providers like Google, Facebook and LinkedIn go a different route, we need to be on top of those developments. For the organisation that means that we have to be much more, I hesitate to use the word, agile.

What will be your key focus over the next 12–18 months? What exciting things can we look forward to?

I am responsible for the Project Development Officer and Project Management Assistants teams and temporarily also the Events and Learning & Development teams. My immediate focus will be on Trust & Identity, because there we have to make some big steps to pull all the activities together in a coherent vision. As for exciting things: I've seen the keynote line-up for TNC, you will want to be there! REFEDS, eduroam, eduGAIN, and AARC are all producing great stuff, thanks to the GÉANT staff and the whole R&E community. I see it as my task to make sure that those and more exciting things keep happening.

NATIONAL DEPLOYMENTS: THE NEXT STEP IN THE GÉANT IAAS CLOUD INITIATIVE

Over the past 12 months, GÉANT carried out a joint pan-European tender for Infrastructure-as-a-Service (IaaS) offerings: a collective invitation to providers to submit a bid to supply their IaaS solutions to Research and Education institutions across Europe. As a result, national rollouts are being prepared with the support of the GN4-2 project's Cloud Teams.

The pan-European IaaS tender covering 36 countries attracted strong interest. Over 20 providers, including Microsoft and Amazon resellers, qualified for contracts. The next stage, national deployments, are literally just around the corner.

Most participating NRENs have assigned a designated cloud service delivery manager, or team, and are already in touch with their institutions and interfacing directly with framework IaaS providers to prepare for national delivery of IaaS solutions. The first GÉANT Cloud Summit where managers, vendors and institutions met and discussed the ins and out of national deployments was held in Utrecht in February.

HOW DOES IT WORK?

Before commencing delivery, a service commencement form needs to be signed between the national NREN and the supplier, which stipulates the NREN's role and cost recovery. The GÉANT Cloud Team have created a template for download.

Also, a contract package for each provider will be made available by GÉANT through a web-based document repository with eduGAIN authentication. This repository is accessible for appointed NREN cloud managers, who can delegate access to representatives in their institutions. The NREN cloud managers also have access to an online BOX folder with further cloud documentation.

FROM THE FIELD

In The Netherlands, SURFnet is adopting a hybrid and diversified approach. They already have their own solution, based on VMware, up and running, and plan to add several services from the GÉANT framework agreement.

"Having several providers offering VMware resources forces competition, ensuring continuous service improvement," says Michel Wets, Cloud Service Manager for SURFnet. "VMware providers are ideal for institutions who want an easy migration from their own VMware environment. Likewise, Microsoft and Amazon resellers will act as competitors for institutions who want to take the step to re-architecture their applications."

In Norway, UNINETT decided to adopt a mini competition approach.

"This is a new area for our universities, and they look to us for advice and recommendations," says
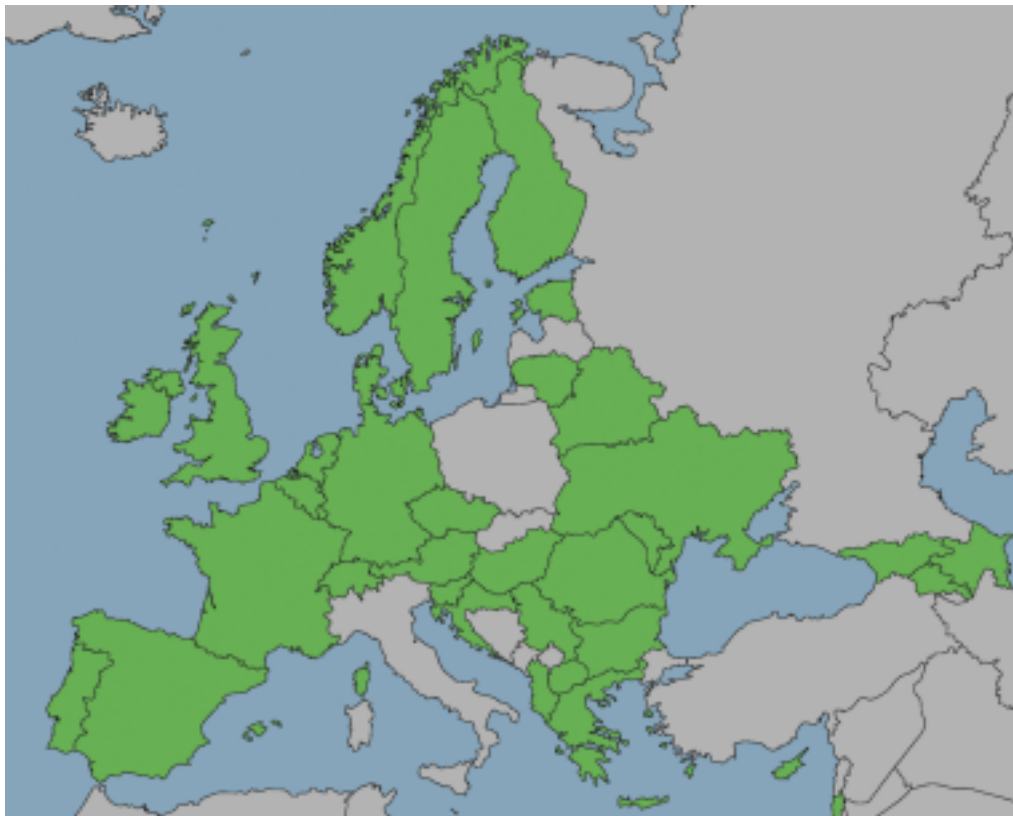
Hildegunn Vada, the Project Manager for UNINETT. "To make it easy for them to get started, we plan to do a mini competition in order to close with one preferred vendor."

COMMUNICATION AND COLLABORATION

The GÉANT Cloud Teams are engaged in a host of collaboration and communications activities to help national deployment gain momentum. Every Friday at 10:00 CET there is a weekly Cloud Forum VC session to discuss delivery and adoption. The sessions take place in the Cloud Team LifeSize VC room at **http://lifesizecloud.com/2750418**.

In addition to this, and events like the Utrecht Summit, the Cloud Teams are represented at different meetings and events. Team members will be on hand at the SIG-Marcomms and SIG-MSP meetings in Poznan on 7-9 March. Representatives also are present at various national conferences hosted by different NRENs.

At the TNC conference in Linz, on Wednesday 31 May, you are invited to the Cloud Café and to attend one of many sessions on GÉANT Cloud initiatives. The Cloud Café will be a great opportunity to meet the GÉANT Cloud Teams, NREN Cloud Managers and Vendor representatives in an informal setting.

For more information, please visit **https://clouds.geant.org/** or email the team at **clouds@geant.org**.

SUPPLIERS

- Arcus (Amazon reseller)
- Atea (Microsoft reseller)
- Cacttus (Microsoft reseller)
- Cloudsigma
- Comparex (Amazon & Microsoft reseller)
- Dimension Data
- Dom-Daniel (Microsoft reseller)
- Infosoft
- Interoute
- itSoft
- KPN
- Lattelecom
- Micromail
- Nextsense (Microsoft reseller)
- Novabase (Microsoft reseller)
- NTT Europe
- SoftwareOne (Microsoft reseller)
- Span (Microsoft reseller)
- T-Systems
- Telecom Italia (OIP, Amazon reseller)
- Vancis
- Ymens (Microsoft reseller)

THE CONNECT INTERVIEW: FOTIS GAGADIS

A FRESH APPROACH TO SECURITY

When you're asked to imagine what a Security Officer would look like you're probably imagining a strict IT policeman wanting to control every aspect of the business. Well with Fotis Gagadis, that image couldn't be further from the truth. In the 18 months since joining GÉANT, Fotis has become not only a key element in GÉANT's security process but a major contributor to the GÉANT team and culture. Karl Meyer speaks to Fotis about his background and why we should be thinking more about security in our connected and complex world.

Fotis, you have a very interesting background, what led you to be interested in security?

Well, my first degree from the American College of Greece – Deree College was in Computer Information Systems and security was mostly considered as a technical topic (back in 2000). When I took my Masters at the University of London I studied Information Security to really understand how security should and can be embedded deeper into the enterprise, application and system design and how this principle can help enterprises flourish and be secure. Most of my roles in Greece and the UK have focused on assessing and recommending architectures and controls (managerial, technical, physical) to help organisations develop securely upon their needs.

So you're more of an enabler than a policeman?

Absolutely! The security team in GÉANT have to work with the management, developers and engineers not against them. People must understand that security is business-oriented, human-oriented, cost-effective and create reusable concepts/controls. For example, a firewall is the technology concept but the vendor can change every year, thus security is placing controls (managerial, technical, physical) that will be used/re-used as long as the business strategy and environment needs them. Thus, security must be integrated at the core of the business.

Isn't security difficult and expensive?

Security isn't difficult if it's considered from the start. It becomes difficult and expensive when it has to be added later. Not thinking about it can be even more expensive. The ICO (Information Commissioner's Office) can impose fines of up to £500,000 in the UK and fines across Europe can be just as high so developing insecure environments can be very expensive. Particularly as GÉANT is potentially handling and transporting very sensitive data for our users we must be aware of our environment and this is why we are consulted by our legal advisors when required.

Who is in the Security team?

The security team comprises Chief Operations Officer Mark Johnston, myself and Security Engineer Evangelos Spatharas. Together with the GEANT Operations Centre (GOC) we form the GÉANT CERT (Computer Emergency Response Team). Our team provides the third level of incident support to the GOC. GÉANT is also currently recruiting a Chief Information Security Officer to lead the security team.

That's quite a small team – how do you manage?

Our role is to help develop the right controls so that hopefully most of the issues never reach our desks! If we've done our job right then we should have very little to do to deal with emergencies because either the environment itself can handle it or the GOC understands how to manage things. For example, the GÉANT Firewall on Demand service (see panel on opposite page) helps NRENs manage many security incidents themselves quickly and easily.

With such a large number of developers across the organisation and the project what is your role with product management and new product development?

We are cooperating at the moment with various departments and GÉANT Head of Product Management Shaun Cairns in particular, to develop features for a secure product lifecycle process inside GÉANT to ensure that products and services are audited for security before launch. But we'd really like to be seen as a team that people can reach out to, in order to help them understand security during development and really embed security into services at a very early stage. This will hopefully in the long run reduce costs and reduce the amount of reworking which can be needed.

The R&E community is of course a big fan of open source software. Coming from a more commercial background what are your views?

I think both have their place but within the security area we need to make sure that support and control is in place for services. We need to make sure that when we're investing in security we're investing for the long term. Through the proper evaluation and comparison of products we can identify the best fit for purpose product within an environment. However, we must ensure that the product is fully supported and we have the support we need all the time due to limited human resources.

Firewall on Demand

Firewall on Demand (FoD) is a powerful system which allows authorised users, via a web portal, to quickly create and disseminate firewall filters based on traffic flows to or from their designated address space. This system allows NRENs to filter and block malicious traffic flows from within the GÉANT backbone giving NRENs unprecedented power and control.

FoD's key features are:

- Precision – specific malicious flows can be targeted.
- Speed - time to disseminate/withdraw firewall filters is sub 10 seconds.
- Convenience - NREN users can use web portal. themselves, or make request by phone or e-mail.
- Simplicity - the web portal uses intuitive, non-vendor specific GUI-based wizard to configure router firewall filters.

FoD is powered by standards-based flowspec technology as specified in RFC 5575.

The ability for NRENs to extend their control of traffic across the GÉANT backbone is a uniquely powerful feature of the partnership between NRENs and GÉANT.

GÉANT TESTBEDS SERVICE – BRINGING RESEARCHERS AND TECHNOLOGY TOGETHER

The pace of research into advanced networking technologies and services is accelerating with new systems being developed to take advantage of expanded network capabilities. This research is not just limited to developing new networking technologies but is increasingly looking at operating new services over these networks.

Initially research can be done in simulation or on the lab bench but soon it is necessary to test these models in real-life systems requiring research on high-performance networks and equipment. This leap from bench to real-world can require significant technical expertise, time, administrative and logistical support, and funding. Additionally, these research teams themselves may not have the skills and experience to build out wide area networks adding to cost of additional team resources and increasing the ramp-up time required prior to doing the actual intended research.

VIRTUALISATION – NO LONGER A POOR SUBSTITUTE

Over the last two decades there have been many projects available across the world, trying to make networking facilities available to researchers. Initially emulation was an intermediate solution trying to simulate the equipment while protecting the production environment from tests. This provided an option of creating the networking environment researchers did not have funds or resources to create, but these emulations were unable to adequately replicate real-life performance of real networks, making it hard to assess performance of systems when at the limits of technology.

With this in mind, the GÉANT Testbeds Service (GTS) was conceived to address a specific purpose – advanced network research, at scale.

GTS is the fastest and most cost-effective way to field a wide area network testbed to validate models in a real-life environment. Most importantly with GTS we are mitigating the setup process with a simple method of defining and getting the needed resources within minutes. GTS offers an easy, agile procedure for providing researchers with secure and immediate access to predefined sets of virtual resources. This allows researchers to build, test, break down and rebuild networks incredibly quickly.

Virtualisation is not "emulation" or "simulation" and does not mean slower than real-life. Today's virtual objects are predominantly realised in real hardware. Virtual machines, virtual circuits, virtual file systems are all examples of production-capable high performance virtual resources accessible within the GTS environments. Combined with advanced virtual SDN switching, access to dedicated computational resources,

intuitive user interfaces, and a broad range of other usability and control features, GTS delivers unique capability to define custom virtual environments deployed across Europe to run exciting new services and applications. With GTS, virtualised resources can provide elastic WAN networks that leverage network infrastructure effectively and efficiently and can deliver state of the art performance.

In addition GTS is able to provide some advanced features not available in other virtual environments.

One key design objective of GTS environments is that they are isolated from one another or the real world. This enables researchers to run parallel tests, sharing common hardware platforms, without interfering with each other.

This model of operation provides facilities in the wide area network that enables researchers to deploy novel concepts at scale without the fear that an errant experiment could impact other production services. This is novel. And it allows service providers to support such highly experimental activities in the WAN precisely because there is secure isolation among GTS testbeds. This allows novel services to be exposed to real users, to evolve in realistic service environments, and be deployed months or years sooner than traditional methods.

The GTS team is currently preparing to transition from GTS version 3 to GTS version 4. As part of this evolution a number of important new features will be introduced: dedicated high performance server resources will arrive, support for full 10Gbps circuits, virtualised high performance SDN switching resources, and multi-domain international reach will be introduced.

Additional features are on the GTS roadmap into 2018. Users will be able to modify their environments in real time, and save those environments and restart them later. A wider range of transport circuits and SDN switching and forwarding capabilities will be

available. Future GTS environments will be able to run 100 GBPS experiments with full packet processing performance, federated AAI and advanced user policy control features will be available.

MORE THAN JUST A NETWORK ENVIRONMENT

GTS is expanding its abilities to support more and different types of research. GTS can now build 'application specific' networks that bind production science communities, provide a rapid deployment "on ramp" to operate and refine new services, or act as an advanced learning platform for computer science and network engineering curriculum. This moving up above the traditional network technologies to support the next generation application and service development will help developers test their services in real-world scenarios that can be set up and controlled via a website in an automated process. This automated provisioning allows researchers to drive faster test and improvement cycles which speed up innovation in science and technology. For instance, particular GTS environments could be used to support security services and DDOS mitigation tools in a production scale environment, or to support novel big data and information centric networking paradigms.

To find out more about how GTS can support large scale network service research and development visit **http://www.geant.org/Services/ Connectivity_and_network/gts**

OPENAIRE - EUROPE'S OPEN SCIENCE GATEWAY TO THE WORLD

Research is a global endeavor. Teams are built across boundaries and they need to access and share their knowledge with everyone. The phrase "Standing on the shoulders of Giants" applies to all areas of research – this year's researchers are building on knowledge from their predecessors and next year's will build upon them. But to stand on those shoulders requires the ability to find and use this knowledge and use it effectively.

In this collaborative world, open knowledge sharing requires open access, interoperability and commonly agreed standards across institutions, countries and regions. OpenAIRE is a key participant in the "Aligning Repositories Worldwide" initiative, run by the international Confederation of Open Access Repositories (COAR). The goals of this group are common data standards, access policies, and exposure of data to other regions to maximise the availability and value of data and the knowledge it contains.

OpenAIRE has a primary goal of enabling Linked Open Science. Science not only has to be open but has to be linked together so that knowledge can be developed and shared. OpenAIRE does this by:

- Supporting researchers and guiding them on how to open, use and re-use scientific artefacts at the local level within their own environment.
- Building bridges with global disciplinary regional and by sharing common data, services and resources - both human and technical.

This builds a network of skills and technologies to develop global knowledge repositories. OpenAIRE serves as the European Open Access gateway to the world, placing Europe at the forefront of Open Science developments.

OPENAIRE'S OPEN KNOWLEDGE INNOVATION PLATFORM

With emphasis on open access and open science policies, OpenAIRE provides concrete guidance and services that facilitate and accelerate openness and linking of the whole spectrum of research outputs, including articles, books, data, software, etc. By attaching provenance information related to funders, organisations, people, facilities, and by extending the

links to all research artefacts (workflows, methods, protocols), OpenAIRE creates an interlinked database that captures, monitors or potentially recreates, all phases of the research life-cycle.

In this way OpenAIRE produces open, curated, validated and interlinked research information, resulting in off-the-shelf near real-time monitoring services. OpenAIRE can bridge from science to other types of related information, e.g., patents, PSI data, Wikipedia, education material from Open Educational Repositories, online courses/MOOCs, science channels and media for the public or the industry.

Making correct decisions means using all the data possible. By enabling an interlinked and validated approach to Open Knowledge, OpenAIRE offers a cost-efficient solution to transparent decision making.

OPEN ACCESS PUBLICATIONS AND DATA ON THE RISE

The OpenAIRE information space now encompasses 17.6 million OA unique publications and 32 K data records from about 800 validated data sources. 500K publications are linked to 12 funders - all accessible through OpenAIRE's portal (**www.OpenAIRE.eu**) and APIs, and from our beta Linked Open Data service.

THE FUTURE OF OPEN KNOWLEDGE

Scientific and scholarly results are key to EC's Digital Single Market and "Open Science, Open Innovation and Open to the world" strategies, and OpenAIRE is the major gateway to such results to achieve this objective. OpenAIRE's open, participatory and community-led design serves as a natural testbed for innovative open scholarly communication models. Synergies with commercial researcher networks such as Academia.edu and ResearchGate or public ones like REISearch, together with novel publishing platforms (Winnower, Open Scholar, F1000) show great potential for innovative open scholarship.

To find out more about how OpenAIRE is opening up access to global data visit **www.OpenAIRE.eu**

OpenAIRE is a Horizon2020 project (grant no. 643410). OpenAIRE2020 will assist in monitoring H2020 research outputs and will be a key infrastructure for reporting H2020's scientific publications.

EGI – SUPPORTING INTERNATIONAL RESEARCH AND EDUCATION

EGI'S BENEFITS FOR RESEARCH COMMUNITIES

EGI is coordinated by a not-for-profit foundation established in The Netherlands and is dedicated to supporting research communities. The foundation has participants and associated participants drawn from NGIs, EIROs, ERICs, and other legal entities who provide the physical resources and shared services that enable EGI to deliver, improve and innovate services for communities.

The foundation coordinates areas such as overseeing infrastructure operations, user community support, the contact with technology providers, strategy and policy development, flagship events and dissemination of news and achievements. The main benefits of EGI for R&E organisations are to:

• Ensure uniform and reliable availability of resources to researchers on a local, national and European scale
• Enable faster production of scientific results through collaboration across organisational and national boundaries
• Promote open and collaborative science and ensuring open access to shared resources and expertise
• Allow researchers to focus on their research rather than managing their e-infrastructure needs
• Provide effective use of resources in different administrative domains to ensure the most effective return on infrastructure investments
• Facilitate the innovation and sharing of solutions by building a thriving ecosystem through community events and collaborative services.

EGI, GÉANT and the other e-infrastructure projects are working closely to ensure that the best services are available to users and to avoid duplication between projects and offer seamless access to resources.

Following the success of the first Digital Infrastructure for Research (DI4R) conference in 2016, further events and collaborations are planned for 2017.

EGI and GÉANT will shortly sign a Memorandum of Understanding to agree on a range of joint activities, in particular to work together to help develop a common service portfolio, share procurement collaboration and exchange training. In addition, GÉANT and EGI will be supporting each other on communication and presenting services to the users, including working on events together and increasing user community engagement and support.

EGI is a federation of computing and storage resource providers united by a mission to support research and development.

Over the last decade, EGI has built a federation of long-term distributed compute and storage infrastructures that support research and innovation. EGI resources are provided by:

• The EGI Federated data centres
• The EGI Federated Cloud providers

This international e-infrastructure has delivered unprecedented data analysis capabilities to more than 48,000 researchers from over 200 disciplines. The federation brings together more than 300 data and compute centres in 56 countries worldwide.

Today, EGI provides both technical and human services, from integrated and secure distributed high-throughput and cloud computing, storage and data resources to consultancy, support and co-development.

The research supported by EGI is diverse. Examples include the search for the Higgs boson at the Large Hadron Collider particle accelerator at CERN, offering HTC solutions for the Cherenkov Telescope Array's computational challenges, finding new tools to diagnose and monitor diseases such as Alzheimer's, or the development of complex simulations to model climate change.

To find out more about EGI's work in R&E and their services visit **www.egi.eu**.

PERFSONAR ON SMALL NODES

Performance focussed Service oriented Network monitoring Architecture, or perfSONAR[1], is a well-known network monitoring and troubleshooting infrastructure used in the Research and Education networking world. It helps pinpoint the problems within the network and enables effective utilisation of network resources

At TNC16 last year we launched the perfSONAR on Small Nodes project to a small, but highly engaged audience. After a series of informative presentations, 20 representatives from a variety of organisations collected 20 nodes pre-installed with perfSONAR and pre-configured as **perfSONAR powered devices**.

In the following days, back at their respective organisations, each workshop participant plugged the device into a power socket, connected it to the network, assigned to it an IPv4 and an IPv6 address and notified us of those addresses. No further steps were required. On the next day, each small device was already measuring network performance across the GÉANT network and the central server was collecting latency, loss and throughput data to populate the Small Nodes

project dashboard. Very soon, the network measurement matrix expanded and colourful patterns emerged: perfSONAR on Small Nodes started to come to life![2]

As this was intended to be a short-term project with well-defined objectives, four months since its launch we ran a survey amongst the project participants in order to have a better understanding of how they were using their small nodes and to get an insight into the project value. Results were very positive. All of those who took part in the survey stated that they would recommend participation in another identical or similar project and more than 90% were in favour of adding more GÉANT managed small nodes to their network. None of the participants had decided to remove the small node from their network or from the measurement mesh.

In general, workshop attendees were all very satisfied with the project and were happy for GÉANT to continue to run and operate the measurement mesh. In fact, we were pleased to learn that nearly 60% of all participants were planning to set up their own perfSONAR mesh.
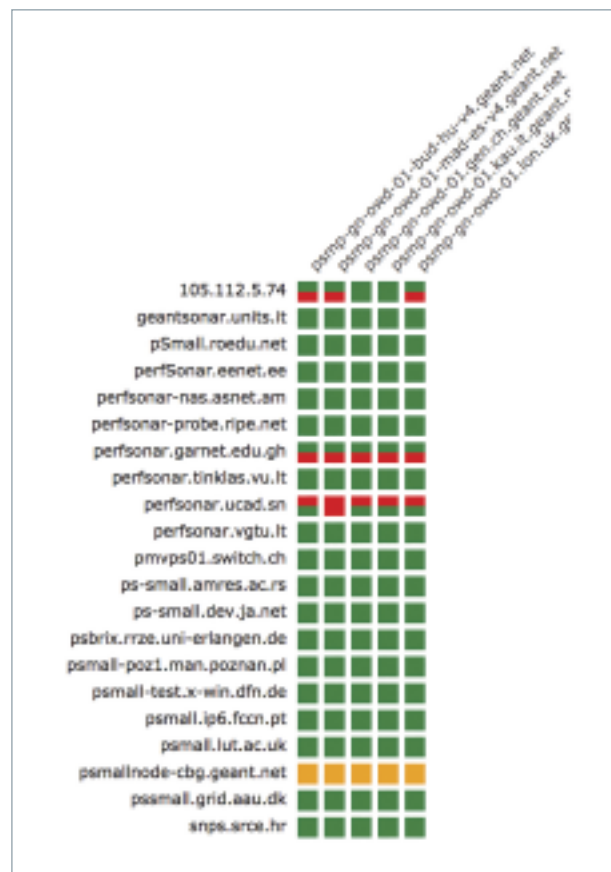
Here's a brief testimonial from one of the users, Indrek Rokk from EEnet: "perfSONAR on Small Node showed us how easy it is to setup a measurement point and how a measurement mesh can be used to monitor network quality. We are now looking into the deployment of multiple small nodes for some of our clients on our own network measurements mesh. We highly recommend this type of deployment to other network providers."

At GÉANT we are looking to upgrade the small nodes and the entire mesh to the next version of perfSONAR in order to be able to run this project for a longer period. We're also looking at ways to extend and easily replicate its setup in order to provide even more value to a wider user base. If you're interested in joining the mesh or running a similar measurement for your organisation, please do not hesitate to contact us at **gn4-2-sa2-t3@lists.geant.org**

Pictures

Top left:
Small Nodes deployments

Top right:
IPv4 loss matrix

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[1] **http://www.perfsonar.net**
[2] See it for yourself at **http://perfsonar-smallnodes.geant.org/**

STAY CONNECTED MORE WHILE PAYING LESS BY JISC'S IPASS SERVICE

Words

Esmat Mirzamany,
Mobility Team
Manager, Jisc

Fred Walker, VP
Jisc Group Sales

Today's Research and Education model is international, immediate, and virtual with the increasing demand of always-on connectivity beyond education premises. Recent development in mobile access technologies can provide the possibility of having round-the-clock availability of the rich digital resources beyond the physical walls of the institutions. However, this eventually can lead to a very high bill for using high data rate services and excessive use of bandwidth. The situation gets even worse for roaming users and usually the fear of cellular bill shock prevents users from having access to data resources while they are out of coverage of their home network.

The need for seamless connectivity while you are on move was recognised in the Research and Education sector some 15 years ago. Today, eduroam is a solution, providing campus-based Internet access for roaming users. However, currently, eduroam has a limited footprint in public areas. An ever-growing demand from users who need to access online resources, any time and from any place, imposes the need for secure Internet connections with the same if not better quality of experience as the campus network. While 4G can meet the need, the cost of having unlimited, global cellular data connectivity may go well beyond what our members can afford and connectivity to free Wi-Fi in coffee shops and hotels presents a clear security risk. To fulfil this growing demand, Jisc has been partnering with iPass - the largest global Wi-Fi provider in the world with more than 57 million hotspots in over 120 countries to connect to. iPass is a cloud-based global Wi-Fi roaming service, offering you a secure, invisible and reliable unlimited data connectivity, in places where eduroam is not available. This is a perfect solution for eduroam users who are spending noticeable amount of their time on planes, trains, hotels, airports, cafes, and other public places. This will allow users to limit the use of their expensive 4G service only when eduroam and iPass are not available. Using the combination of eduroam, iPass and 4G can provide an affordable data connectivity for our community.

IPASS - PROVIDING A SECURE CONNECTIVITY

Free Wi-Fi is anything but free. It comes with numerous, well-known security risks. With three layers of security, iPass keeps connections secure. It allows the use of a corporate VPN (virtual private network, or secure tunnel). If users don't have a VPN, they can turn on Last Mile VPN (iOS or Android only), which encrypts data when it is most vulnerable: between the user's device and the iPass Internet gateway.

Also, iPass uses an advanced, dynamic password capability, One-Time Password (OTP). By virtue of being dynamic, randomised and only valid for a short period, OTP protects users from password sniffing, because an OTP cannot be reused. An OTP also eliminates the need for users to remember their passwords to in order to authenticate, making the iPass service more user friendly.

BENEFITS OF IPASS

For staff and students who regularly access Wi-Fi in locations such as airports, stations, hotels and cafes – or would if they could - iPass is the solution. While eduroam is ideal when staff and students need high-speed access at Research and Education organisations globally, if they regularly need off-campus access via commercial networks, then iPass provides that answer – while providing an alternative to expensive mobile data or risky 'free' Wi-Fi. iPass offers an efficient solution for both end users and organisations. Users can:

- Connect 'invisibly' to Wi-Fi hotspots, thanks to streamlined access: there's no need to search for free hotspots.
- Connect to the best network - iPass SmartConnect builds a real-time picture of the location and performance of Wi-Fi hotspots worldwide, both inside and outside the iPass network. With SmartConnect, iPass can make intelligent connection decisions, invisibly and securely connecting users to the best Wi-Fi hotspot for their needs on any Wi-Fi enabled device.
- Save time and hassle using the 'One Time Password' feature – they enter credentials only once;
- Access unlimited data via 57 million hotspots across 160 networks in 120 countries.
- Access Wi-Fi from multiple devices, including iOS, Android, Windows and Mac.

To make life easier for IT teams, administrators can have access to the web-based iPass Dashboard, where they can manage all of their account information in one place, including configuration and deployment of iPass clients. Also, as iPass is a cloud-based service, there is no need for extra resources to maintain it – making it an efficient solution.

A COMPETITIVE DEAL THROUGH JISC

As the preferred supplier of iPass for the Research and Education sector in the UK and Europe, Jisc can offer a competitive deal negotiated to help save time and money. This deal:

- Offers substantial cost savings with over 80% discount – per-year costs are similar to monthly costs from other providers, and are similar to the cost of one day's Wi-Fi connectivity in some hotels.
- Includes a range of user packages for all needs. Bundles start as low as 250 users, making it cost effective even for smaller organisations – while fixed costs mean there are no hidden charges.
- Saves our members money and time negotiating their own deal with iPass, without a need to go through procurement.

For more information please visit **https://www.jisc.ac.uk/ipass**. Interested UK-based institutes can directly contact **iPass@jisc.ac.uk**. EU and non-EU institutions can contact us through **iPass@geant.org**.

NRENs who are interested in offering the service to their community can contact GÉANT for further information.

ALL YOU EVER WANTED TO KNOW ABOUT FEDERATED IDENTITY MANAGEMENT (FEDIDM) BUT WERE AFRAID TO ASK

EXPLORING THE VALUE OF FEDERATED IDENTITY MANAGEMENT IN 10 EASY LESSONS

The Research and Education networking community is focused on removing as many barriers to accessing information as possible, and has enjoyed huge success in helping connect students, researchers and academic staff from around the world.

However with increased connectivity there comes a need to manage and control access to enable authorised users to connect to, create and share information. To achieve trusted collaboration effective management of user identities is essential. In an interconnected world the process of establishing identity management systems, joining federations, and sharing resources presents many challenges and opportunities to institutions and organisations.

The payoffs of an investment in a well-designed identity management system are significant. Examples include:

- Improving campus network security.
- Allowing resource sharing on a global scale for students and faculty.
- Enhancing collaboration opportunities for researchers and educators.

To help Research and Education organisations around the world develop and manage identity services, an international collaboration led by GÉANT and Network Startup Resource Center (**https://nsrc.org/**) (NSRC) of the University of Oregon have created a series of video sessions that will take you through the policies and technologies of identity management at a local level. The videos then continue with further discussion on how identity federations build on and are of value to campus identity systems, and how to manage the risks involved.

Thanks to the support of GÉANT and the NSRC these materials are free to use for any interested groups or individuals.

"Every robust collaboration is built on trust. Federated Identity Management allows any organisations to express their local trust relationships with faculty, staff, and students in a way that can be understood and leveraged by the global R&E community."

Lucy Lynch (NSRC)

"Federated Identity Management offers a wide range of benefits for the R&E community but the learning curve to understanding the technology is significant. With these videos, we break down that complexity into bite-size learning to better support adopters and help them move quickly to implementation."

Nicole Harris (GÉANT)

To find out more about this video series and other NSRC resources, visit **https://learn.nsrc.org/FedIdM/**

TASK FORCES AND SPECIAL INTEREST GROUPS – DRIVING COLLABORATION AND INNOVATION ACROSS THE COMMUNITY

By their very nature, networking technologies and associated services require co-operation between organisations and across borders. Without this co-operation services cannot deliver to their fullest potential and users are left with having to work with many different incompatible technologies.

Across GÉANT, collaboration is crucial to the successful development and implementation of services and technologies. Working groups such as task forces and special interest groups help GÉANT, NRENs, other Research and Education bodies, and service and technology providers to collaborate, share experience and guide future developments of networking services and technology. By involving users, developers and industry leaders at these early stages the added value that TaskForces (TFs) and Special Interest Group (SIGs) bring to innovation is immeasurable.

Each TFs or SIGs is different and each has contributed to the R&E community to help deliver new services or enhance global collaboration. The examples below are just a few from the current portfolio of 13 groups, each providing the community with a different focal point and mission.

TF-STORAGE/SIG-CISS – SUPPORTING CLOUD SERVICE ADOPTION THROUGHOUT THE COMMUNITY

Since its inception in 2007, TF-Storage has helped develop a range of solutions for the Research and Education community. It was instrumental in supporting the development of community software services such as FileSender and the power of the group enabled GÉANT to negotiate a members' deal with ownCloud for R&E users. It was also a major support for the OpenCloudMesh initiative.

This TaskForce has been re-constituted as SIG-CISS (Cloudy Interoperable Software Stacks). This SIG will provide a broader forum for gathering and exchanging experiences, ideas and knowledge on the development, deployment, testing and standardisation of cloud infrastructure software stacks, platforms and workflows.

It will aim for a common cloud platform for execution, plugging in workflows from researchers. Commercial clouds are different, research clouds should be similar. In particular it will engage with the Scientific Working Group and Large Deployment Team of the OpenStack community.

TF-CSIRT

TF-CSIRT is one of GÉANT's oldest TFs and has currently celebrated its 50th meeting in Valencia, co-located with the FIRST Regional Symposium for Europe. Over 200 participants joined us to discuss a range of issues from the use of Open Source incident management platforms to cybercrime Research and Education within the EU. TF-CSIRT attracts CSIRT teams from a wide variety of backgrounds, including Research and Education, commercial, government, national and military teams. TF-CSIRT is more than just a series of meetings – it supports a portfolio of services overseen by a Steering Committee of volunteers from our community. This portfolio includes the well-known TRANSITS-I training, which provides new and potential CSIRT personnel with a solid background in incident handling and TRANSITS-II, for more advanced CSIRT staff. At the heart of the TF-CSIRT portfolio is the Trusted Introducer service (**https://www.trusted-introducer.org/**) which acts as a clearing house for teams to establish trusted relationships and provide accreditation services to enhance that trust.

More information about TF-CSIRT is available at: **https://tf-csirt.org**.

EDUROAM - A MASSIVE SUCCESS DRIVEN BY TASKFORCES

Everyone in the R&E community uses eduroam on a daily basis. With access in over 80 countries around the world eduroam is a truly global success story. But few people realise that eduroam grew out of TF-Mobility as a project between two Dutch Universities before growing and taking over the world!

Without the work of Klaas Wierenga (see pages 12-13) and the commitment of the team working for TF-Mobility this amazing service would never have seen the light of day.

www.eduroam.org

GET INVOLVED

The strength of TaskForces and SIGs comes from their members. Grass roots and world experts are welcome. They meet to explore emerging issues in Research and Education networking, collectively develop strategies and solutions, and test innovative ideas. Working with these groups provides not only shared expertise but also a community of developers and early adopters able to contribute to technology developments. These groups help to share best practice, develop new services and technologies and advance expertise in the R&E community. The work of the TaskForces and SIGs demonstrates the added value working with the GÉANT community can offer.

If you would like to find out more about GÉANT's TaskForce and Special Interest Groups and how to take part, visit **https://www.geant.org/ Innovation/SIG_TF**

GÉANT TO ADVANCE EARTH OBSERVATION COMMUNICATION NETWORKS AS PART OF GEO 2017 – 2019 WORK PROGRAMME

The Group on Earth Observation, GEO, is a partnership of 104 Member governments and 106 Participating Organisations which aims to provide comprehensive and coordinated Earth Observation (EO) content to allow informed decision-making in the area of climate change for the benefit of humankind.

The Global Earth Observation System of Systems (GEOSS) focuses on the best observation and information systems to support GEO's mission. So far GEOSS information exchange has been based on the Internet and contributing information distribution systems such as GEONETCast or the Global Telecommunications Network (GTS) component of the WMO Information System (WIS).

A priority in GEO 2017 – 2019 Work Programme will be to advance communication networks and explore possibilities of making other communication resources available, and advocate for adequate resources to develop the communication infrastructure that will ensure wider and sustainable access to and use of earth observation data and information.

This work will be carried out by a task force involving Research and Education (R&E) networks, governmental bodies and partners from around the world such as the European Union, the World Meteorological Organisation (WMO), ASREN and GÉANT.

The priorities for 2017 – 2019 will be:

- To document existing communication infrastructure within GEOSS and develop a concept architecture for a worldwide communication network of networks available to GEOSS
- To draft a plan on how individual services could complement the other networks for the benefit of GEO Members
- To engage with AfriGEOSS and potentially other Flagships and Initiatives to assess network requirements and possible improvements of data dissemination
- Support AfriGEOSS and the African National Research and Education Networks (NRENs) to discuss existing communication infrastructure, requirements and developing activities in the region
- Investigate state-of-the-art information technologies, such as cloud services, and how these may be applied to GEOSS
- Engage with GEOSS data providers to seek potential cooperation with and requirements to the GEOSS communication networks
- Discuss further development and seek cooperation with new GEO partners on the initial progress and findings of this task.

AfriGEOSS aims to provide the necessary framework for African countries and organisations as well as international partners to access and leverage on-going local and international EO-based initiatives across Africa, thereby creating synergies and minimizing duplication for the benefit of the continent and the rest of the world.

As a key contributor in GEO new Work Programme for advancing communication networks, GÉANT will work very closely with all GEO partners as well as R&E networks in Africa, in particular through the AfricaConnect2 project, in order to arm scientists and governments from around the world with better communication systems to tackle climate change and related challenges such as water management or food security.

The next GEO Symposium will take place in Tshwane, South Africa, on 12-13 May 2017, following the 37th International Symposium on Remote Sensing of Environment (ISRSE).

Read the full GEO Work Programme at:
http://www.earthobservations. org/geoss_wp.php

UP TO UNIVERSITY (UP2U) - A NEW EU-FUNDED PROJECT BY GÉANT

BRIDGING THE GAP BETWEEN SCHOOLS AND UNIVERSITIES THROUGH INFORMAL EDUCATION

Peter Szegedi talks to CONNECT about Up to University (Up2U), GÉANT's latest project for education https://up2university.eu/
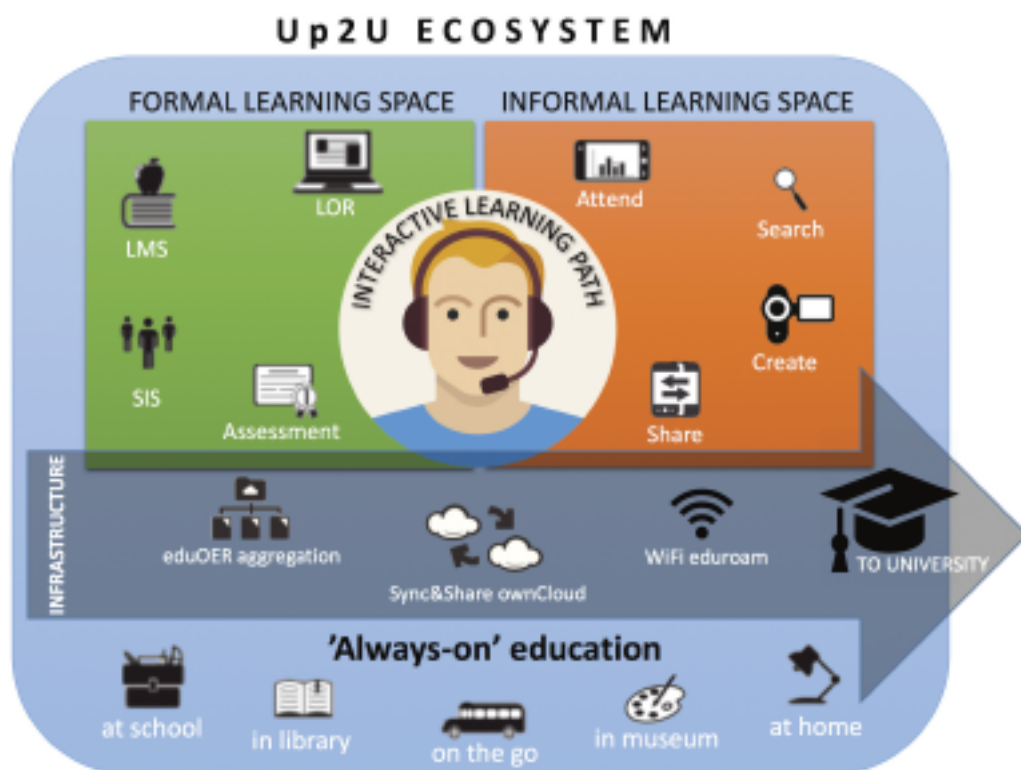

Up2U ECOSYSTEM

PROVIDING EDUCATIONAL TOOLS AND SERVICES TO SECONDARY SCHOOLS IN EUROPE

The key objective of Up2U is to bridge the gap between secondary schools and Higher Education and Research by better integrating formal and informal learning scenarios, and adapting the technology and the methodology that students are likely to encounter at university. This initiative aims to respond to the requirements of a clear mandate from the European Commission allied with the provision of new cloud-based tools and services to enhance primary and secondary education in Europe.

Up2U is a 36 month long collaborative project with €5M funding that kicked off in January this year. It is coordinated by GÉANT and gathers 18 partners from 12 countries across Europe including NRENs, traditional and open universities, infrastructure providers and commercial partners.

PERSONALISED LEARNING AND SUSTAINABILITY

Up2U focuses on a specific learning context and very formative period represented by secondary schools that in most European countries provide education to children between the ages of 11 and 19.

The aim is to develop an innovative ecosystem that facilitates more open, effective and efficient co-design, co-creation and use of digital content, tools and services specially adapted for personalised, collaborative or experimental learning by students preparing for university.

In addition, to ensure long-term sustainability of the project, Up2U will also investigate appropriate business models using the expertise of Small Medium Enterprises (SMEs) and NREN partners. In a later phase, it will also engage with educational content and service providers to further develop a suitable framework for the delivery of a fruitful commercial outcome.

A SCALABLE AND FUTURE-PROOF PLATFORM

The project entails the provision of educational applications, project-based and peer-to-peer learning scenarios and the facilitation of international interaction for secondary schools in Europe. Creative teachers will be placed at the core of the kick-off and briefing phase and encouraged to provide input and ideas for implementation.

Inspired by organic educational initiatives, such as Google for Education and Khan Academy, Up2U creates a flipped virtual ecosystem where pupils can learn at their own pace supported

Words
Peter Szegedi,
Project
Development
Officer, GÉANT

by social interactions, federated access and are able to exchange documents and other project-related multimedia content in a trusted and privacy-protected environment. The initial phase of Up2U will focus on the adoption and customisation of an e-learning management system with basic functionalities and standard Learning Tools Interoperability (LTI) interfaces. During the first year the new platform is expected to create an environment for creative student projects across Europe whose results will be shared with other schools and will be made publicly available. Up2U will also investigate personalised learning analytics, peer reviews and community driven digital recognition systems, using Open Badges and blockchain technology.

The project team will be gathering early feedback form teachers and students, following the rapid prototyping and minimum valuable product development principles. The platform will also need to be future-proof and scalable, with room for growth and development to seamlessly accommodate new schools and future commercial partnerships. Nowadays, the distance between a creative idea and a commercial product is becoming shorter and shorter; our commercial partners and project partners will explore these opportunities from day one.

PILOT COUNTRIES

The initial challenge is to start connecting the selected schools in the pilot countries - Germany, Greece, Hungary, Italy, Lithuania, Poland and

Portugal - using existing and established networks. Subsequent phases will then seek the extension of Up2U to other countries, including those GÉANT Project NRENs that have the mandate to serve secondary education in their respective countries, but are not partners in the Up2U project.

UNSCHOOLING

Up2U will also encourage "unschooling". But what does this mean? Unschooling is an informal space where teachers and learners meet. It is defined as the natural way to learn and is based on the fact that children are natural learners who thrive if provided with the appropriate tools in the right environments. Thus the platform, by being readily accessible in a context external to school, will enable students to keep on learning almost without realising it.

THE VISION

Individual schools and learning communities will use the Up2U ecosystem, its tools and services as an alternative education platform and store their personal and project-related data according to their own choice and local policies with respect to the European regulations. The desired outcomes are seamless, interoperable intercommunication, broader education and an inspiring vision of a multicultural, connected society for all students.

To summarise, Up2U will interconnect formal and informal education through engagement with teachers and students by means of

sharing tools in virtual classes using project-based learning and interaction with schools in their respective and other countries. It will provide strong support for teachers and will aim to deliver personalised education in a safe and trusted environment, where students will be able to complete inspiring assignments and receive community rewards thanks to a digital recognition system built into the platform.

For further information on Up2U, please visit **https://up2university.eu/** You can also contact Peter Szegedi, GÉANT at **peter.szegedi@geant.org**

BREAKNECK NETWORK SPEED TO DELIVER NEW ENERGY PARADIGMS

Ambitious goals require ambitious technologies. The ITER ("Way" in Latin) is one of today's most ambitious global energy projects and has the potential to change the methods and economic models of energy production and consumption. The ITER project, headquartered in southern France, is a collaboration between 35 nations to build the world's largest tokamak, a magnetic fusion device designed to prove the feasibility of fusion as a large-scale and carbon-free source of energy based on the same principle that powers the sun and the stars. This work is crucial to advancing fusion science and will serve as a foundation of the fusion power plants of tomorrow.

When ITER starts running plasma shots, operators all over the world need to crunch the same huge amounts of data collected by the tokamak's diagnostics systems at the same time as those in the on-site control room. The challenge: finding a way to transfer data as fast as possible to a site half a world away.

BREAKING RECORDS IN THE LAND OF THE RISING SUN

Each of ITER's early, non-nuclear plasmas will generate an estimated 1 terabyte of experimental data—the equivalent of a full commercial hard disk. When ITER goes nuclear, some ten years after entering operation, this volume might be multiplied by fifty. The project's Remote Experimentation Centre (REC) in Rokkasho, Japan, a duplicate of ITER's control room on-site, allows scientists in Japan to participate remotely in ITER experiments by storing the experimental data accumulated over time and ensuring the massive database is instantly accessible to researchers. A huge amount of data that needs to be transferred at speeds that current networking technologies simply could not deliver - until last autumn.

The capacity to transfer this data to Japan at a pace compatible with that of the tokamak's experiments—approximately one pulse every 30 to 60 minutes—was demonstrated in early September by information technology specialists from ITER and their counterparts at three Japanese institutes: the National Institute for Quantum and Radiological Science and Technology (QST), the National Institute for Fusion Science (NIFS) and the National Institute of Informatics (NII) in cooperation with the European agency for ITER.

The demonstrated repeat transfer of 1 terabyte of data within 30 minutes and some 50 terabytes of data per day is the largest level inter-continental high speed data transfer between two sites in the world. At an average speed of 7.9 Gigabits per second (Gbps), this is some 1,600 times faster than the average global broadband connection.

Broadband Network

ITER site In France

REC site in Japan

COLLABORATION AND NEW TECHNOLOGIES PUSH THE LIMITS OF POSSIBLE

The record-breaking speed was made possible by the implementation of a super-fast protocol, the Massively Multi-Connection File Transfer Protocol-MMCFTP (see box) over a direct link recently established between the GÉANT network and the 5th generation of the SINET network (SINET 5), developed and operated by NII.

The direct 20 Gbps connection between Japan and Europe has reduced the physical distance of data travels by one-third; in fact previously the data had to travel via the United States. In addition, by constructing a dedicated virtual private network (L2VPN) between Rokkasho and ITER, the collaboration between GÉANT and RENATER, the operator of the national Research and Education network in France, has created a stable, highly-secure broadband network.
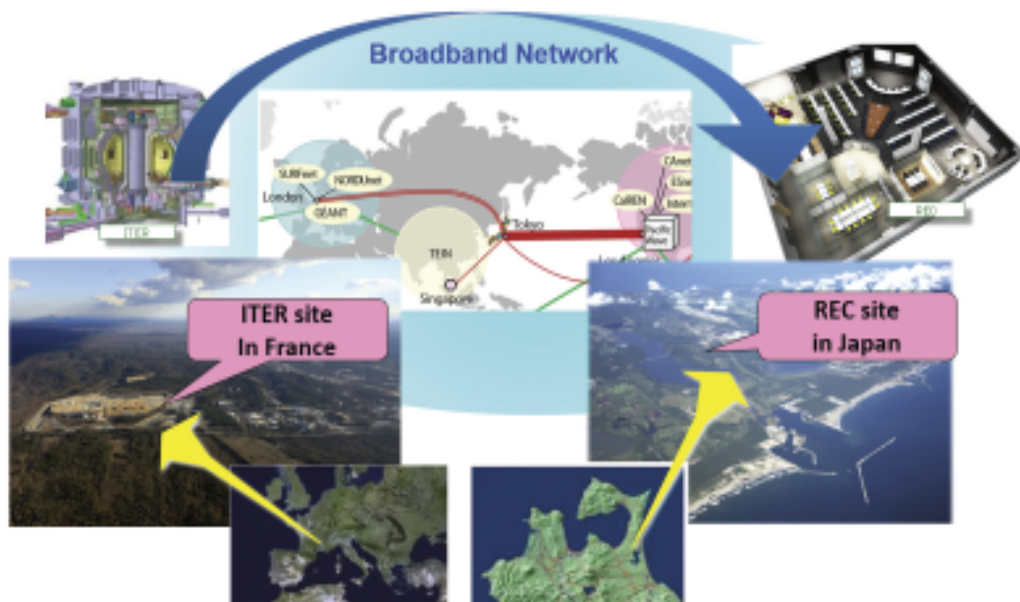
INFUSING NEW ENERGY INTO EUROPEAN-JAPANESE RESEARCH COLLABORATION

Over 50 million researchers, academics and students across Europe and Japan will be able to benefit from this direct connection and technology. In addition to the ITER project, this capacity boost will answer the increasing data transfer requirements of collaborative research between Europe and Japan on other projects, such as the Large Hadron Collider (LHC) at CERN and the worldwide e-VLBI radio-astronomy network. This unique collaboration within the international networking community enables scientists to redefine and push the limits of research and discovery.

THE PROTOCOL BEHIND THE SPEED

The Massively Multi-Connection File Transfer Protocol (MMCFTP) developed by Japan's NII overcomes the limitations of standard TCP/IP protocol. With TCP/IP, data is only sent after an acknowledgment is received, to confirm that each packet sent is correct. Over long distances, this takes a very long time so that data transfer speed for large amounts of data decreases dramatically. MMCFTP is one of the world's fastest protocols for transferring data over long distances. Using MMCFTP, the data file is split, creating multiple connections simultaneously and balancing the amount that is sent over each connection to maintain a steady speed. MMCFTP was adopted for the nuclear fusion field so the full capability of the network connection could be exploited. The use for other data-intensive experimentation is limited only by the imagination.

Pictures

Top right: Data transferred from ITER site in France to REC site in Japan. Credit: Takahisa Ozeki, QST.

Bottom right: Data of 105 TB were transferred repeatedly every 30 min at a high speed (average of 7.2 Gbps) from ITER (France) to REC (Japan) for 50 hours. Credit: Hideya Nakanishi, NIFS.

50 hours

2016/09/03 04:00 - 2016/09/05 08:00

33
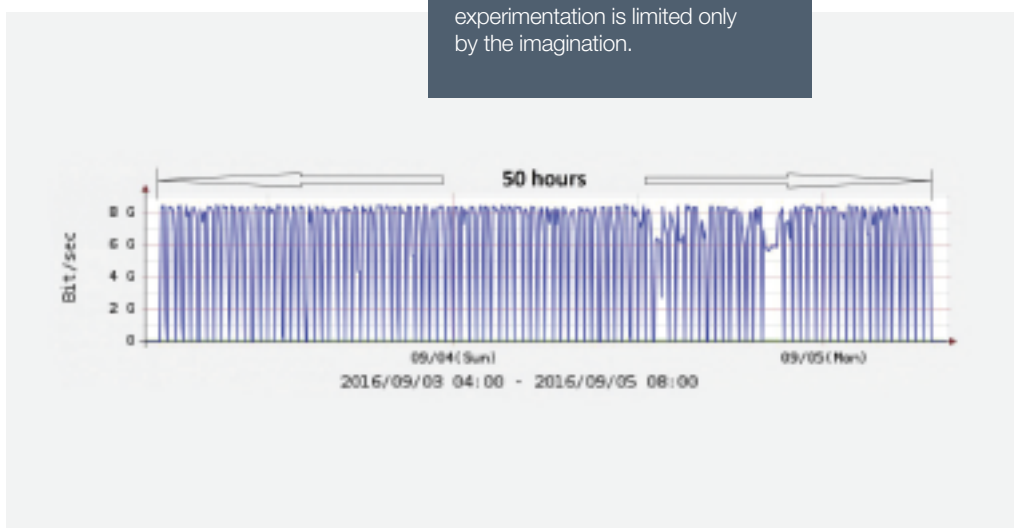
EASTERN MEDITERRANEAN SPURRED ON BY EUMEDCONNECT3 PROJECT EXTENSION AND LEBANON CAPACITY UPGRADE

EXCITING TIMES AHEAD

The year has started well for the NREN and the user community across the Eastern Mediterranean thanks to a three-year extension of the EU-funded EUMEDCONNECT3 project, which supports international R&E connectivity for the region. But that's not all: until December 2019 the beneficiary partners in Jordan, Lebanon and Palestine will also be able to benefit from an increase in the European Commission's co-funding share from 36% to 60% of the overall project costs which is set to catalyse further connections and capacity upgrades.

E-AGE2016 IN BEIRUT

The contract amendment was formalised earlier this month between project coordinator GÉANT and the Directorate-General for Neighbourhood and Enlargement Negotiations (DG NEAR) of the European Commission which provides €3.2M funding. The extension was announced at e-AGE 2016 – the flagship event of project partner ASREN - held at the beginning of December at the American University of Beirut (AUB) in Lebanon. During the opening session, ministers and senior officials, also from the EC, stressed the importance of technological literacy as a key factor for socio-economic and scientific progress and recognised the role of initiatives such as EUMEDCONNECT3 in enabling international collaboration and in forging citizens of the world.

LEBANON ON A ROLL

Conference participants also welcomed the announcement of the recent capacity upgrade of Lebanon's international connectivity link. In early 2016, AUB allocated 10 Mbps of its internet bandwidth to interconnect to the GÉANT network via ASREN's London hub for a pilot connection. The success of this and the prospect of the EUMEDCONNECT3 project extension led to the upgrade of the capacity to 320 Mbps in November and accelerated plans for an NREN in Lebanon (LERN). redefine and push the limits of research and discovery.

JORDAN AND PALESTINE

The Lebanese success story and amended EUMEDCONNECT3 contract terms are expected to further encourage R&E networking activity in Jordan and Palestine. Jordan is already connected at 155 Mbps by ASREN using EUMEDCONNECT3 funding. Further upgrades are expected to support the SESAME synchrotron radiation facility as it enters production phase and the Jordan R&E community starts to take advantage of the connectivity.

Palestine is also keen to re-join the international R&E networking community. Plans are underway to establish a 155 Mbps international link with EUMEDCONNECT3 funding and other donors, such as the Talal Abu-Ghazaleh Organisation.

Picture
Participants at 2-AGE2016 in Beirut

"This extension demonstrates that GÉANT is a partner of choice of the European Commission in its quest to support regional networks around the world and interconnect them with the GÉANT pan-European network to facilitate global R&E collaborations. Starting in 2004, the EUMEDCONNECT programme led to the first of such regional GÉANT-like models being set up outside Europe and the latest extension and the increased funding share is already spurring on our partners to rekindle R&E networking in the region."

David West,
EUMEDCONNECT3
Project Manager, GÉANT

"It can be challenging to convince R&E institutions in Lebanon about the value of an NREN, especially when the infrastructure, tariffs and political climate are all but favourable. But by moving the NREN discussion away from how can we build a fast and cheap network, we can put the focus on providing shared services to build a community, and then use this community as leverage to build the high bandwidth. The implementation of eduroam at AUB has delivered a key argument to secure a critical mass of support and EUMEDCONNECT3 allows us now to deliver on the connectivity front."

Yousif Asfour, Chief Information Officer, American University of Beirut (AUB)

BACKGROUND

The EU-funded EUMEDCONNECT project supports Research and Education (R&E) networking for the Eastern Mediterranean (Jordan, Lebanon and Palestine). Now in its 3rd phase, it provides high-capacity international internet connectivity for academic and scientific collaborations. The project is run by the GÉANT organisation in partnership with ASREN, the local NRENs and the NRENs of Cyprus, France, Greece, Italy and Spain.

Through its earlier phases the EUMEDCONNECT programme also provided a regional R&E network for North Africa with Algeria, Egypt, Morocco and Tunisia benefiting since 2004. In July 2015, the North African countries became partners in the new AfricaConnect2 project, also managed by GÉANT and ASREN. Close links with the EUMEDCONNECT3 community are being maintained as the two projects bring the African and Arab R&E communities together.

To learn more about EUMEDCONNECT3 visit **www.eumedconnect3.net**

Find out more about e-AGE2016 at **http://asrenorg.net/eage2016**

WEST & CENTRAL AFRICA GEARS UP FOR AFRICACONNECT2 THANKS TO TANDEM-WACREN PARTNERSHIP!

TANDEM
TRANSAFRICAN NETWORK DEVELOPMENT

WHAT IS TANDEM?

TANDEM, or the Trans African Network Development, is a Horizon2020 project started in May 2015 that has focused on creating an engaged audience for effective Research and Education networking in West and central Africa through the West and Central African Research and Education Network (WACREN) and its participation to AfricaConnect2.

Due to end on 30 April 2017, TANDEM's specific goals have been:

- To obtain political and financial support to WACREN for the network implementation in view of the AfricaConnect2 extension
- To raise end users' awareness and gather their requirements to design the WACREN service offer
- To identify necessary technical adjustments to deploy the WACREN service portfolio
- To establish a strong NREN community.

A 360-DEGREE OUTREACH SUCCESS

How did TANDEM manage to achieve its objectives? Primarily through a strong synergy with WACREN which allowed the project team to work with the right people. Secondly by using a 360 degree strategy to reach out to all key stakeholders.

The strategy was conducted with three objectives in mind:

- Understanding the end user audience
- Making the case for NRENs through advocacy activities towards ministries, regulators and other influential decision makers
- Building an engaged community.

The TANDEM-WACREN Survey and the Focal Points Taskforce

A survey was designed to understand end users requirements to enable WACREN to develop the right services for them.

The survey was then administered by a regional task force, called the Focal Points, representing local NRENs, who disseminated the survey in universities and research centres and started building a regional database of future members.

The survey was promoted from September 2015 to March 2016 by WACREN, its member NRENs and all partners throughout Africa and Europe, including AfricaConnect2, RENATER and others.

Dr. Venant Palanga, CEO of TogoRER and Focal Points coordinator tells us more: "I am proud and impressed by the work carried out by the Focal Points.
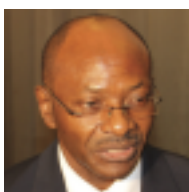
Their efforts have considerably raised awareness of NRENs and their value to end users at universities and research centres in the region. This success is even more notable considering we are all volunteers doing this on the side of our teaching, researching or studying activity. But the outcome for the region is worth it."

Dr. HAMADOU Ali, Professor at Dan Dicko Dankoulodo University of Maradi in Niger and member of NigerREN highlights his learnings from being a focal point:


"As a Focal Point, I learnt how to develop strategies to mobilise and animate my country's end-users community around TANDEM and WACREN activities, namely the participation in the survey on education and research, the end-users database building, the dissemination of opportunities in terms of capacity building (WACREN workshops, Sci-GaIA events, etc.) and research projects funding. Another key advantage is the collection of end-user data as well as the identification of their needs in the perspective of AfricaConnect2."

The PODWAG

A special consultative group formed of policy makers, donors and regulatory authorities in West and Central Africa was founded: the PODWAG. Its aim: to maintain a permanent dialogue at the policy maker and donor level and influence them positively.

Represented in this group are ministries and other governmental bodies, research institutions such as IRD or the Malaria Research and Training Centre, international development partners such as the World Bank or the African Development Bank as well as regulatory bodies.

Mrs Gametti, Permanent Secretary of the Ministry of Higher Education and Research of Togo sums up one of the main achievements of the PODWAG:
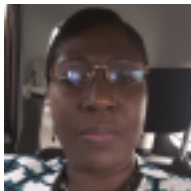
"Until our first PODWAG meeting we had a very limited knowledge of what an NREN was. Gathering decision makers from various institutional groups in the region is very positive from whatever angle you look at it because it favours national, regional and international integration. As a result of our joint efforts, the Ministry of Higher Education and Research has budgeted Togo's contribution for TogoRER's participation in AfricaConnect2 and views it as a priority for the country".

Mr Seydou Sissouma, Commissary at UEMOA, the Economic and Monetary Union for Western Africa highlights the importance of collaborative work at policy level:

"The PODWAG work is crucial to maximise resources and avoid duplication of efforts towards the development of better ICT for education and research, which is a high priority for the UEMOA partner countries. This is even more critical given local NRENs are widely under-funded and need the support of their governments to achieve this shared objective. Ultimately we want to be able to increase the input of West and Central Africa to global science through locally produced and processed content."

THE BIRTH OF ADDED-VALUE R&E NETWORKING

TANDEM-WACREN Survey Results

The WACREN-TANDEM survey on end users requirements gathered over 1000 answers from 17 countries and allowed to identify key challenges faced by the regional R&E community, starting with network connectivity cost and reliability, but also the lack of distance learning programmes and open access sources. Poor networks prevent researchers from participating in international programmes thus limiting the African input.

Overall the survey allowed to prioritize the next services to offer to both an educational and research audience.

WACREN Service Portfolio

Based on the learnings of the survey WACREN started to build a service portfolio listing high priority and lower priority services and technical recommendations.

Top of the list are:

- Online educational material
- Online access to software used in education and research such as Big File transfer or scheduling tools
- Identity federation and eduroam
- Video and web conferencing tools
- Massively open online courseware (MOOCs).

The NRENs will now decide on their own service priorities, highlighting the added value of the WACREN network being developed under AfricaConnect2.

The Way to AfricaConnect2

Ultimately the connectivity provided by WACREN through AfricaConnect2 will help deploy these services to an eager and now more aware audience across the region.

Thanks to the TANDEM-WACREN partnership a few West and Central African NRENs have been able to receive funding from their governments and development partners for their participation in AfricaConnect2.

The connectivity tender for WACREN is ongoing and best final offers are expected to be invited by end of March. An equipment tender is also underway.

The WACREN conference in Abidjan, Ivory Coast, on 30 and 31 March 2017 will be preceded by the closing event of the TANDEM project organised around a community workshop in the morning and a high-level meeting in the afternoon of 29 March.

WACREN 2017 will unveil and amplify the outcomes of the lobbying and engagement work started with TANDEM and provide further perspectives with AfricaConnect2 to a committed audience of researchers, students, policy regulators and decision makers.

You can download the full TANDEM-WACREN survey results as well as the WACREN service portfolio recommendations on **http://www.tandem-wacren.eu/project-resources/**

EASTERN PARTNERSHIP E-INFRASTRUCTURES CONFERENCE 2017 SET TO FOLLOW SUCCESS OF FIRST EAPEC

EaPEC2017

EaPConnect
Eastern Partnership Connect

The first Eastern Partnership E-infrastructure Conference, EaPEC, was given a 5-star rating by participants in a feedback survey. The conference provided opportunities for human networking and exchanging useful information on a range of topics around computer networks, high performance computing resources, databases and software in use for various areas of science.

Hosted in cooperation with the University of Georgia by GRENA, the Georgian NREN, the conference in Tbilisi was organised by the EaPConnect project as part of its goal to interconnect the Research and Education communities in the EU and Eastern Partnership regions.

Held in October 2016, the event served as a platform for collaboration on policy and research and to support community building in e-infrastructures between the Eastern Partnership region and EU member states.

With welcome speeches from high-level Georgian dignitaries and representatives of the European Union's DG-NEAR and DG-CONNECT teams, EaPEC2016 attracted around 80

attendees from 16 countries and more than 50 organisations, including NRENs, universities, research institutes, government, NGOs and representatives of industry and the press.

To build on this success, EaPEC2017 will be hosted by UIIP NASB (BASNET) in Minsk, Belarus, on 27-28 September 2017. EaPEC2017 welcomes policy makers, researchers, students and experts on networking and high performance computing for Research and Education from EaP countries and all over the world.

EAPEC 2017 WILL FEATURE:

- A keynote speaker from the Human Brain Project, one of the EC flagships in Future and Emerging Technologies
- Presentations and discussions about research and e-infrastructures for open science
- Presentations of the 2nd Enlighten Your Research awards in the EaP countries (EYR@EAP - details for entry to be announced soon)

Pictures
Left: The EaPEC2016 and EaPConnect team.

Right: Yuras Hetsevich of the National Academy of Sciences of Belarus (left), and Naira Kocharyan (centre) of ASNET-AM on behalf of Armen Poghosyan of the Bioinformatics Group of the International Scientific-Educational Center of NAS RA, Armenia, receive the first EaP Enlighten Your Research awards at EaPEC2016 from Walter van Dijk of SURFnet (right).

The full conference web pages and preliminary agenda will be made available soon.

Register or express interest in receiving more information via **https://eventr.geant.org/events/2590**.

OTHER RECENT EAPCONNECT PROJECT ACHIEVEMENTS:

- January 2017 – Workshop on Business Models for NRENs: hosted by DFN in Berlin, 22 participants from 6 EaP and 6 European NRENs.
- November 2016 - Workshop on Collaborative Robotics Applications: hosted by PSNC in Poznan with researchers from Poland and Belarus.

For further details please visit **https://www.eapconnect.eu/**

IN THE FIELD BLOG - BRINGING THE RESEARCH AND EDUCATION COMMUNITY TOGETHER WITH THE MOST INSPIRING STORIES AND ACHIEVEMENTS

The 'In the Field' blog (**www.inthefieldstories.net**) features inspiring stories that illustrate how Research and Education (R&E) networks around the world are utilised to solve problems and make a real difference to the everyday lives of people.

BOF AT TNC17

At TNC17 (see pages 4-5) the 'In the Field' platform will be the focus of a Birds of a Feather (BoF) session, taking place on 30th May, entitled "How to use the 'In The Field' platform to engage with users, funders and key influencers". The session aims to maximise the potential of this blog – both in terms of content and usage - and will explore how the platform can be effectively used by NRENs, particularly in emerging regions, as a powerful marketing and lobbying tool with end-users, funding bodies and the media.

STORIES SHOWCASE

From the impressive collection of over 120 posts, representing more than 60 networks across 6 continents, we have selected two stories to whet your appetite for the blog.

BRINGING HIGH-SPEED INTERNET TO THE BIRTHPLACE OF ZEUS

http://www.inthefieldstories.net/ bringing-high-speed-internet-to-the-birthplace-of-zeus/

High connectivity delivered to a remote archaeological site in Greece for the first time

For many years, archaeologists from Greek and American universities working together at the birthplace of Zeus, on a remote mountain top in the middle of Arcadia, had been facing real communications challenges due to slow and expensive internet connectivity. Thanks to the collaboration between the Greek NREN, Greek Research and Technology Network (GRNET) and GÉANT, a high-speed internet link was finally deployed to the site at Mount Lykaion.

Setting a technological precedent in the field of archaeology

Finally scholars around the world were able to have real-time access to analysis sites direct from the excavation. This joint initiative between researchers in remote field operations and the academic networks in Greece, Europe and the U.S. represents a milestone in technological collaboration for the Humanities.

CREATING AN ATLAS OF THE BLACK-EYED BEAN GENOME

http://www.inthefieldstories.net/ creating-an-atlas-of-the-black-eyed-bean-genome/

Exclusive infrastructure supports knowledge sharing about the black-eyed bean

In Brazil, researchers from the Plant Genetics and Biotechnology Laboratory of the Federal University of Pernambuco (UFPE) have created the Cowpea Bean Genome Consortium, using an exclusive infrastructure to send data to laboratories across the world, in order to develop more environmentally adapted cultivated forms of this bean.

The cowpea bean, known as black-eyed bean in Brazil, is one of the main components of the food diet and a protein source capable of replacing the consumption of red meat, often sparse, it also leverages family-based agriculture, because it occupies much of the planted area and generates thousands of jobs. The reason for its importance is in its adaptability to unfavourable soil and weather conditions.

Optical fibre architecture

UFPE's IT Center, in partnership with RNP (the Brazilian NREN), installed an optical fiber architecture exclusively for the laboratory, in addition to the network that serves the entire university campus. This infrastructure accelerated the data transfer between the laboratory and the partner institutions.

International collaboration

UFPE's Plant Genetics and Biotechnology Laboratory collaborates with the universities of Frankfurt and Potsdam in Germany, Luxembourg, Virginia, in the United States, and Sherbook and McGill in Canada.

For more information on the BoF at TNC17, please visit **https://tnc17.geant.org/core/event/10**

CRNC 2017: KEY APPOINTMENT FOR THE CENTRAL ASIAN R&E COMMUNITY

Following the successful 'premiere' event in Almaty in October 2014, the second edition of the Research Networking Conference for Central Asia – CRNC 2017 – will be held on 25-26 April 2017 at the Kyrgyz Turkish Manas University in Bishkek.

The event will bring together professionals from the Central Asian research and higher education (R&E) community, policy makers, connectivity providers, ICT vendors and will also draw on the expertise of representatives from other regional networks and organisations, such as GÉANT and its Asian counterpart TEIN.

Themed "Empowering the Central Asian Research and Education communities through global high-speed networking", CRNC 2017 will feature an overview of the recent developments in advanced ICT services for research and higher education, stories from the field in the use of these advanced services and how ICT is best introduced at member institutions of the Central Asian NRENs. CRNC 2017 will also celebrate the official launch of the 3rd phase of the EU-funded CAREN project which supports the development of a regional R&E network in Central Asia.

Participants will learn first-hand from scientists and academics how R&E networking makes a real difference in advancing collaborative research in areas such as environmental studies, seismology, telemedicine and preservation of natural and cultural heritage. In addition, presentations will outline how e-learning and remote training opportunities make education and knowledge transfer more accessible.

CRNC 2017 will be jointly hosted by KRENA, the Kyrgyz Research and Education Network Association, and the Kyrgyz Turkish Manas University in Bishkek.

For further details and registration please visit **https://crnc2017.icaren.org/en**

ASI@CONNECT PROJECT KICKS OFF

A new phase of Asia-Pacific regional R&E networking called Asi@Connect was launched at the APAN43 meeting in New Delhi in February to seamlessly extend and further build on the successful TEIN initiative. The Asi@Connect contract was signed between European Commission's Directorate-General for International Cooperation and Development (DG DEVCO) and the Korean regional networking organisation TEIN*CC which has been managing TEIN4, the most recent phase of the TEIN project.

AMBITIOUS TASKS AHEAD

Asi@Connect takes over the regional R&E backbone network from TEIN4 which currently supports 23 Asia-Pacific economies and over 50 million users. With a substantial five-year EU-funding commitment of EUR 20M until 2021, Asi@Connect is designed to step up efforts to support the emerging countries across the region to:

- develop new network services and support their deployment
- facilitate human capacity building and knowledge exchange
- extend the R&E footprint to connect additional Asia-Pacific countries
- promote and support user communities to utilise R&E networking
- improve public internet access in least developed countries

A CONTINUING SUCCESS STORY

Asi@Connect marks the 4th phase of EC funding to a programme that has successfully established a regional network from scratch in 2004 and progressively expanded its geographical footprint over the years. During this new phase, greater emphasis will be on delivering the project with increased involvement of additional partners within the Asia-Pacific R&E community. GÉANT (then DANTE) transferred responsibility for the TEIN programme to TEIN*CC in 2012 and has since provided consultancy advice. This advisory role will continue during Asi@Connect.

Visit **www.tein.asia** to find out more about **Asi@Connect**

Pictures

Left: Asi@Connect ribbon cutting at APAN43 in New Delhi in the presence of EU Ambassador to India Tomasz Koslowski, TEIN*CC President Hye-Joo Yoon and Principal Scientific Advisor, Government of India Rajagopala Chidambaram, February 2017

Right: Attendees at TEIN*CC Governors' and TEIN4 project meeting in August 2016 in Hong Kong

SINGAREN OPEN EXCHANGE LAUNCHED

In October 2016, Singapore Advanced Research and Education Network (SingAREN) unveiled the SingAREN Open Exchange (SOE) to enable domestic and international R&E connectivity to Singapore.

Established as a single and resilient PoP, SOE is open for local and international institutions to connect at speeds of up to 100 Gbps. The announcement was welcomed in particular by bandwidth- demanding users, such as the supercomputing community, as connecting to SOE facilitates high-speed data transfer improves routing efficiency and reduces latency.

SOE is co-funded by the National Supercomputing Centre (NSCC) Singapore which provides state-of-the-art petascale High Performance Computing (HPC) facilities, multi-petabyte data storage and multi-gigabit speed global connectivity through its 100 Gbps connection to SingAREN.

For more information on SOE and how to connect, please visit **https://www.singaren.net.sg/soe.php**

OPTIMISING THE IMPACT OF NRENS ON AFRICA'S RESEARCH & EDUCATION

LEARNINGS FROM

UbuntuNet CONNECT 2016

The last UbuntuNet-Connect conference was held in Entebbe, Uganda, on 3-4 November 2016 and discussed the impact of NRENs on African research. RENU, the Research and Education network for Uganda hosted the 9th edition of the conference which drew nearly 150 participants from 33 countries and 5 continents. Over 30 papers were presented focusing on building and expanding NRENs, Network security, Open Access, Global collaboration and more.

Meoli Kashorda, CEO of KENET, the Kenyan NREN, led a panel discussion of experts including representatives of the Inter University Council for East Africa (IUCEA), the African Academy of Science and The Climate Impact Research Capacity and Leadership Enhancement group (CIRCLE).

The discussion pointed out a few reasons limiting the potential impact of NRENs in Africa, starting with:

- Competition between Universities
- Lack of defined metrics in measuring the impact of research
- The absence of well-defined end-user communities.

Isaac Kasana, the CEO of RENU underlined the key role NRENs have to play in bringing African universities together: "It is high time African universities start believing in themselves and their products by collaborating with each other in research fields that have a direct bearing on their communities. It is the NREN role to facilitate these collaborations."

THE WORD OF THE UBUNTUNET ALLIANCE

"The theme of this conference is about making each other stronger. The polarisation of our region means that while some NRENs are robust connectivity and service providers, others are only starting to position themselves. In this context the most advanced NRENs show the others what can be done with connectivity and together with their researchers they can demonstrate that connectivity is for innovation", says Pascal Hoba, CEO of the UbuntuNet Alliance. "On another level, it is not a coincidence that we organised our conference together with our colleagues of the African Partnership for Chronic Diseases (APCDR) who had their conference at the same time in Entebbe, as an example of engagement between NRENs and an end-user community". APCDR and the UbuntuNet Alliance held the joint closing session of the UbuntuNet-Connect 2016 which allowed to raise awareness of both organisers' activities to their respective audiences.

AFRICA GOES GLOBAL WITH NEAAR

Global collaboration was an important item in the conference programme since the UbuntuNet Alliance is a partner in the Networks for European, American and African Networks collaboration (NEAAR) along with Indiana University, GÉANT, WACREN and ASREN. NEAAR aims at increasing data exchange between researchers and students in Africa, US and Europe.

"With AfricaConnect2 the Alliance will connect more countries and contribute to the success of NEAAR", said Hoba. Jennifer Schopf, from Indiana University, Principal Investigator in the collaboration, gave a presentation at the conference which highlighted the importance of the human network, from the end-user to the network engineer and the regional RENs. NEAAR launched a 100 Gbps transatlantic link in January 2017. It will further provide capacity building and pursue the development of an exchange point in Africa.

UbuntuNet-Connect has proved again that it was an effective platform for discussion for the Eastern and African Research and Education community and a strong voice towards the global community.

The UbuntuNet Alliance now has 15 members, having signed a membership agreement with ZARNET (Zimbabwe) in October 2016. Current members connecting to the UbuntuNet network under the EU co-funded AfricaConnect2 project include SomaliREN, MAREN (Malawi), and RwEdNet (Rwanda).

All the presentations given at UbuntuNet-Connect 2016 can be found at:
https://events.ubuntunet.net/ indico/event/1/speakers

Q&A WITH RENU CTO ON HOSTING UBUNTUNET-CONNECT 2016

Organising a regional conference has its own technical challenges. Nicholas Mbonimpa, Chief Technical Officer of the Research and Education Network of Uganda (RENU) tells us about his experience of supporting UbuntuNet-Connect 2016.

WHAT WAS YOUR OVERALL EXPERIENCE?

Hosting the 9th edition of the UbuntuNet Connect conference was a great opportunity for us to showcase what we are about at RENU, and in Uganda at large. We are very grateful to the UbuntuNet Alliance for choosing us. It is the second time that we host the event and we are very proud to have enabled the first live-streamed UbuntuNet-Connect conference. There were a few challenges but overall the conference was a success.

WHAT WERE THE CHALLENGES?

The first hurdle was to mobilise and deploy logistics and resources. This is because RENU is headquartered in Kampala and the conference was hosted in Entebbe, about 40 km south of Kampala.

But from a technical perspective the biggest challenge was to bring the poor and intermittent internet connection at the hosting hotel up to the standards expected for a networking conference. To achieve this we connected the sections of the hotel hosting the conference to the RENU network. We did this first by laying optic fibre cable from the hotel to the RENU PoP in Entebbe; we then deployed sufficient wireless access points to ensure that all end user devices had access to high speed connectivity. eduroam was also set up to provide secure network access to visitors from different parts of the world where the service is deployed.

The other technical challenge was the frequent power fluctuation. This was handled by placing Uninterruptible Power Supply (UPS) systems on all active devices constituting the LAN custom-built for the conference.

By addressing these technical issues, we ensured that all preconference and conference participants (over 150) enjoyed optimal connectivity.

In 2016 RENU celebrated its 10th anniversary; became the official Roaming Operator for eduroam in Uganda (reaching 65 connected campuses); launched video conferencing to support its member institutions; established the RENU Identity Federation (RIF); was able to carry out substantial connectivity cost reductions; commissioned a direct link from the 2nd RENU PoP in Kampala to the UbuntuNet PoP in London under the AfricaConnect2 project. For more information visit: **www.renu.ac.ug**

THE IMPORTANCE OF ACADEMIC PEERING

Q&A WITH PROF. DEIRDRE CARABINE — VIRTUAL UNIVERSITY OF UGANDA

Professor Deirdre Carabine is the co-founder of VUU, the Virtual University of Uganda. A philosopher by training she is passionate about embracing ICT to enhance the higher education experience. At the UbuntuNet-Connect conference last November she presented a paper on How ICTs and Collaboration with NRENs are changing the Face of Higher Education. Here is her testimony, from the academic perspective.

Tell us more about the Virtual University of Uganda

The Virtual University of Uganda is the 1st online-only university in Sub-Saharan Africa. We have just celebrated our fifth birthday and awarded our first graduates. We currently deliver 4 diploma and master programmes (Public Health, ICT for Development, International Development and Business Administration). VUU allows students who live in rural areas and who cannot travel to pursue higher education studies. We have students from Uganda, Tanzania, South Africa, Burundi, and many other African countries, and even some students form Europe.

What is academic peering?

In my view, academic peering is human networking. In a world where we see the growth of the Internet of People and Li-fi, the lonely academic in his/her ivory tower is a thing of the past. Networking, or academic peering is as inevitable as using a computer even though many academics still resist it. My central idea is that we ought to embrace it because academic peering can have numerous benefits: it can save human power hours and cut costs, it can enhance content quality, it can expand audiences and bring the very best content to more students, and it can enhance the development of critical minds that are creative and can think outside the traditional box.

### When do ICT and NRENs come into play?

While academic peering can start with individual academic staff or even a few institutions coming together, in thinking the big picture, peering is achievable nationally and regionally by using our NRENs to network us cheaply and efficiently.

However enabling research networks achieve their self-imposed goals cannot be done solely by the NREN. The importance of NRENs for academic research and teaching is indisputable. According to Prof. Francis Tusubira (2011), NRENs not only provide "dedicated high speed networks that enable access to online resources for students and researchers", but also "support content-level collaboration in Research and Education." "Support content-level collaboration": this is precisely where we need to start our reflections as academic staff. Here we shift the burden of responsibility from the provider and enabler, the NREN, to the end users, the academics and the researchers, who are the content creators.

How can we empower academics to harness ICTs and collaborate with NRENs to achieve their goals?

NRENs are the "enablers" in the sense that they are the backbone supporting our teaching and research efforts. In the past, of course, when books and learning resources were stored in libraries, NRENs had no role. With the diversification and democratization of knowledge and learning materials, a country's teaching and research institutions now need their NRENs to do what they are formed to do, that is: to
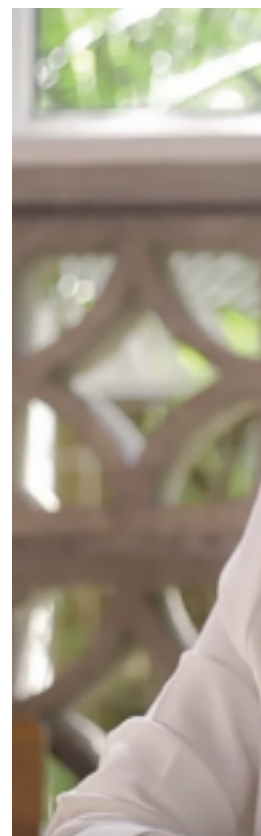
be "specialised internet service providers dedicated to supporting the needs of the Research and Education communities within a country."

And if NRENs are to be enablers of research, this means that significant changes have to be implemented at the grassroots university level.

The good news is that we, the teaching staff, are being forced to change because student expectations and learning practices have changed. The serious-minded student will often explore a topic widely on Google and obtain good up-to-date resources. All scholars need to engage with that and begin exploring for themselves.

How can ICTs and collaboration with the NREN increase teachers' value to their students?

The world's foremost intellects in the university world have numerous videoed lectures uploaded to the internet; we can easily use these to stimulate and broaden our students' learning experiences. We can listen to Amartya Sen on peacebuilding, Richard Branson on entrepreneurship, Stephen Hawking on the future of robotics, Amina Mama on feminism … all these are much more interesting than listening to one lecturer for three hours every week for a full semester. It simply takes a little creativity.

But let me widen the net (so to speak): what about co-teaching? I teach in situ while my colleague's class can see the lecture while at a different location and then the next week we swap places. One course, two teachers, interested students, and more importantly, increased inter-university student interaction. This is the individual academic peering that I believe is made possible through our NRENs.

Gone are the days when the department budget had to look for sufficient funds for guest lecturers from other universities: today, this is easily achieved with all parties in their own location using the video-conferencing facilities provided by our NRENs.

What about staff worrying about earning less because of the rationalization made possible by ICTs?

ICTs and collaboration with NRENs provide new opportunities, for interactive feedback between classes to share, invited guests, and after video-conferencing with professors and students from the other side of the world and more. While all this takes time to prepare, the content and experience end up being more enriching for all. It is the duty of the universities to value these

new skills and ways of teaching. As I said earlier ICTs also allow universities to save money on infrastructure expenditures but this is possible only if we can change the academic mindset and balance our budgets in a different way.

There is a need for ICT savvy academics in universities to influence their deans and IT departments to embrace collaboration with NRENs to showcase what is possible.

Equally there is a need to increase the use of ICTs in teacher training to match future students' expectations. Physical classrooms, lecturer's offices, and student residences are not necessarily an integral part of a university's infrastructure today; rather, investment in appropriate technology is the key priority in setting up the programmes of tomorrow. This is where academic institutions need to rely on their NREN and work to make it happen.

What does the future look like?

While it is very satisfying to be moving in the direction of advanced networks on the continent, we note that the game has two major players now: engineers and academics!

The enablers need inputers, content providers. In order for a NREN to be truly successful, the nuts and bolts parts, the backbone, must be enfleshed by local researchers and educators who realise the benefits of peering, of networking, or simply, of sharing knowledge.

As our local NREN, NRENU (2016) put it in their newsletter outlining their development, growth, and future plans: "The third level envisaged is where transformation mostly happens and we shall refer to it as the level of deeper sharing of resources. The resources to be shared include: highly skilled human resource (such as academic staff, researchers and other specialists); high value research facilities (such as expensive lab equipment, high performance computer (HPC) facilities, massive research data); jointly utilised education content hosted by shared repositories."

Our NRENs have done a wonderful job in enabling university peering. The future will be a joint initiative.

Watch the video of Prof. Deirdre Carabine on NRENU's YouTube channel:
https://www.youtube.com/ watch?v=cEsaNi0wSAg

"WE COULDN'T DO RESEARCH THIS WAY WITHOUT SWITCHLAN"

SWITCH's high-speed network plays a key role in international research in Switzerland. Here are two examples.

More and more public and private research teams are using SWITCHlan. Some have already been using it for many years. Among them are the Swiss research teams that supplied data to the global project resulting in the 2013 Nobel Prize in Physics. SWITCHlan also helps to produce detailed weather forecasts every day, contributing to the safety of the Swiss population.

NOBEL PRIZEWINNING PARTICLE PHYSICS

4 July 2012: CERN finds the Higgs boson. This represents a milestone in particle physics as it is the first experimental proof that the particle first predicted back in the 1960s actually exists. A year later, in 2013, researchers François Englert and Peter Higgs are awarded the Nobel Prize for providing the theoretical basis for this fast-decaying particle.

Something the general public is unaware of is that several Swiss research groups were instrumental in proving the existence of the Higgs boson, and all of them rely on SWITCHlan to transfer data. They analyse data produced in CERN's particle accelerator, the Large Hadron Collider (LHC).

Christoph Grab coordinates the national computing resources used by the Swiss groups, which cooperate with others around the world on the three LHC experiments, Compact Muon Solenoid (CMS), ATLAS and LHCb. "The network has become a crucial element in our experiments. We couldn't do research the way we do without SWITCHlan," explains Grab. To understand why, it is important to know how particle physics research is organised these days.

Pictures
Top left: Lightning strike in Neuburg-Dättnau. (photo: Andreas Hostettler, MeteoSwiss)

Top right: Compact Muon Solenoid detector at CERN. (photo: CERN)

The particle accelerator at CERN produces vast quantities of data by colliding protons or atomic nuclei. These quantities are so vast, in fact, they cannot simply be saved to disk. The CMS experiment, for instance, produces up to 4.5 petabytes of data per second. By way of comparison, Google processes roughly 20 petabytes of data per day, i.e. 19,440 times less. Special algorithms are used to reduce the volume of the CMS data by a factor of approximately one million. This makes it possible to process them and save them to disk at CERN. They are then sent via a dedicated network to about a dozen major computing centres around the globe, where additional reconstruction algorithms are used. Large quantities of these data are then distributed to more than 60 countries worldwide. Researchers access them, carry out their calculations and interpret the results. However, these calculations still require massive amounts of

computing power, so the physicists work with distributed capacity spread across more than 150 computing centres all over the world.

To date, over 300 petabytes of data have been stored on disks globally for the experiments, and 50 gigabytes are sent across the world's networks every second on average. A 90-minute feature film takes up roughly 10 GB, so this equates to five films per second. The data produced by the Swiss teams working on the LHC experiments are stored on a server at the National Supercomputing Center or Centro Svizzero di Calcolo Scientifico (CSCS) in Lugano, with daily traffic reaching some 60 terabytes.

"Working with distributed resources is very effective, but you need a very fast network, otherwise there's no way you can analyse such enormous amounts of data," says Grab. This is where SWITCHlan comes in. As the Swiss arm of the global research network, it enables researchers in Switzerland to send and receive data between CERN, the CSCS and other participating countries. The CSCS, as a national computing centre, plays a central role. SWITCHlan connects it with triple redundancy via Zurich, Valais and since 2013 also Graubünden.

"We're very pleased with SWITCHlan. No one else can offer us the stability and the bandwidths we need," notes Grab. "Thanks to the redundancy, problems have been very rare – even more so since the third link was built. The worst we've experienced has been the occasional slight delay. Our work isn't a matter of life and death, so it's not so bad for us if we have to wait an extra half an hour for results once in a while. We also know that we can increase capacity to 100 Gbps if we need to."

There have been some security incidents. "But they were always dealt with very quickly and professionally," recalls Grab. "SWITCH-CERT communicates them, and the administrators fix them straight away. They know exactly what to do. We've never sustained any major damage."

WEATHER FORECASTS TO KEEP THE POPULATION SAFE

Weather forecasts have become increasingly detailed over the years. The Federal Office of Meteorology and Climatology (MeteoSwiss) is currently installing a new and even more precise forecasting model called COSMO-NExT. COSMO-NExT reduces the grid box size, i.e. the distance between topographical data points, from two kilometres to just one. However, this increased resolution also means an increase in data volumes. The data is handled by graphics processors that are 40 times faster than normal CPUs. This is a world first for a national weather service. The computers are located at the CSCS in Lugano and connected – like the Internet – via SWITCHlan.

"The availability and performance of SWITCHlan are vital for us. We need to be able to send large volumes of data to our supercomputer in Lugano reliably," explains Martin Schäfer, Head of Information and Communication Technology at MeteoSwiss. "Availability is essential, especially for flight weather around the airport in Kloten. Some of the data we rely on is sent via the Internet. Being able to react quickly and send out warnings is particularly important in cases of ice, storms and lightning, when the weather situation changes rapidly, so we need a fast and reliable way to receive the relevant information," says Schäfer.

MeteoSwiss is tasked with warning the population about extreme weather. Every single person living in Switzerland thus benefits from detailed weather forecasts that can also be consulted on the move through a smartphone app – when a storm is moving in, for example, or when someone is planning a hike in the mountains. At the same time, reliable weather simulations are also needed for statistically improbable events such nuclear accidents.

MeteoSwiss has another important remit in terms of research in the fields of climatology and meteorology. Direct access to the academic network is therefore an additional advantage that SWITCHlan offers with regard to collaborating with the universities. Since weather and climate are both global in scope, MeteoSwiss also takes part in cross-border cooperations and shares data internationally.

"In general, our experience with SWITCH is very positive," stresses Schäfer. "We value the personal contact we have with the experts, who ably assist us with even the most specialist problems. When we moved our computing centre, for instance, we needed a fibre-optic line from the old location to the new one. It all worked perfectly. We view SWITCH as a flexible, dependable business partner," he concludes.

Martin Schäfer is very satisfied with the high levels of availability, stability and performance SWITCHlan delivers: "Stability has never been an issue. In the four years I've been working at MeteoSwiss, there hasn't been a single connection failure. When it comes to security, I can remember one incident where SWITCH-CERT reported an anomaly in our data traffic. It quickly supplied us with precise details, which allowed us to look into the problem and fix it without any damage being caused."
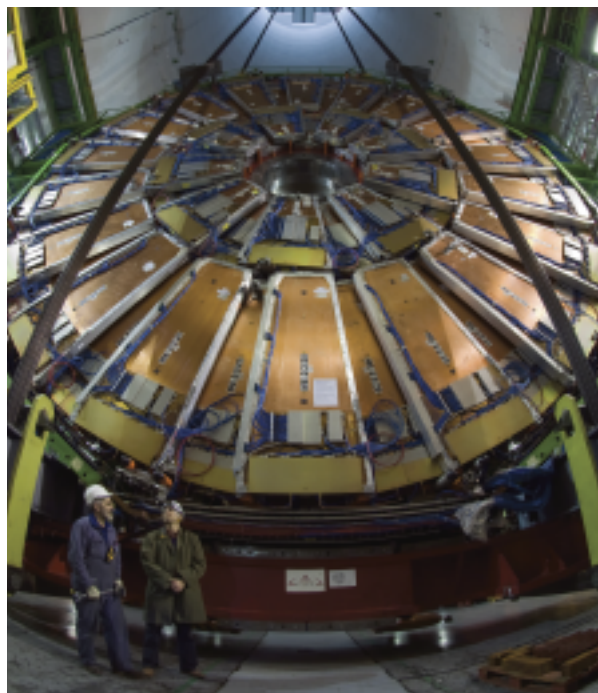
WHAT IS SWITCHLAN?

SWITCHlan is a high-speed network that was built in 1989 for education and research and has been continually optimised in line with their needs ever since. Thanks to a redundant fibre-optic network, it offers high levels of availability and supports bandwidths up to 100Gbps, as much as 100 times more than conventional networks. It is connected to the pan-European GÉANT network, enabling high-bandwidth links to other research and university locations throughout Europe and overseas.

SWITCHlan is protected by SWITCH-CERT, the Computer Emergency Response Team, because research data are sensitive and increasingly targeted by cybercriminals.

All of this means that SWITCHlan is of interest to private research groups as well.

More information (**http://www.switch.ch/network/**)

CHRISTOPH GRAB

Physicist Prof. Christoph Grab has been part of the Compact Muon Solenoid collaboration at CERN in Geneva since 2003. Since 2008, he has led his own research group at ETH Zurich's Institute for Particle Physics. He coordinates the national computing resources for the Swiss activities concerning the physical analysis of data from the Large Hadron Collider.

MARTIN SCHÄFER

Martin Schäfer has a degree in physics from ETH Zurich. Since 2012, he has been Head of Information and Communication Technology at the Federal Office of Meteorology and Climatology (MeteoSwiss), where he is a member of the Extended Management Board.

ONE SERVICE, MANY NAMES – A SHARED VIDEO PLATFORM FOR THE FEDERATION OF UNIVERSITIES OF APPLIED SCIENCES

The Federation of Universities of Applied Sciences (FUAS), a strategic alliance formed by Häme University of Applied Sciences, Lahti University of Applied Sciences and Laurea University of Applied Sciences, decided to develop a video service to meet the institutions' shared and individual needs by becoming the first pilot users of CSC's Funet Etuubi Kaltura. Now that the project has reached its conclusion, it's time for a brief evaluation: Where did we start, what did we learn, and what did we achieve?
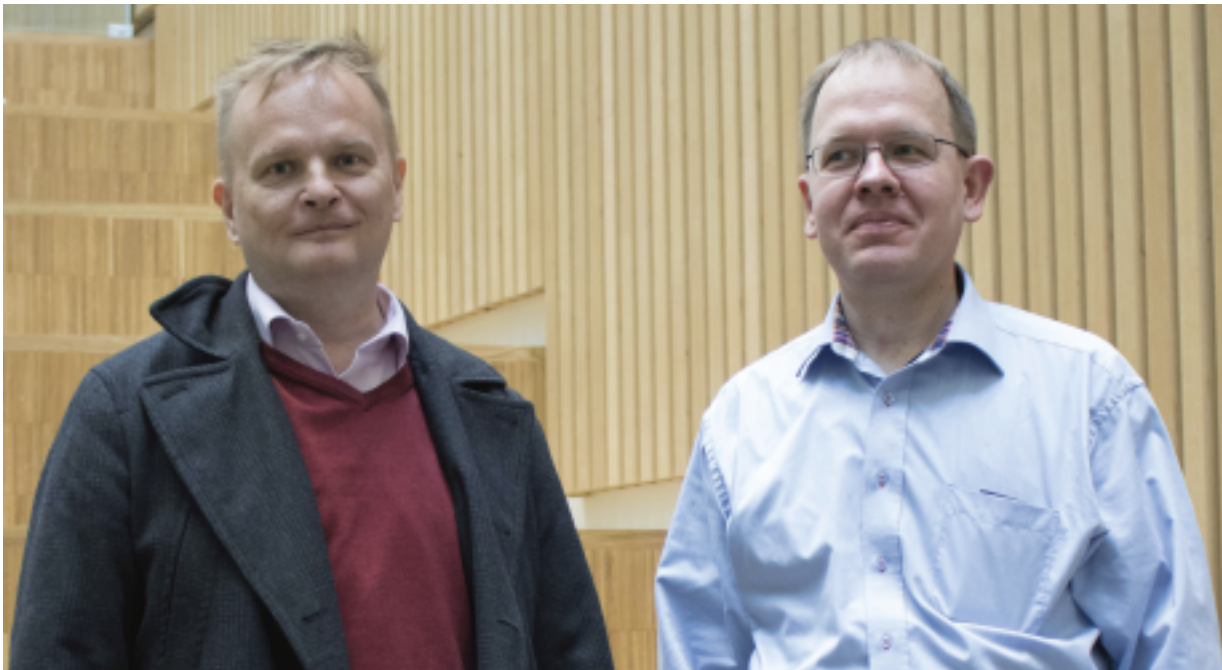
WHEN YOUTUBE IS NOT ENOUGH

Videos are an essential part of education and digital learning environments. All the universities of applied sciences in the FUAS federation produce a considerable amount of educational videos, and each institution used to have its own practices for their distribution.

Although YouTube was a popular distribution channel, it had several known weaknesses such as limited integration potential with other systems, advertisements, and copyright issues. Above all, the inability for a selected number of users to share videos with each other.

"We needed a shared platform for the FUAS virtual campus - where we could collate videos, virtual lessons and distribute videos both internally and between Federation members" says CIO Ari Kuusio from Häme University of Applied Sciences (HAMK), the project's technical team leader.

We sought a user-friendly way to create, distribute, share and manage educational video materials.

"The Kaltura software package appeared to be a promising solution to video management. It was important for us that NORDUnet managed and supported the cloud service in the Nordic countries. We found it to be a good, secure option.," says Kuusio.

A SERVICE FOR OVER 20,000 USERS

"Initially, it wasn't easy to determine the roles that would be played by the six different players in the project – CSC, Kaltura, NORDUnet and the three universities of applied sciences. We needed to adopt a new approach and create shared schemes and practices. However, there was already a strong sense of mutual trust between the project partners, which made it easier to build the new system" says Project Manager Kari Kataja from HAMK.

"We also considered how to encourage and train teachers to use the system. NORDUnet provided us with benchmark and cooperation contacts during the course of the project. We received concrete peer support for software introduction from Roskilde University in particular, as they've already been using the Kaltura system for several years," Kataja adds.

The shared system went into production in September 2016. All videos are now managed through one administrative user interface.

"All of the 20,000 students and 1,400 staff at the Federation's three institutions can watch and share videos using their own HAKA IDs whenever and wherever they want." says Kataja.

Videos are currently distributed manually at Federation level, but automation will be planned once established practices are in place.

SHARING EDUCATIONAL RESULTS AND BEST PRACTICES

At CSC, the project was led by Funet Development Manager Harri Kuusisto. "A pilot project of this size was also a major learning process for us. Itwas founded on a strong sense of mutual trust and shared goals; in factproject members openly shared their experiences and discussed the development requirements from the start. The best practices arising from the project have also been documented and will be shared with a wider user base." concludes Ari Kuusio.

VIDEO ASSIGNMENTS FOR STUDENTS

Students and teachers have been using Video Laurea since spring 2016. Videos are used to complete and return assignments, and also to provide guidance on software use. They're also used as study materials. Laurea's Development Manager Irma Mänty says:

"We interviewed teachers that used videos and found that they were already quite proficient with the basic functions. They were satisfied with the genuine user friendliness of the system. In practice people prefer familiar tools and working methods. That's why we're investing in training and personal guidance. Two of the people in our eight-strong digital team provide support for teachers creating videos. We also arrange workshops for teachers and a separate video guidance service for students" adds Mänty.

CONTINUED DEVELOPMENT

Kaltura development work will continue, even though the official introduction has come to a close, mobile integration, as well as some improvements to existing features are still expected.

"So far, everything has gone to plan, but we're also seeking to improve the service's support process in NORDUnet. Allthe project participants also wanted to create an active Kaltura user community to discuss shared wishes and collate concrete development ideas; and this, for example, could be done via the VideoFunet working group." concludes Kuusisto.

GÉANT AT INTERNET2 GLOBAL SUMMIT 2017

The Internet2 Global Summit is a leading forum whose aim is to support and drive the advancement of Research and Education, spur next-generation innovation and accelerate global discovery. The summit gathers Chief Information Officers and leaders from institutions around the world in an environment of open engagement, free exchange, partnership and collaboration. It will take place in Washington DC, 23–26 April 2017.

GÉANT contributes to the Global Summit 2017 with an impressive list of speakers. It is a very prestigious international event and we are delighted and proud to take part by sharing our expertise and knowledge with the Summit's global audience. Please find below a list of our representatives and the topics they will cover.

GÉANT CONTRIBUTORS AT THE INTERNET2 GLOBAL SUMMIT

24th April

Bringing K12 Education Closer to R&E Applications and Services
Peter Szegedi (GÉANT); 07:15-08:30

eduGAIN Steering Group Meeting
Brook Schofield (GÉANT); 10:00-11:30

The Great Identity Debate
Nicole Harris (GÉANT) and Brook Schofield (GÉANT); 15:00-16:00

Clouds Are Happening
Mandeep Saini (GÉANT); 15:00-16:00

25th April

Lesson learned from AARC: Challenges to Pilot New Components in Production e-infrastructures
Licia Florio (GÉANT), Christos Kanellopoulos (GÉANT), Paul Van Dijk (SURFnet) and David Groep (Nikhef)

Exploring the Sociological and Cultural Challenges of International Research Engagement
Sylvia Kuijpers (SURFnet) and Enzo Capone (GÉANT); 13:15-14:30

Task Force on Research Engagement Development (TF-RED) Meeting
Enzo Capone (GÉANT), Sylvia Kuijpers (SURFnet) and Jakob Tendel (DFN) Verein; 14:30-16:00

Defining the Challenges of International Education (Transnational Education)
Esther Wilkinson (Jisc), Thomas Fryer (GÉANT); 16:30-17:45

26th April

Sustainability in Federated Identity Services - Global and Local
Ann Harding, GÉANT Project, (SWITCH); 10:30-11:45

Lightning Talk session
Nicole Harris (GÉANT) and Brook Schofield (GÉANT); 13:15-14:30

ITSM in the Research and Education Networking World
Mark Johnston (GÉANT); 15:00-16:00

Enabling Federated Access in International Research Collaborations
Licia Florio (GÉANT), Christos Kanellopoulos (GÉANT), Paul Van Dijk (SURFnet) and David Groep (Nikhef); 16:30-17:30

To find out more about GÉANT's involvement at the Internet2 Global Summit 2017, visit **http://meetings.internet2.edu/2017-global-summit/**

A DAY IN THE LIFE OF:
TONY BARBER, HEAD OF THE GÉANT OPERATIONS CENTRE (GOC)

Tony Barber has been in post for 4 years. Here's his account of a typical day's work.

A CHANGING ENVIRONMENT

Traditionally IT environments in Research and Education (R&E) have always been considered low pressure and low intensity, but times are changing. The growing expectations of the R&E community have increasingly been adding more challenges to my role as the GOC's manager. My own personal experience of working in the academic sector in the UK some years ago confirms this.

GÉANT is gradually aligning itself to the commercial world because of the increasing pressure to provide value for money and measurable service levels. Indeed, I think that this is how things should be; as a publicly funded organisation we need to be accountable and everything we do needs to be more measurable.

NEVER A DULL MOMENT

My job is certainly never boring! Every day is different and, almost on a daily basis, I am faced with new challenges; likewise, old issues also occasionally resurface, as if just to test my memory! Much of my working day is spent liaising with other departments; I may be sitting on a weekly operational conference call making sure that all teams work in alignment or offering input about changes, driven by other projects, which may affect my team.

We regularly interact with colleagues on partner relations and service management matters such as the addition of new services to the GÉANT product portfolio. I need to make sure that when such services are deployed, my team is fully briefed and trained so that any operational issue can be addressed promptly and thoroughly.

At some stage during my working day I could also be dealing with training arrangements, shift rosters or writing summary reports for different areas of the business.

A TYPICAL DAY

Yesterday was a typical day, it started at 9:00 with a quick briefing from the team about issues arisen overnight or carried on from the day before. At 9:30 I attended a meeting for the kick-off of a new procurement of a critical service component of the GOC. I then went through my inbox and made follow-up phone calls about some additional office wall monitors that we are all eagerly expecting.

In the next meeting, scheduled for 12:00pm in the main office - only 10 minutes away on foot - I discussed company plans on how to apportion support on the new virtual machine estate. This lasted just over one hour. I quickly returned to GOC building for a 75 minute presentation about current and imminent projects happening in the first quarter of the year: a vital exercise as the GOC team works in a dedicated building across the street from the main office and we therefore tend to miss out on the usual corridor conversations. The regular excursions between the two buildings keep me fit and, on rainy days, perfectly hydrated.

This presentation allows the team to learn about what is happening around them, why and how it could affect their work; for the same reason we also receive regular updates from other areas of the business. Separation undoubtedly has some very positive points, not least that it avoids distractions and enables the team to focus on the GOC's primary objectives, such as fixing issues and dealing with members' queries as quickly and promptly as possible.

My final, but equally important tasks of the day entail dealing with various staff matters, issues around a router code upgrade and writing a weekly report on the status of our network. I can then catch up with email messages that either require urgent answers or need to be assimilated before the end of my working day around 17:30. Believe it or not, some days I even have time for lunch!"
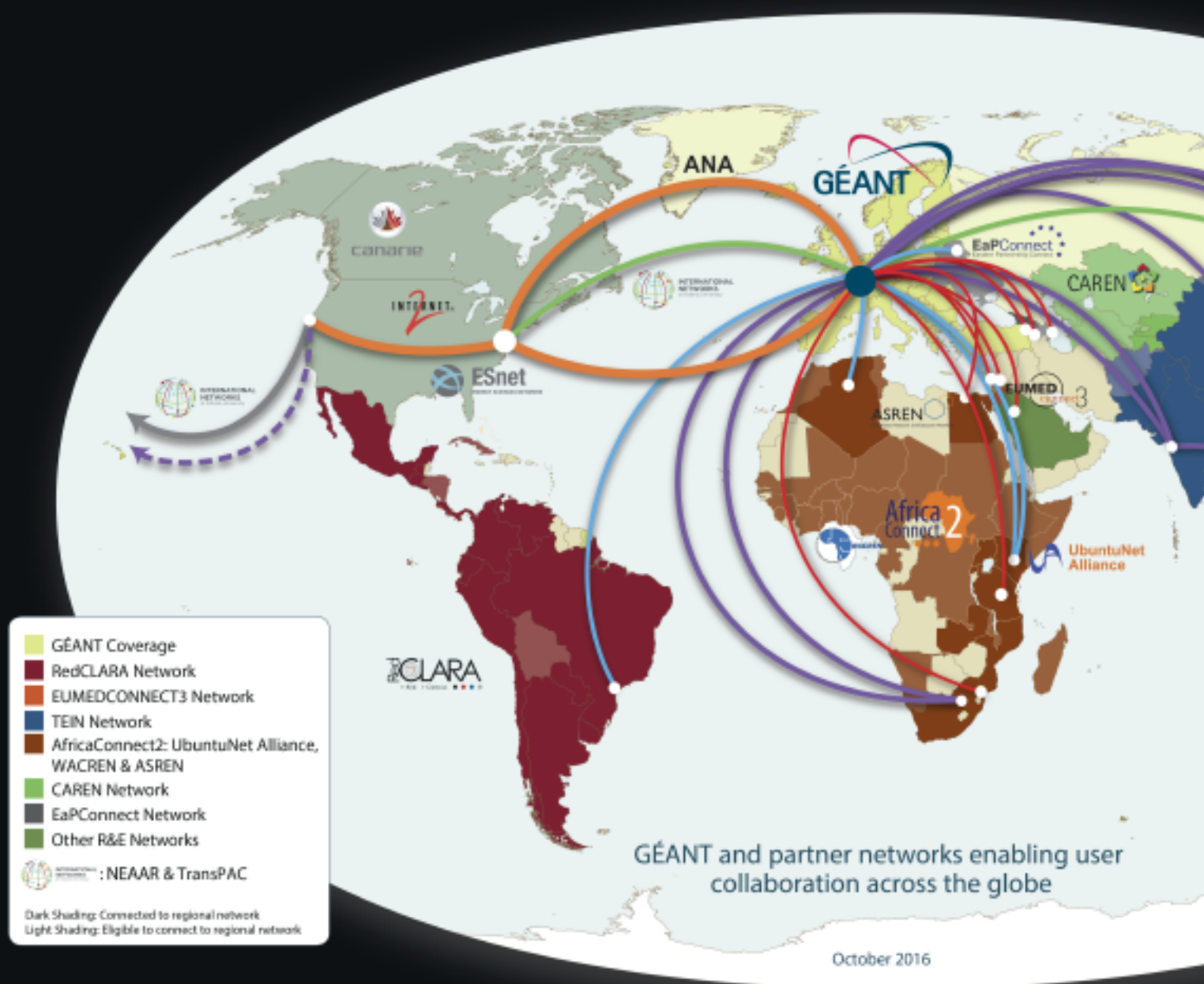
A COMMITTED TEAM

I am very lucky to work with a very efficient and experienced team who can deal with most day to day issues, enabling me to manage mostly by exception. In addition, sharing an open plan office helps me to keep abreast of activities! The second line team has very low staff turnover levels; in fact we haven't had any leavers in the last 3 years. For me this is the undeniable proof that ours is a very enjoyable working environment.

GÉANT AT A GLANCE

GÉANT is the leading collaboration on network and related infrastructure and services for the benefit of Research and Education, contributing to Europe's economic growth and competitiveness.

GÉANT has 41 member countries and is owned by its core NREN membership, and also has Associate members including commercial organisations and multi-national research infrastructures and projects.

GÉANT and partner networks enabling user collaboration across the globe

Legend:
- GÉANT Coverage
- RedCLARA Network
- EUMEDCONNECT3 Network
- TEIN Network
- AfricaConnect2: UbuntuNet Alliance, WACREN & ASREN
- CAREN Network
- EaPConnect Network
- Other R&E Networks
- : NEAAR & TransPAC

Dark Shading: Connected to regional network
Light Shading: Eligible to connect to regional network

October 2016

NETWORKS

GÉANT interconnects research, education and innovation communities worldwide, with secure, high-capacity networks. We plan, procure and build the large-scale, high-speed networks that are essential for sharing, accessing and processing the high data volumes generated by Research and Education communities, and for testing innovative technologies and applications.

GÉANT also provides network and collaboration services that facilitate international cooperation between researchers and educators, and brings people together for the human networking that drives innovation.

SERVICES

GÉANT develops the services its members need to support researchers, educators and innovators - at national, European and international levels.

Our portfolio of advanced services covers connectivity and network management, trust identity and security, real-time communications, storage and clouds and professional services.
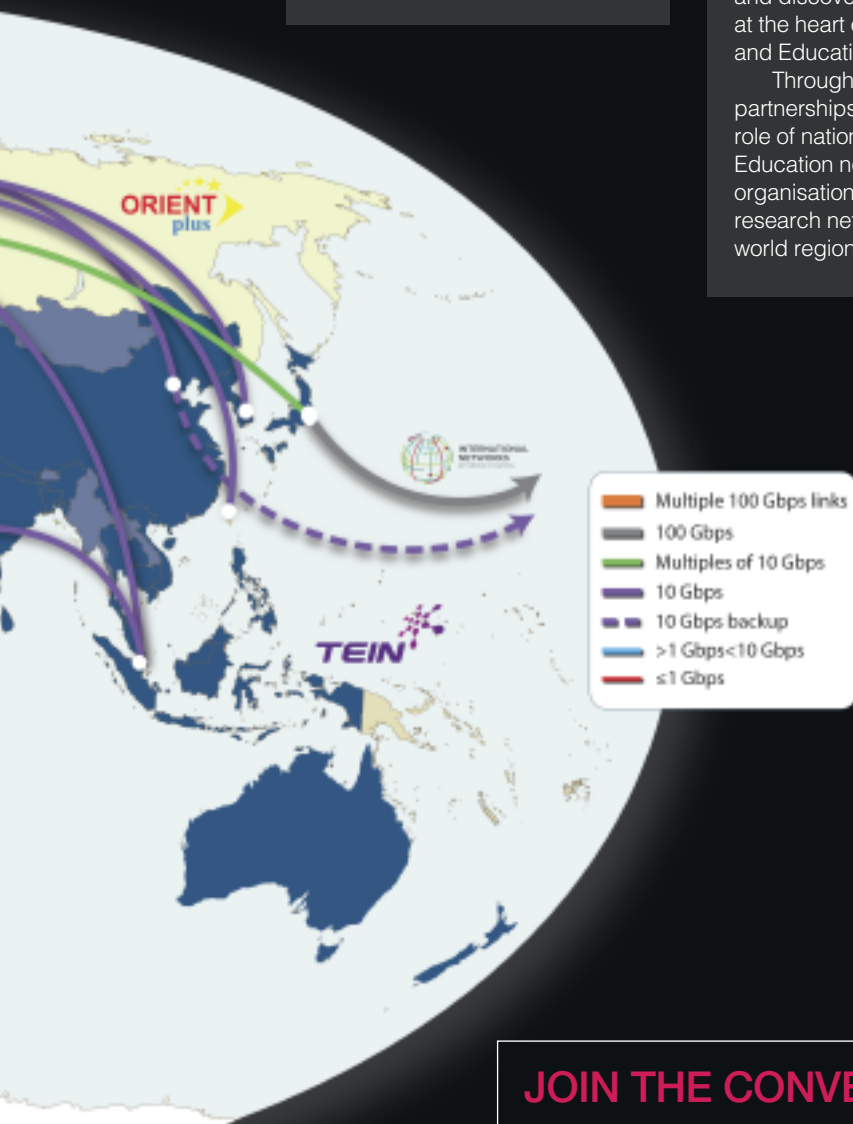
PEOPLE

GÉANT collaborates with its members, partners and their re search, education and innovation communities to drive research and discovery, keeping Europe at the heart of global Research and Education networking.

Through our extended global partnerships we champion the role of national Research and Education networking (NREN) organisations and facilitate research networking across all world regions.

INNOVATION

GÉANT invests in the research and development of network architectures, technologies and paradigms to develop into the services, processes, tools and network capabilities of tomorrow.

GÉANT facilitates community collaboration that pushes the boundaries of networking possibilities. Fresh ideas from task forces, special interest groups and open calls are applied through specific research activities and initiatives, informed by foresight studies and future user needs to achieve and promote innovation.

PROJECTS

GÉANT is a trusted European Commission (EC) partner in many global collaboration projects and initiatives through our special relationship with the European Union.

We have built up our depth of network expertise and leadership over two decades, and excel in managing and participating in highly successful projects, delivering Research and Education networks and services, and coordinating innovation.

Learn more at
www.geant.org

ORIENT plus

TEIN

Multiple 100 Gbps links
100 Gbps
Multiples of 10 Gbps
10 Gbps
10 Gbps backup
>1 Gbps<10 Gbps
≤1 Gbps

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