

CONNECT

THE MAGAZINE FROM THE GÉANT COMMUNITY | **ISSUE 23 2016**

SPECIAL ISSUE: DI4R **EUROPE'S E-INFRASTRUCTURES JOIN FORCES**

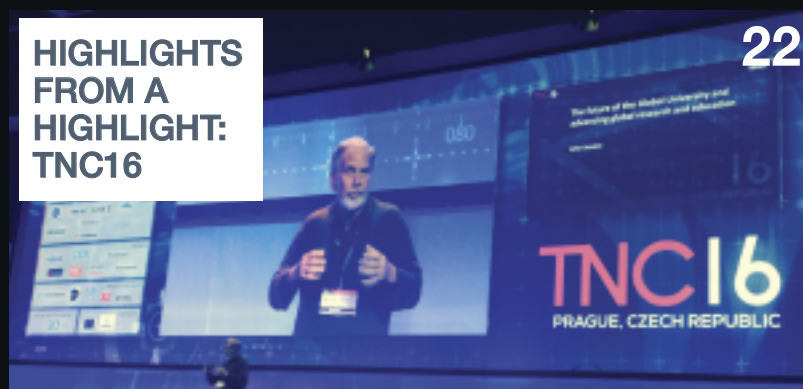


IAAS: BEST VALUE
CLOUD SERVICES
FOR R&E

SONIFYING SPORT:
DATA SONIFICATION AND
SPORTS MEDICINE MEET

Q&A: STEVE COTTER,
GÉANT CEO

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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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WELCOME FROM CATHRIN STÖVER



It's almost a year since Steve Cotter became CEO of GÉANT. Time for CONNECT to catch up with him and hear about his impressions and successes, the challenges he has faced and his plans for the future. Steve reminds us again that we are all part of the vast community of R&E

networks here to support global and collaborative research and education. The content of this magazine is great testimony to the work we are doing.

Over the years, Domenico Vicinanza has brought to us singing and dancing volcanoes, the sounds of Voyager data in a musical duet and the LHC Open Symphony – now he is bringing data sonification and the power of sound to sports and medicine. With the images of the Olympic Games still fresh in my head, I was captivated how data sonification and access to GÉANT promise to revolutionise physical therapy, rehabilitation and athletes training (page 18).

I am also really excited about NORDUnet's Emerging NRENs Knowledge Exchange Fellowship

which offers emerging NREN delegates the opportunity to participate in the NORDUnet 2016 conference. Read more about the NORDUnet 2016 conference on page 16.

Plus, with more information on GÉANT's pan-European IaaS tender, the AARC and e-InfraCentral projects, the GÉANT Community Programme, SIG-ISM and the WISE community, a snapshot of our Canadian partner CANARIE, as well as an interview with Askar Koutanov on the rebooted CAREN project and much else, you are holding again a very complete CONNECT magazine in your hands. I hope you will enjoy the read.

Cathrin Stöver, GÉANT



DIGITAL INFRASTRUCTURES FOR RESEARCH 2016

On 28-30 September Europe's e-infrastructures (EGI, EUDAT, GÉANT, OpenAIRE and RDA Europe) join forces to host the first Digital Infrastructures for Research event, DI4R. Hosted by ACC Cyfronet AGH, Kraków's academic computing centre, the event is designed with research communities in mind and aims to foster broader adoption of digital infrastructure services and promote user-driven innovation.



"Research and education are two big fields deserving the best infrastructures available to keep Europe a world leader. To achieve this we all have to work together and that is why this conference brings together people from all disciplines and all infrastructures to work on the shared vision and solve the problems that stand in our way."

David Foster (CERN), Programme Committee Chair

The main programme is structured around four main tracks that will serve as a backdrop for networking, collaboration and brainstorming, and complemented by training workshops, demonstrations and plenary sessions.

- **Challenges facing users and service providers:** emerging needs of research collaborations, the

requirements of added value thematic services and the computing needs of data-driven science. (example topics: Working with the research community and industry, community engagement, computing platforms (cloud, HTC, HPC), thematic platforms (science gateways, Virtual Research Environments)

- **Services enabling research:** services and frameworks needed to enable researchers to securely collaborate and share resources in a federated environment combining geographically distributed services from multiple providers and further the opportunities of Open Science. Submissions for this track should highlight benefits and challenges as

seen by researchers when using existing frameworks or present ideas to address the future challenges.

- **A changing environment, changing research:** The environment in which research is conducted, and digital infrastructures operate, is changing rapidly. Access and provisioning of services require clear governance, engagement rules, policies and funding models. Submissions should focus on the barriers, opportunities and changes in this environment in order to address the non-technical pressures, for example social, financial, legal and policy that influence the present and future opportunities.
- **Working with data:** requirements of data-driven science and the solutions for finding, accessing, integrating and reusing research data. Papers that highlight requirements and opportunities for a seamless usage of digital infrastructures for data management, storage and curation as well as for linking and publishing all forms of research objects like data, software, tools, pipelines and publications would be particularly topical.

In addition, co-located events include the 3rd WISE Workshop (Wise Information Security for collaborating E-infrastructures) and a workshop entitled "Design your e-Infrastructure":

- **The WISE community** will hold an open one-day workshop on 27 September before the DI4R conference in Krakow. WISE is a global trust community where security experts share information and work together, creating collaboration among different e-infrastructures. The working groups will give an update on their work during the workshop and future plans will be discussed, together with other key issues relating to security and trust. All members of e-Infrastructures, Research Infrastructures, research/user communities, indeed anyone wishing to learn about security collaboration, best practice and trust building in federated distributed infrastructures, are welcome.
- The interactive **Design your e-Infrastructure** workshop will look into the design and development of e-infrastructures for emerging scientific communities and their use cases. Participants will analyse the use cases that the participating scientific communities bring to the event, then - in a collaborative way - will design and define suitable e-infrastructure setups and roadmaps to implement them using and customising solutions from the participating e-infrastructures. (See panel.)



Q&A WITH GERGELY SIPOS FROM EGI, CO-ORGANISER AND CHAIR OF THE DESIGN YOUR E-INFRASTRUCTURE WORKSHOP

WHAT IS THE BACKGROUND FOR THIS WORKSHOP?

At EGI we support large infrastructures and projects that are scaled over a certain period of time and across countries. These projects need tailored e-infrastructures to support their researchers. We wanted to provide a solution by teaming up with networking and service suppliers in a workshop to:

- better understand the needs of these scientific initiatives
- offer a consultancy service to allow them to start devising their own e-infrastructure with expert recommendations and support.

The 1st workshop was held in April 2016 at the EGI conference and was co-organised with EUDAT. We are proud to co-run the 2nd edition of this workshop with the European e-infrastructures that organise DI4R. GÉANT and OpenAire joining in to provide additional expertise and innovative solutions to workshop attendees.

WHO IS THE AUDIENCE?

This workshop is both for technical representatives of R&E projects and infrastructures and e-infrastructure service suppliers to devise appropriate digital solutions to accelerate the work of researchers and academics across Europe.

It is in a way a meeting place if not a market place to analyse demands and create solutions together.

WHAT SHOULD PARTICIPANTS GET OUT OF THE WORKSHOP?

The main outcomes of the workshop are:

- A clearer vision of the required set up, recommended services and resources for implementation, together with timeline for delivery.
- A human network established from the participating research community representatives and e-infrastructure suppliers. This human element will ensure efficient collaboration and follow-up of actions after the workshop.

As an example you can see the use cases we discussed and the recommendations that were made during the 1st workshop on <https://indico.egi.eu/indico/event/2895/> Use cases varied from climate data processing to ocean observation, carbon observation or medical molecular genotyping. Some of these (for example ICOS, Euro-Argo) are reaching now pilot setups and we hope will progress into production e-infrastructure services towards the end of this year.

HOW DO YOU SEE THIS WORKSHOP SUPPORTING THE AIMS OF DI4R?

This workshop is taking place one day prior to the opening of the conference so it will give its participants a thorough understanding and more incentive to make the most of the conference through additional networking and information hunting.

The workshop is run by the main organisers of DI4R so it's the perfect introduction for the workshop participants and a place to start a dialogue and share needs, insights and objectives together.

Ultimately this workshop embodies what we are seeking to achieve as the main leading e-infrastructures in Europe, which is service harmonisation in order to make the most of the knowledge and resources we have to provide an outstanding support to European research and education. European service harmonisation will also be part of other sessions of DI4R, for example a training session taking place at 6pm on the 1st day of the conference.

WILL WE SEE MORE OF THESE WORKSHOPS, AND IF SO WHEN?

This is only the 2nd such workshop we've organised but already we have had excellent feedback from the participants of the 1st one. We hope to be able to repeat this success in September, and then to host similar workshops every 6 months to once a year within the community.

Find the Design Your e-Infrastructure workshop programme on:
<https://indico.egi.eu/indico/event/3025/>

DI4R is jointly organised by EGI, EUDAT, GÉANT, OpenAIRE and RDA Europe. The consensus is clear: we are all here to best support and facilitate science and research across Europe. CONNECT spoke with representatives from the organisers to get further insight into these common views.

TIZIANA FERRARI, TECHNICAL DIRECTOR OF THE EGI FOUNDATION



WHAT ATTRACTS YOU TO THE IDEA OF A JOINT E-INFRASTRUCTURE USER EVENT?

The possibility to get in touch with the best ICT experts in Europe, who can advise and inform in many different technical areas. This is the first time that research infrastructures and e-infrastructures meet and it is a unique opportunity of cross fertilisation. I expect this event to be the starting point of many new collaborations.

WHAT IS THE ADDED VALUE OF THIS TYPE OF EVENT FOR RESEARCHERS?

In Krakow, researchers will have the opportunity to meet the providers of many European infrastructures, multidisciplinary and thematic ones. This gives them the unique possibility to get a lot of information about the digital capabilities offered by European infrastructures for research and the opportunity to contribute to their technical development.

WHAT KIND OF AUDIENCE ARE YOU EXPECTING?

I am expecting a mix of infrastructure providers, innovators and research community experts from both the public and private sectors.



HOW CAN RESEARCHERS INTERACT WITH PROVIDERS AND DEVELOPERS DURING THE CONFERENCE?

During the conference there will be sessions that provide ample opportunities for interaction, workshops, booths and the co-located events such as the "Design your e-Infrastructure" workshop (Tuesday 27 Sep) - a full day workshop where ICT research community experts, projects, research infrastructures and European e-infrastructure providers such as EGI, EUDAT, GEANT and OpenAIRE can work together to design and develop e-infrastructures for scientific communities and their use cases. (See previous page.)

WHAT IS THE FOCUS OF THE EVENT?

The focus is the co-development of ICT infrastructures for European research collaborations. I expect the main outcome of the event to be concrete action plans for increasingly open and seamless infrastructures to analyse and reuse research data, connecting researchers across borders and scientific disciplines.



"This is a golden opportunity for researchers, and those who support research, to engage in a dialogue with e-Infrastructure providers in one setting. The goal is for the e-Infrastructure providers to better understand how researchers work and the services they need. In addition, researchers should come away from the event with a clearer understanding of the e-Infrastructure landscape and their service portfolio. We will each learn from one-another, and work towards the common goal of advancing science and research."

Steve Cotter, CEO, GÉANT

"Digital infrastructures providing services from basic network, CPU and storage up to those populating the dynamic knowledge integration will determine our ability to extract knowledge from the data floods."

Peter Wittenburg, Executive Director, RDA Europe



"Open research infrastructures are stepping stones for new products and services. We encourage all researchers to join our event to discuss open research infrastructures that have a long-term impact on the European scientific community."

Tony Ross-Hellauer, Scientific Manager, OpenAIRE

DAMIEN LECARPENTIER, PROJECT DIRECTOR, EUDAT2020



WHAT ATTRACTS YOU TO THE IDEA OF A JOINT E-INFRASTRUCTURE USER EVENT?

Researchers need to have access to a wide range of distributed resources to carry out efficient research: experimental facilities, high-performance computing and networking, data repositories, high-throughput computing grids and so on. Integrating these various resources and providing seamless access to them is what makes sense for the current research communities. For the first time we are bringing along representatives from all the different e-Infrastructure layers (networks, grids, computing, data) to discuss, together with the users, how these e-Infrastructures should develop and how to connect the different pieces together to create a common platform for research and innovation.

WHAT IS THE ADDED VALUE OF THIS TYPE OF EVENT FOR RESEARCHERS?

Ultimately, researchers have the most to win from greater collaboration at the e-Infrastructure level, which should result in easier access to all the distributed resources they need in the pursuit of their research. With this event, researchers have a unique opportunity to address representatives from all the e-Infrastructures at the same time and impact on the development of the future services and platforms.

WHAT KIND OF AUDIENCE ARE YOU EXPECTING?

Given that the focus of the event is on the integration of e-infrastructure and research infrastructures, and integration across e-infrastructures for the benefit of their end users, we can expect a very diverse audience ranging from community managers, data scientists representing research infrastructures, to e-infrastructure developers and service providers.

HOW CAN PARTICIPANTS INTERACT WITH PROVIDERS AND DEVELOPERS DURING THE CONFERENCE?

Participants can interact with providers and developers in many ways, through the interactive workshops, training sessions, exhibition, posters & social opportunities. The whole event is organised to maximise interaction.

HOW DO YOU SEE THIS E-INFRA COLLABORATION BEYOND DI4R?

DI4R presents a very good opportunity to discuss how to improve collaboration between e-Infrastructures. We can build on existing collaborations which should be extended and enhanced in the very near future, with concrete actions and achievements. Dialogue will continue between the different e-Infrastructures and if the event is successful we should consider reiterating it next year. With the upcoming European Open Science Cloud, we will also have a very good vehicle to bring the discussions and actions forward.

GÉANT AT DI4R

As a key e-infrastructure developer and supplier, GÉANT is represented at many sessions:

Towards interoperable e-infrastructures (1B)

- Towards interoperable e-Infrastructures – *Afrodite Sevasti, Annabel Grant*

Building interoperable AAI for researchers (1C)

- In AARC we trust...or not yet? – *Licia Florio*
- eduGAIN: Some people don't get it – *Brook Schofield*
- eduGAIN - Meeting the challenge of scaling conflicting requirements – *Ann Harding*

Solutions for federated service management (2B)

- Needs and solutions for federated service management – *Toby Rodwell, Afrodite Sevasti, Annabel Grant*
- GÉANT VOPaaS - Towards a platform for supporting pan-European collaboration – *Niels van Dijk*

User experience of AAI (2C)

- A novel AAI approach for the European Integrated Data Archive within EPOS - *Javier Quinteros*

Cloud procurement (3C)

- Towards Pan-European Cloud Services - *Lars Fuglevaag*

TRAINING: INTRODUCTION TO EUROPEAN E-INFRASTRUCTURES

Plenary Session

- Discussion panel: Digital infrastructures for research

Joint service catalogue for research (5B)

- Towards a Joint Service Catalogue for Research in Europe

Federated AAI meets reality, Security Incident Handling Play in DI4R

- *Panel involvement*

Exploitation of COPERNICUS Data in the e-infrastructures (6A)

- Exploitation of Copernicus Data in the e-Infrastructures – *Beatrix Weber, Maria Minaricova*

WISE people take action on security (6B)

- WISE people take action on Security - *Dr Alessandra Scicchitano*

BUILDING USER-DEFINED AND USER-CONTROLLED VIRTUAL NET- WORKS FOR WAN WORKFLOWS

SME engagement with e-infrastructures (7A)

- SME Dynamics Workshop: SMEs as consumers of e-Infrastructures - Towards an integrated approach – *panel session*

Harnessing the power of end to end networks (8B)

- Challenges in Achieving Optimal End-to-End Network Performance – *Chaired by Enzo Capone*

Q&A: STEVE COTTER, GÉANT CEO

Less than a year after his appointment as GÉANT CEO Steve Cotter has already won the support of the European Union in the European Science Cloud, increased the interest of the global research and education community in Europe and implemented a new organisational structure to match the challenges of a fast-evolving environment.

When asked about his experience over the last few months he describes it as “one of the most challenging I’ve faced in my career, but the challenge is well worth it compared to the real benefits that we, as GÉANT, can bring to society.”

In this Q&A Steve Cotter shares with us his vision for the European network for research and education and talks about his belief in its community.

HOW DOES IT FEEL FROM THE INSIDE?

GÉANT is not new to me. I have been involved with the European R&E community for several years, as chair of the GÉANT External Advisory Committee and multiple times as speaker at TNC. Having the honour of leading one of the most impactful networking organisations in the world is adding to my faith in what we do and stimulates me to create the right environment for all the bright and committed people in this community to thrive.

WHAT HAS INSPIRED YOU OVER THE LAST FEW MONTHS?

The fact that the EU values the role of NRENs and sees us as a key component of the European Science Cloud is very motivating and makes me want to work that much harder to deliver an outstanding service.

Something which truly inspires me is that in this community, people believe in collaborating to achieve a common good, something which does not happen often in the commercial sector. In the R&E community, people are keen to talk about their successes and failures and learn from each other. This belief goes beyond borders, languages and cultures. And GÉANT is a proud example of that.

At the end of the day, knowing that what we do helps researchers find a cure for cancer, allows a student to learn a profession so they can support their family, or enables mankind to understand the universe we live in inspires me to get up every morning and go to work.

WHAT HAS CHALLENGED YOU?

What’s challenged me is also what attracted me to the role in the first place. Figuring out how we can get people to work together. Understanding how we can cater to NRENs with very different profiles and offer them a service that they can all take up. Working to get it right for everyone.

WHAT IS YOUR PLAN?

My plan is to make the most of this collaborative culture to:

- Deliver world-class services to our NRENs and their end users

- Provide exceptional value for money
- Build the community so that we are stronger together
- Run an efficient, highly-effective organisation to make the most of the resources we have

How? By building a team of leaders that can translate these concepts into actions that will make the GÉANT community stronger and more adaptable to a very fast-changing environment.

HOW DO YOU SEE THE R&E ENVIRONMENT EVOLVING?

I see a world of opportunities opening up to research and education networking – opportunities which obviously will also challenge our business models, structures and organisations. For example, globalisation offers a wider scope for collaborations but also boosts competition. Global exchanges provide unfettered access to data but also increase security threats and the need for more concerted policies. Governments’ push for greater innovation is another clear trend. This drives a need for broader community access to data, scientific instruments, cloud services, and open science to fuel innovation. And with our users’ expectations for quality increasing, we must learn how to deliver commercial-grade services and get better at business development.

WHAT ARE GÉANT'S STRENGTHS IN THIS ENVIRONMENT?

GÉANT's strength is its diversity. We really need to embrace it because that is exactly what will enable us to face today's challenges: by combining the different sets of skills from one side of Europe to the other, together we can tackle the pressures of globalisation, boost innovation and answer the needs of our end users in a way that will make them say: "we couldn't have done it without the GÉANT community".

So our first mission is to know our end users better so we can help them be successful – because all our efforts will be for naught if our community doesn't achieve its goals. I trust my new team to come together and collaborate closely with all the NREs to leverage the knowledge and skills we have to be successful together.

AS GÉANT'S NEW CAPTAIN WHERE DO YOU WANT TO TAKE THE SHIP?

I believe we need to become an engineering organisation that is willing to go the extra mile to delight our members. Obviously, it can't all be about playing with the latest technology – we have to deliver services that are relevant and of high quality. We can only do this if we fully understand our NREs' business models and their end users' requirements, then develop the innovative solutions they need.

My job is to provide the resources for all this to happen. That's why we will be putting more effort into those areas that are strategic for our members: security, trust and identity, Software Defined Networking (SDN) and influencing public policy. This is a change from where we were focused in the past. That is why I will also work to create an environment that empowers staff, allowing them to take initiative and make decisions at their own level. If each and every one of us puts in the effort, it'll happen.

HOW DO YOU THINK BREXIT WILL AFFECT GÉANT'S JOURNEY AND ITS COMMUNITY?

While it is still too early to speculate on the practical consequences and implications of this decision, we, as GÉANT, remain committed to serving all of the European community and to allow cross-border collaboration to happen. The fact that GÉANT is both based in the UK and Netherlands provides us with a more flexible framework for a



dialogue. If anything, this decision makes our mission even more important because, rather than allowing collaborations to break down, we are here to ensure that they get stronger.

WHAT IS YOUR TOP PRIORITY FOR THE YEAR AHEAD?

A successful restructuring. As the inaugural CEO, I was appointed to complete the merger between DANTE and TERENA so that GÉANT is better positioned to face today's challenges. The process is still ongoing and, as with every merger, it will be a while before we fully reinvent our working environment to match our ambitions and deliver a stronger organisation. It is not an easy thing to do and one always wishes it would go faster than it does. But it is important we do this correctly and take care of our people along the way. All restructurings are difficult and I would like to praise GÉANT's employees for their resilience and professional commitment throughout this process.

SOMETHING MORE PERSONAL YOU'D LIKE TO SHARE?

Many people may not realise that my family is still back in New Zealand. It's been several months since we've seen each other but I was recently able to spend my holiday with them. Going back to essential things like sharing times with loved ones reminded me how important a strong support network is. Here at GÉANT, we are an amazing bunch of people with different backgrounds, skills, opinions, and life journeys, but we all believe in the same thing: the importance of being one community and sharing knowledge for the betterment of humankind. We are all part of a global family and it's our support of one another that makes us stronger.

GÉANT RESTRUCTURES FOR AN EXCITING FUTURE

GÉANT has introduced a new organisational structure, aimed at producing a highly efficient and effective organisation intent on delivering a world class user experience and exceptional value for money to best support the NREN community. The new structure is organised by business function into seven complementary teams, each headed by a member of the Executive Team.

- Community Support, Events and Training headed by Chief Executive Officer Steve Cotter.
- Finance, HR, Procurement and Facilities headed by Chief Financial Officer David Wrathmall.
- Project Management, Product Management and EC liaison headed by Chief Programmes Officer Matthew Scott.
- Operations Centre, Service Assurance, Network Architecture, Engineering and Implementation headed by Chief Operations Officer Mark Johnston.
- Business Development, International Relations and Marketing/Communications headed by Chief Collaboration Officer, filled in the interim by Cathrin Stöver.
- Software development and IT headed by Chief Information and Technology Officer, filled in the interim by Dimitri van Zantvliet Rozemeijer.
- Security headed by Chief Information Security Officer (to be recruited).

The full organisation chart can be found on the Staff page of the GÉANT website, www.geant.org

MEET THE GÉANT EXECUTIVE TEAM



**STEVE COTTER,
CHIEF EXECUTIVE
OFFICER**

Driven, entrepreneurial and collaborative, Steve's experience spans the globe leading transformational change and organisational renewal in small to medium sized businesses. Always motivated by a challenge, he is passionate about building flexible, fast, and progressive cultures within organisations by focusing on taking decisive action, providing clear values and accountable leadership.

Steve joined GÉANT as CEO in November 2015, having held CEO positions in New Zealand's NREN, REANNZ and the US Department of Energy's ESnet.

Steve is a member of the Global R&E networks CEO Forum, as well as the European Open Science Policy Platform.

He holds a Master's Degree in Business Administration and Management from Boston University.



**DAVID WRATHMALL,
CHIEF FINANCIAL
OFFICER**

David joined GÉANT in July 2013 as CFO. David is a Chartered Management Accountant with commercial experience, up to Board level, gained within financial, digital media & telecoms sectors, and holds a degree from University College London.

David is responsible for GÉANT's Financial, Procurement, HR and FM operations, and oversees all aspects of statutory and legal compliance. David is Company Secretary and supports the Association's Members, Board and Audit and Risk Advisory Committee to ensure effective governance.



MATTHEW SCOTT, CHIEF PROGRAMMES OFFICER

Matthew joined GÉANT in June 1996 as Commercial Manager, responsible for its financial operations, later becoming CFO in February 2003 and then General Manager in 2010. Now as Chief Programmes Officer his responsibilities focus on the major, mostly EC co-funded projects, the organisation's products and services portfolio and EU Liaison.

An engineer and qualified accountant with 20 years' experience in the R&E networking area, Matthew has a deep understanding of GÉANT's key stakeholders' requirements and uses his strategic outlook, combined with strong analytical and problem-solving skills, collaborative approach and attention to detail to help the organisation deliver to its objectives and where possible exceed expectations. He has been involved in the procurements of various generations of pan-European networks as procured and implemented by GÉANT and has extensive knowledge of the international telecoms carrier market.

Matthew is a Fellow of the Royal Society of Arts, qualified Chartered Accountant and holds an Engineering degree from the University of Newcastle upon Tyne.



MARK JOHNSTON, CHIEF OPERATIONS OFFICER

Mark is a strong positive leader and problem-solver who applies both technical knowledge and business acumen to deliver results. He is a dynamic self-starter with a strong sense of responsibility who can get stuck into the detail while focusing on the bigger picture. A proven manager skilled in overseeing operational teams to design, plan, build and operate ICT platforms and delivery complex projects. An experienced financial and commercial manager who is practised at operating in a fluid complex environment, using facts and figures to assess risks and make decisions. Highly effective at cultivating and developing relationships and motivating individuals and teams to excel under pressure.

Mark joined GÉANT in 2013 and is responsible for the network infrastructure serving Europe's research and education community to deliver real value and benefit to society by enabling research communities across Europe, and the world, to transform the way they collaborate on ground-breaking research.

Mark holds a MBA, Business Administration and Management from the University of Edinburgh.



CATHRIN STÖVER, CHIEF COLLABORATION OFFICER (INTERIM)

With almost 20 years of experience working in global telecommunications and the roll-out of network infrastructures across various continents, Cathrin is a highly effective global team leader, successfully working across borders and cultures in complex multi-dimensional projects. With superior levels of cultural awareness and inter-personal skills, she builds rapport at first encounter and delivers passionate messages about otherwise dry roll-outs of infrastructures, focusing on the benefits and opportunities. Cathrin is committed to collaboration and knowledge sharing and transfer as well as inclusive team building based on a foundation of mutual trust.

Cathrin has belonged to the GÉANT team since 1997, holding various positions as the organisation has grown and developed, always with a specific focus on growing the geographic reach of the GÉANT network and the deepening of the global R&E collaboration for the benefit of the global research and education community.

Cathrin holds a European Business degree from the FH Osnabrück in Germany.



DIMITRI VAN ZANTVLIET ROZEMEIJER, CHIEF INFORMATION TECHNOLOGY OFFICER (INTERIM)

Dimitri is an experienced and results driven CIO and technology entrepreneur/investor. He joined GÉANT in 2016, after having founded the Amsterdam Business Awards, Next Unicorn Awards as well as the largest SME platform in the Amsterdam region. He was CIO, Global IT director, manager and consultant at CMG, ING Securities, Athlon Car Lease, ASML and the Chamber of Commerce between 1990 and 2016.

Having worked in IT and innovation for 25 years in SME's, (semi) governments and multinationals makes him all-round, flexible and effective.

He is responsible for IT, Software Development and Data Science and aims to align with the R&E community by engaging with them as much as possible.

Dimitri holds an MBA in Business Administration and International Business from the University of Derby.

GAME-CHANGER FOR CLOUD SERVICES!

36 NRENs across Europe can now offer a range of IaaS cloud services from leading suppliers to their institutions and users.



The collaboration of the European NRENs in GÉANT on cloud services has reached an important milestone. Over the past year, 36 NRENs conducted a Pan-European tender for IaaS services: a collective invitation to suppliers to submit a bid to supply their services.

The tender aims to allow European Research and Education institutions to consume the cloud in a safe, easy and predictable way, where services meet European and national regulations, have attractive pricing, are connected to the community's networks and identity management capabilities and can be purchased in a controlled and transparent manner.

This demand aggregation of NRENs and their circa 10,000 participating institutions creates a substantial single digital market.

TENDER OUTCOME

There was a strong interest in the tender from suppliers. More than 100 companies registered for the procurement and the evaluation of the proposals was comprehensive. The following providers have qualified and will become part of the GÉANT Cloud Catalogue IaaS portfolio:

- Amazon, through resellers: Arcus, Comparex, Telecom Italia
- Cloudsigma
- Dimension Data
- Interoute
- itSoft
- KPN
- Lattelecom
- Microsoft, through resellers: Atea, Cactus, Comparex, Dom-Daniel, Infosoft, Micromail, Nextsense, Novabase, SoftwareOne, Span and Ymens
- NTT Europe
- T-Systems
- Telecom Italia
- Vancis

PORTFOLIO OF SERVICES

GÉANT is now in the process of transferring the tender outcomes into framework agreements with these companies, which will contain standardised terms of use with a four-year lifespan. The IaaS portfolio will be

ready in September, for the NRENs to make these contracts available to their institutions. Institutions do not need to run separate tenders themselves and can easily consume the IaaS solutions via either a direct award or a mini-competition. This efficient supply-chain saves the institutions and the service providers time and money and positions the NRENs as the 'above-the-net' service delivery organisations for Research and Education in Europe. This portfolio of services also delivers a firm basis for bringing the EC's European Cloud Initiative and European Open Science Cloud to fruition.

NEXT STEPS: DELIVERY AND ADOPTION TRACK

NRENs will be assisted with bringing the services to their institutions by the GÉANT cloud team. This support consists of:

- Communication materials (templates for the NRENs to use when communicating with their communities).
- An online IaaS service matrix, as part of the GÉANT cloud catalogue, which allows customers of this tender to see the outcomes and drill down to the detailed answers from suppliers.
- Meetings and workshops (online and face-to-face) on service delivery and adoption. The first GÉANT Cloud Workshop takes place in Rome on 13-14 October 2016 and zooms in on how NRENs can make the IaaS services available to their communities.

MORE INFORMATION:

For updates, see the GÉANT clouds website:
<http://clouds.geant.org>

Sign up for the GÉANT Clouds newsletter or contact the clouds team at clouds@geant.org
Register for the clouds workshop for NRENs on 13-14 October in Rome:
<https://eventr.geant.org/events/2480>

DELIVERING AN INTEGRATED SERVICES PORTFOLIO

GÉANT – SERVING THE COMMUNITY

GÉANT develops services to support researchers, educators and innovators - at national, European and international levels. These services are both developed through the GÉANT project and also by the community. Our portfolio of advanced services covers connectivity, trust identity and security, real-time communications, and clouds services.

To help support the networking community and the wider research and education users GÉANT's service portfolio can be grouped into five core families;

- Connectivity
- Trust Identity and Security
- Real-time Communications
- Cloud Services
- Professional Services

With such a breadth and depth of services it is vital that this portfolio is carefully integrated to support the user community.

CONNECTIVITY

As the largest element of the GÉANT project the inter-NREN network services are perhaps one of the most significant components of the service portfolio. These connectivity services support the NRENs in delivering world-class network facilities to the research and education community.

High Capacity Services

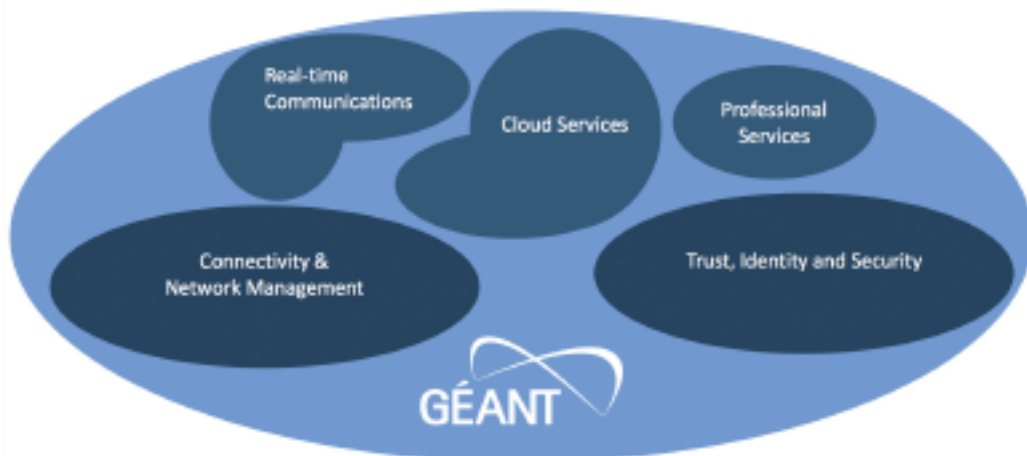
GÉANT's core function is to provide the NRENs with a private networking service to support research and education. Working at speeds of up to 100Gbps, GÉANT provides core connectivity that enables advanced research across Europe and, with its connections to International partners, around the world.

GÉANT also works to extend high performance access to countries and regions that do not currently have access, in order to support truly global collaboration.

This connectivity underpins the work of a wide range of e-infrastructure projects and activities by providing a high performance, reliable and cost-effective international communications platform for research.

User Empowerment

eduroam provides students and researchers access to thousands of wifi access points in over 70 countries worldwide and offers access using a single, secure login facility - making



international collaboration much easier. **www.eduroam.org** With an estimated 3 billion authentications per year and over 1 billion international authentications, eduroam is an essential service for millions of researchers around the world

TRUST, IDENTITY & SECURITY

Today, access to online services is crucial to research and education. Students, researchers and institute staff rely on them for research, collaboration, e-learning, and teaching. Trusted digital identities allow them to simply and securely access content and services. GÉANT provides technologies that build trust, promote security and support the use of online identities. This trust and identity model is an essential component of many infrastructure projects by bringing together services and users in a scalable, manageable and secure manner.

eduGAIN enables single-sign-on access for students and researchers from 1500 institutions worldwide to over 1000 academic services.

www.edugain.org

The range of Trust Identity and Security services extend far beyond just eduGAIN with GÉANT providing services to help NRENs develop Identity Federations, provide certification services, and deliver security services and training to their users.

REAL-TIME COMMUNICATIONS

Online communications are crucial to research and education. Students, researchers and institute staff rely on e-learning services and audio and video conferencing to learn and share. This is a rapidly developing area and GÉANT is working to support and foster innovation

for the national research and education networking (NREN) organisations and their communities. Developments in Video Conferencing (particularly WebRTC services) and supporting e-learning are crucial elements of the GÉANT service portfolio and will help NRENs and the wider R&E community. These services will provide tangible benefits to users across Europe. Many of these services will be designed to be implemented and managed on cloud based platforms.

CLOUD SERVICES

From large scale computing facilities to personalised storage, Cloud services offer higher education and research organisations the opportunity to become more agile and provide their users with a wider range of relevant IT services at a faster pace to fulfil user demand. Cloud services can be accessed directly by users needing advanced and flexible storage and computing facilities but can also be used as a delivery platform for other services developed and delivered by the NRENs and GÉANT.

clouds.geant.org

PROFESSIONAL SERVICES

From Training to Project Management, GÉANT has a range of skills and services to help share knowledge and develop human capital across the R&E networking community. Through its secretariat support of Task Forces and Special Interest Groups, GÉANT enables innovation and sharing of best practice in a wide range of fields.

By using the power and flexibility of the cloud, GÉANT helps research and education institutions to deliver maximum value to their users.

EINFRACENTRAL – DEVELOPING A EUROPEAN E-INFRASTRUCTURE SERVICES GATEWAY

ALASDAIR REID, INTERVIEWED BY KARL MEYER



Alasdair, tell us a little about eInfraCentral and why it's important...

Well the major e-infrastructure projects, GÉANT, PRACE, EGI, EUDAT and OpenAIRE have already been extremely successful in improving the lives of major European research project but there is a huge amount more we can do to reach out to the wider community. eInfraCentral will help the wider community find, understand and use these services and help deliver the EC's vision of an Open Science Cloud.

So one of the core markets is the "long tail" of research?

Yes this is one group eInfraCentral is intended to reach. These are the smaller projects who may not have the IT skills and resources to navigate the different service offerings and find the correct solutions. We want to help researchers

who simply want to "Use" IT rather than have to spend their valuable time "Doing" IT.

That sounds really exciting – a One Stop Shop for R&E services?

Certainly a One Stop Catalogue! The "shopping" element is likely to be a little more complicated due to the way that many e-infrastructure services are delivered but the gateway will help users understand what each service can offer them and how to request it from the service provider.

With all the major projects offering very different services this sounds like it's going to be complicated.

The aim is to help manage this complexity. The gateway will harmonise the various definitions of services so that

non-expert users can understand, compare and select the right service set for their project and tell them how to request the service.

This simplicity and visibility will really help those research teams who don't already know about the e-infrastructure services that are available – increasing the uptake and value that these services offer.

The e-infrastructure projects are, by their nature, very technically focused. How do you plan to reach out to this "long tail" of small research projects who are more focused on simply using IT?

One of the plans for the first phase is to develop use cases so that users can relate to real-world examples of how these services work and can benefit their projects. Rather than just listing a set of difficult to understand acronyms, actually showing the positive impacts of the technologies.

Outreach to the user community is a vital component of this project – the aim is to get more people to find and use the services so connecting with them is crucial. This is particularly crucial when giving SMEs and the wider business community access to these services as these groups are much less aware of the e-infrastructure projects and may consider the services not relevant to them.

What are the next steps?

We hope to have the Grant Agreement signed my Mid October and the aim is to have an early prototype available by mid-2017.

Thank you very much - I really look forward to seeing this in action!

Alasdair will be presenting the e-InfraCentral project at Digital Infrastructures for Research (DI4R) conference in Krakow 28-30 September.

DEVELOPING EDUGAIN TO EXPAND ACCESS AND SUPPORT E-RESEARCH

eduGAIN is already a major success story for global research and education with over 2,000 Identity Providers (IdPs) and over 1,200 Service Providers participating and supporting users globally. The success of eduGAIN and identity federation is strongest in the areas of journals and e-learning services but the biggest area of growth is in meeting the more complex, diverse needs of e-research. This relies on having as many users, IdPs and SPs taking part to maximise the benefits.

The next few years will see the eduGAIN teams within GÉANT continuing to work extremely hard to help expand usage of eduGAIN and to make it easier for organisations and users join and work with the eduGAIN community. Here are some of the key developments that are planned or are already available from GÉANT over the next few years.

SUPPORT FOR RESEARCH COLLABORATIONS

Collaboration in research is absolutely key to success. In particular, many research collaborations are composed of individuals and small teams distributed globally who come together for particular pieces of research. This can be anything from a single paper to a multi year research infrastructure. These Collaborative/Virtual Organisations benefit significantly from being able to support federated, single-sign-on across their users and to services they are developing. GÉANT supports such collaborations by providing expertise, know-how and consulting. Based on this experience, GÉANT is soon to pilot with AARC to implement a Virtual Organisation Platform to help support this need and to help enhance collaborative research. Aspects such as assurance, security incident response and interoperability with additional protocols are also on the roadmap.

INACADEMIA

While eduGAIN and Identity Federation provides a rich trust environment, for many simple services a simple “Yes/No” answer to the question “Is this person a student, researcher or member of staff” is all that is required. Examples of this lightweight authentication requirement could be the ability to sign up for student special offers or to get upgraded facilities from a cloud service.



InAcademia is intended to support this need. It will enable a wide range of commercial and R&E systems to very simply allow academic members to have access to information without the need for expanded attribute release.

MOONSHOT

With the growth in web services it's sometimes hard to remember that many systems (particularly management systems) still rely on “command line” sign-in and authentication and many of these systems are very hard to integrate with eduGAIN. Moonshot tackles the non-web aspect of Single-Sign-On (SSO) to include these systems – making life easier and more secure for a range of complex non-web requirements.

FEDERATION AS A SERVICE

The development of Federation as a Service has greatly helped smaller and developing NRENs build an effective, easy to use and secure Identity

Federation structure within their regions and ensure access to research collaborations is not limited by lack of infrastructure. GÉANT is now working to expand this to help national federations support Campus Identity Provider services. This will help campuses with existing LDAP or Active Directory facilities connect these to the NREN's federation and expand access for their users to provide the ability to easily bridge existing identities into eduGAIN connected federations and will be of huge benefit to the community.

All these developments will increase the value of eduGAIN to the R&E community and help eduGAIN become an integral component of the research and education experience in Europe and worldwide. It looks like the next few years are going to be very exciting for the eduGAIN team at GÉANT.

For more information on these services visit
www.geant.org/eduGAIN



NORDUNET 2016 – SECURING THE INTERNET

Hosted by Finnish NREN Funet/CSC, the upcoming 29th NORDUnet 2016 conference is taking place at the Marina Congress Center in Helsinki, Finland, 20-22 September.

NORDUnet 2016 has firmly established itself as the Nordic networking meeting place, bringing together the networking community from Nordic universities and NRENs, along with their European and global colleagues. The conference attracts not only participants from Norway, Finland, Sweden, Denmark and Iceland. Among the participants already registered for this year's conference are delegates from Taiwan, Canada, US, Ireland, Estonia and the Netherlands.

The NORDUnet 2016 programme committee has chosen "Securing the Internet" as the overall conference theme.

As always, security is a hot topic, says programme committee member Josva Kleist, Chief Development Officer at NORDUnet.

Security has become even more relevant considering recent events in the

aftermath of the terrorist attacks in France. The debate around encryption and the right to digital privacy has flared up once again, so the conference theme seems to be well chosen. Several keynote speakers will address security issues, one of them the Finnish security expert Mikko Hyppönen. Also, we've dedicated one of the conference tracks exclusively to security. We hope to cover all aspects, from technical solutions to handling security issues from an organisational point of view.

Alongside the Securing the Internet theme, NORDUnet 2016 is running an additional conference track focusing on networks. Josva Kleist explains: "The NORDUnet conferences have always been known for accommodating technical topics, and we'll continue that. Regarding the network track, we plan to cover a lot of different aspects, from implementing a wireless network at a

Picture

The NORDUnet conference was last held in Uppsala, Sweden, in 2014 (image). This year's conference takes place in Helsinki, Finland. The NORDUnet 2016 programme committee has chosen "Securing the Internet" as the overall conference theme, dedicating one of the conference tracks exclusively to security.

university to network architecture on a global scale - and everything in-between." Apart from building and maintaining research & education networks, the conference will also be showcasing new developments in e-Infrastructure and e-Learning.

The organizers have a few novelties in store for this year's conference:

- They'll be experimenting with a different conference format by including an UnConference session in the program. Forget about single speakers at the podium. Forget about fixed topics and sitting in on traditional sessions. During the second day of the conference the participants will be part of shaping the programme during the UnConference session, which will be interactive and engaging in a new way. Everyone with a topic in mind is invited to pitch his or her idea. Next, UnConference facilitator Roland Hedberg will gather the topics into themes and distribute them to different meeting rooms.
- Another significant novelty is the Emerging NREN Knowledge Exchange Fellowship. In recent years NORDUnet has been reaching out across the globe to other NRENs to work together in sharing knowledge and network resources. The new Emerging NREN Knowledge Exchange Fellowship is yet another step in that direction. It offers an exciting alternative to traditional conference sponsorships, giving companies the opportunity to support an emerging NREN by covering travel expenses, accommodation, and conference fee for a number of emerging NREN delegates.

Among the speakers at the NORDUnet 2016 conference are Inder Monga of ESnet, Steve Cotter of GÉANT, Kireeti Kompella of Juniper Networks and Stephen Farrell of Trinity College, Dublin. Also, a range of side meetings will be held prior to and after the conference.

Read more about the conference:

<https://events.nordu.net/display/NDN2016/Welcome>
And follow the NORDUnet conference news on Facebook (<https://www.facebook.com/NORDUnet-404288107743/?fref=ts>) and LinkedIn (https://www.linkedin.com/company/nordunet?trk=company_logo)

ICT PROPOSERS' DAY 2016: MAKING THE MOST OF HORIZON2020

ICT Proposers' Day 2016 is organised on the 26-27 September 2016, as part of the Digital Week in Bratislava.

The event will focus on the Horizon 2020 Work Programme 2016-17 in the field of Information & Communication Technologies. It will offer a unique and exceptional opportunity to build quality partnerships with academics, researchers, industrial stakeholders, SMEs and government actors from all over Europe.

GÉANT will join other e-infrastructure leaders in the exhibition to address the needs of European researchers and innovators for transnational communication networks, high performance computing, multidisciplinary data management and collaborative scientific software.

The event will be followed by the Digital Assembly on 28-29 September in Slovakia.

Find out more at:
<https://ec.europa.eu/digital-single-market/en/ict-proposers-day-2016>

ICRI 2016, ENABLING COMPETITIVE RESEARCH, DEVELOPMENT AND INNOVATION

The International Conferences on Research Infrastructures (ICRI) are a global forum in the Research Infrastructures domain. Providing unique opportunities to share insights in this field from around the world, ICRI promote international cooperation.

The ICRI 2016 will take place in Cape Town, South Africa, from 3 to 5 October 2016. The conferences will be co-organised by the South African Department of Science and Technology (DST) and the European Commission.

Building on the conclusions of previous ICRI, and the ongoing debates on Research Infrastructures in international fora, such as the Group of Senior Officials (GSO) and the OECD-Global Science Forum (GSF), a more structured approach to collaboration on global Research Infrastructures will be discussed with the international community. Here, the strategic importance of Research Infrastructures and exploring their role as a tool for Science Diplomacy will be underlined.

As a major global connectivity enabler and service provider for research and education GÉANT will seek to promote further collaborations and solutions through projects such as MAGIC, TANDEM and AfricaConnect2 and services such as eduGAIN and eduroam to name a few.

Read the programme at:
<https://icri2016.co.za/overview/programme/>

SC16, ACCELERATING HIGH PERFORMANCE NETWORKING

The international conference for high performance computing, networking, storage and analysis (SC16) will take place from 13 to 18 November in Salt Lake City.

The event aims to attract new and diverse groups of HPC professionals and students to the conference with the goal of sparking new conversations, new connections and new ideas.

Each program in the SC Conference is dedicated to showcasing work in high performance computing, networking,

storage and analysis by the international HPC community. The core of the Conference is the Technical Program with peer-reviewed content for every track; a series of Student Programs to engage and foster the next generation of HPC professionals; community awards to honor researchers in the field; and the fastest research network, SCinet, built to support high performing applications and demonstrations during the Conference.

GÉANT will exhibit in the Research area with an aim to offer tailored added-value solutions to specific research needs.

For more information please visit
<http://sc16.supercomputing.org/>

WHERE DATA SONIFICATION AND SPORTS MEDICINE MEET

Ever since Johannes Kepler published his treatise intrinsically linking music, geometry and astronomy in 1619, science has looked to the universal language of music for inspiration to understand the relationship between time, speed, repetitions and cycles.

One can only wonder if the author of *Harmonices Mundi* (the "harmonies of the world") imagined that the theories he proposed would one day be used in the medical clinic to diagnose and treat patients suffering the painful effects of sports injuries.

The musical language of resonance, periodicity, patterns and spectra are well-known principles used. But it was meeting at a teaching conference that brought Dr. Domenico Vicinanza, Senior Lecturer and co-director of Sound and Game Engineering at Anglia Ruskin University and GÉANT network expert in Cambridge, and Dr. Genevieve Williams, an expert in Sports Biomechanics in the Anglia Ruskin University's Department of Life Sciences, to realise that their divergent fields had more in common than meets the eye – or in this case the ear.

It is at this junction between sound and music analysis and scientific exploration that the two are pioneering new ways to apply the synergy in the field of biomedicine with remote sensing and data sonification.

MUSIC TO MOVE BY

Anyone who has ever seen the Bolshoi Ballet, Riverdance or a figure skating competition can appreciate the notion that music and human physiology can be intrinsically intertwined. If music is a structured language that enables us to examine and communicate periodicity, fluctuations, patterns and relations, what an ideal tool it can be to study the human body – a complex collection of cycles, periodicity, fluctuations and

transitions. These properties are related to musical concepts such as pitch, timbre and modulation, vibrations and oscillations. Take, for example, the glucose regulation. Insulin that is produced in the pancreas creates periodic oscillation in blood insulin that stops the downregulation of insulin receptors in target cells. Oscillations in the metabolic process are so vital that constant inputs of insulin can jeopardise the delicate system from functioning properly.

Drs. Vicinanza and Williams are taking these concepts a step further in their lab. They are combining Vicinanza's experience in applying scientific data sonification in physics and neurobiology, with Williams' experience in kinesiology, biomechanics, quantifying coordination of human motor skills and dynamical systems theory in movement, and applying this combined knowledge to use remote diagnostics and analysis and data sonification to motor control and biomechanics treatment and diagnostic models.

"Our infrastructure in the lab at Anglia Ruskin is pretty unique," says Dr. Williams. "We joined together my sport science lab with Domenico's state of the art sound and game engineering lab. We use a variety of sensors that are in everyday use in a sports medicine clinic. Like flex sensors to determine bending or tilting, or a position sensor that tracks movement in 3D with sub-millimetre precision."

"Rehabilitation, sports training and coaching increasingly rely on quantitative data and measurements," explains Dr. Vicinanza. "For that reason, biomechanics labs are equipped with

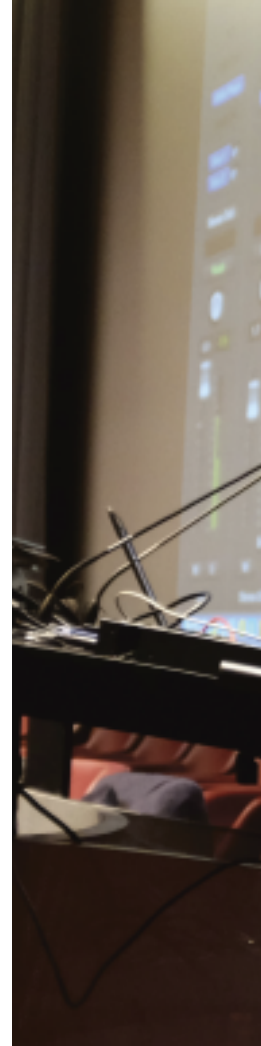
devices able to measure 3D position, force and acceleration in an extremely accurate way. Remote sensing allows us to potentially collect data at spatial and temporal scales that is either unfeasible or difficult to implement with existing instrumentation. Until now though, very little has been done in the actual deployment of networked sensor-based infrastructures for sport and rehabilitation applications."

THE POWER OF SOUND

The next step is to communicate the scientific data in unique, accessible and understandable ways. "Our approach is based on the idea of analysing the waveforms and their relationship by translating them into audible signals," explains Dr. Vicinanza. "We use the natural capability of the ear to distinguish, characterise and analyse waveform shapes, amplitudes and relations."

The sonogram or spectrogram is one of the main tools used in this process, known as data sonification, to investigate the structure of sound. "We can use sonograms to examine the phase relations between a large collection of variables without having to reduce the data. Spectral analysis is used in many fields like high-energy physics. Now we are showing how it can be used in biomedicine. Sonification is a veritable 'magnifying glass' to analyse data."

When coupled with remote sensing and networks, sonification can provide physicians, physiotherapists and





“Thanks to the network we can link physicians, therapists, patients and athletes across the globe.”

Drs. Vicinanza and Williams are quite literally “making their own kind of music” – music that will help build a foundation for new diagnostic and treatment modalities.

patients a uniquely effective way to analyse data and provide accurate and personalised feedback without having to travel to a the clinic or hospital. Physicians can analyse sonograms generated by sonification in real time from anywhere in the world and give immediate and accurate feedback.

“Networking is the final, and in my mind, probably one of the most innovative ingredients,” says Dr. Vicinanza. “Low latency, extremely high availability and a global footprint are crucial to make this possible. National Research and Education Networks (NRENs) provide just that high-quality connectivity and extended reach. We connected our lab to the GÉANT network, through the UK research and education network JISC so that we are able to send or receive measurements across the globe.”

Their work has far-reaching ramifications in the fields of physical therapy, rehabilitation, sports medicine and athletic training. “We are experimenting with mapping data to sound in the very creation of this music. Our brains are ‘hard-wired’ to understand and internalise this audio feedback in ways much more powerful than visual perception,” explains Dr. Williams.

But quantitative audio feedback is not only one of the most promising ways to help athletes perform better; it is an ideal tool to reduce the risk of injury. “For an athlete in training, audio feedback can keep him or her on track even when

they are not under the scrutinising eye of the coach. Also patients in physical therapy who need to perform their exercises on their own. With the benefits of remote sensors and networking, athletes and patients can join together to share experiences and support one another.”

Drs. Vicinanza and Williams are quite literally “making their own kind of music” – music that is forming a foundation for new diagnostic and treatment modalities. With the help of R&E networks, physicians, physiotherapists and patients will one day benefit from models that lower costs, facilitate faster response time in the clinic, improve training, and bring about more effective recovery and rehabilitation from sport injuries.

WHAT IS DATA SONIFICATION?

Data sonification is the use of audio signals to convey information or perceive data. Auditory perception of complex, structured information could have several advantages in terms of temporal, amplitude, and frequency resolution when compared to visual representations and often opens up possibilities for an alternative or complement to visualisation techniques. These advantages include the capability of the human ear to detect patterns, recognise timbres and follow different strands at the same time. This would offer, in a natural way, the opportunity of rendering different, interdependent variables into sound in such a way that a listener could gain relevant insight into the represented information or data. *Presented at TNC 2016*

<https://tnc16.geant.org/core/presentation/729>





AIMING FOR THE CLOUD, AND BEYOND...

One of GÉANT's primary goals is to provide world class networking and services to researchers and educators in conjunction with their local NREN and campus partners. Outside of the GÉANT ecosystem, there also exists a multitude of intricate network connected resources and infrastructures, including those of commercial service providers, that can provide valuable data inputs, data processing and data storage services to enhance the capabilities of collaborative research groups.

A major focus area in the GÉANT GN4-2 Project is interconnecting these disparate e-Infrastructures and empowering end users to request and adopt these new services.

With the increased familiarity of commercial service provider marketplaces of today, services and resources are quickly and easily made available to end users via orchestrated, 'point and click' solutions. Building on this experience, the GÉANT team working on integration with e-Infrastructures and commercial service

providers, is developing a lightweight reusable solution to present a seamless experience to the GÉANT-NREN user base.

The solution will incorporate elements of this end-to-end orchestration and enable familiar one-stop-shop interfaces to allow combined service requests from multiple providers (such as the local campus, regional network, NREN and/or GÉANT) as well as IaaS/PaaS services from public e-Infrastructures or commercial service providers. It is based on standardised simplified APIs, and requires the exposure of a minimum set of elements of each provider's systems (through a RESTful API for example) to address both operational and business interoperability – such areas could include Service Catalogue, Order Management, Provisioning, Service Assurance/Availability, and Fault Management.

Following discussions with a number of NRENs a suitable use case was identified to interconnect a campus network with a cloud service provider (CSP) and enable seamless offloading

between on-premises and cloud based resources.

This use case will be modelled into a Proof of Concept (PoC) which will demonstrate aspects of the service orchestration required in this multi-domain public-private environment. As part of this it will allow users from campus networks to request a L2 VPN from the local environment through the respective NREN and GÉANT networks into the Microsoft Azure ExpressRoute service delivery point, presently hosted at the NetherLight Exchange in Amsterdam. The solution anticipates in the longer term all the business and operational interactions between the involved service providers that are required to support the full service lifecycle, including, apart from provisioning, incident management, service updates and decommissioning.

Words

Afrodite Sevasti (GRNET) and Garreth Malone (HEAnet)

If you would like additional information on this activity, please contact garreth.malone@heanet.ie

TNE – SHAPING THE GLOBAL CITIZEN

EDUCATION WITHOUT BOUNDARIES

“The academy of the future does not confine itself to national boundaries”. These words of John Sexton, former President of New York University, in his inspiring closing speech at this year’s networking conference, TNC16, encapsulate the very spirit behind the provision of education for students based in a different country from the awarding institution. Apart from creating considerable revenue streams for both sending and host institutions, this type of student experience contributes undeniably to equipping the global citizen to compete in an increasingly interdependent and multicultural world.

The concept in itself is clear, less so its definition. The Brits talk about transnational education, or TNE for short; the Americans refer to it as global education (perceiving a somewhat negative connotation of the term ‘transnational’...). Semantics apart, what does it actually cover? A mindboggling lot (with blurry lines) – ranging from branch campuses, joint international degree programmes, regional gateway offices, distance learning, teaching partnerships, MOOCs, and even the quest to cater for the educational needs of migrant populations, such as the Sami who continuously cross the Arctic country borders with their reindeer herds.

WHAT ROLE FOR NRENS?

But what is the role of the NREN community in all of this? How can we best facilitate this seamless delivery of the capital ‘E’ across borders and continents?

The BoF “Understanding and Supporting Transnational Education: The NREN’s role” on Tuesday at TNC16 offered an ideal opportunity to explore how we can help our institutions thrive in their international operations. The panel discussion brought together representatives from NRENs and higher education institutions across the world to discuss the challenges posed by TNE and the strategies they’ve developed to address these very challenges.

The obvious role consists in providing the necessary IT infrastructure to secure real-time collaboration and



communication between students and staff regardless of location. Each approach might be different, but collaboration between NRENs is key.

- Jisc in the United Kingdom, for example, has forged a strategic alliance with CERNET in China and has successfully positioned itself as trusted advisor for UK institutions with TNE aspirations, bringing in-country knowledge, consultancy and brokerage services to the table.
- SURFNet is partnering up with CKLN to support Dutch TNE activities in overseas territories in the Caribbean – a long way to go considering that some islands have not established NRENs yet, let alone fibre. But the ground has been prepared and the seed has been planted.
- Over the last few years, GARR has seen TNE activities in Italy ramping up and is currently working on an agreement with Internet2 to provide cost-effective connectivity and service solutions, including campus grouping and a service package for an aggregate number of institutions.

NEW OPPORTUNITIES AND NEW CHALLENGES

Different challenges, approaches and business models, yet a clear need, voiced repeatedly during the session, for the global NREN community to join forces and share expertise and best practice. GÉANT is uniquely positioned to facilitate this knowledge exchange across Europe and with strategic international partners such as Internet2 and CERNET. There is a need to start documenting challenges to manage expectations and to continue learning from each other’s experiences, failures and successes.

Setting up a Special Interest Group (SIG) would seem to be the next logical step to making this pool of knowledge available and allowing the global NREN community to tap into it. Ultimately we are all on the same mission: help ensure a great digital student experience anywhere in the world and help shape the global citizen!

Originally published by Helga Spitaler on blog.geant.org



HIGHLIGHTS FROM A HIGHLIGHT – TNC16

What's the common thread connecting a drone, a rhyme, gender and diversity, and the question of how worthwhile one's life is? This year's networking conference, TNC16, which was held on 12-16 June.

Pictures

Left: Plenary speaker John Sexton

Right: TNC provides more networking opportunities at the gala dinner and other social events

Far right: TNC16 marked the 30th anniversary of formal collaboration in the GÉANT community

Below far right: GÉANT staff and TNC16 team leaders take a bow



The event in Prague broke all previous TNC participation records. Almost 720 people from 65 countries attended in person. Almost 3150 unique IP addresses from 44 countries were recorded accessing the live video streams of the 24 parallel and 5 plenary sessions. And according to Hashtag Explorer, #tnc16 generated 1,526,504 Twitter impressions with 1,500 tweets.

Starting with a focus on the 30th anniversary of formal collaboration between European research and education networking organisations (NRENs), the plenary talks ranged through topics connected to the TNC16 theme, 'Building the Internet of People'. Security, astrophysics, storage, and healthcare data provided valuable focus points. But it was the personal and human perspective in three other plenary talks that had participants tweeting most enthusiastically. The "wonderful and moving talk" by Anna Wilson (HEAnet) described how research and education networkers can have an impact on the LGBT community. "Must see" Maria Farrell (InterConnect Communications) talked about what we should be doing with the Internet of Things to work on humanity's problems, not just make profit. And John Sexton (NYU) delivered the "compelling message" that, in providing connectivity, the R&E networking community helps to underpin global civil society and to fulfil human potential. "Thank you for the lives you live," he said, "I hope I've been able to give you a hint that they are even more worthwhile than you thought."

Another popular feature of TNC16 was lightning talks, where speakers had a short and strictly controlled time in which to interest listeners in their projects or new ideas. "Rhyming Renato" – Renato Furter of SWITCH – inspired many with his first ever attempt, which was deemed "the most original contribution to TNC16. Or ever."

A rhyme about federated login. This and several other lightning talk topics were also captured in community posts on blog.geant.org, which was launched in time for the conference.

The lightning talks and plenary sessions also proved a step forward for our community with regard to diversity. With 50% of plenary speakers and 40% of lightning talk presenters being women, this was a significant development since TNC15, where the issue of women in ICT was addressed.

Another highlight of TNC16 for many participants was a mind-controlled drone, which SURFnet included in its demonstrations. Six other formal demos and others at exhibition booths, plus a large number of posters to explore, BoF (birds of a feather) meetings and other workshops all provided lively break times and networking opportunities.

The human networking opportunities that TNC conferences provide is the leading reason why many participants attend, according to a series of informal interviews that GÉANT staff carried out during TNC16. "It's one of the highlights of the year", said EC Project Officer Jean-Luc Dorel. ESnet CTO Inder Monga agreed: "It offers a good technical programme, but there is still time for side conversations." And from among the GÉANT Associates and other industry organisations that exhibited at TNC16 there was appreciation that they can talk technically to cutting-edge researchers as well as talking business to key decision makers. "I am recommending to colleagues to attend TNC," said Andreas Jelinek of ADVA Optical Networking. "It's a good investment for our company and we're planning to do even more next year at TNC17."

TNC17 will be hosted by AConet in Linz, Austria on 30 May – 2 June 2017. The conference theme and call for participation will be announced in October 2016. tnc17.geant.org.



ABOUT TNC

TNC is the largest and most prestigious European research and education networking conference, bringing together decision makers, managers, networking and collaboration specialists, and identity and access management experts from across Europe and beyond.

Keynote speeches, parallel sessions, demonstrations and presentations give participants a unique overview of the latest developments in research and education networking, both in technical fields and in the area of applications and management.

ABOUT TNC16

The conference was organised by GÉANT and hosted by CESNET, the Czech national research and education networking organisation. It was held on 12-16 June 2016 in Prague. All information, including the full conference schedule, presentations and archived video session streams can be found on the TNC16 website: tnc16.geant.org.

Streaming was provided by the GÉANT event team – NORDUnet, CESNET and PSNC.

Sponsorship or other support for TNC16 was provided by Ciena, ECI Telecom, Cisco, Internet Society, DigiCert, Nokia, Juniper Networks, Ripe NCC, Verne Global, Infinera, Kaltura, IBM, Xantaro, Pydio, Flowmon Networks, ownCloud, Networks, Brocade, ICT Professional, International Data Group, ADVA Optical Networking, Corsa Technology, OSI Hardware & Telecom, and the European Commission.

MANAGING INFORMATION SECURITY IN OUR COMMUNITY



Words

Alessandra Scicchitano of GÉANT, who provides support to WISE and SIG-ISM

Defending information and computer systems from unauthorised access, use, disclosure, disruption or destruction has become an area of increasing importance and urgency. Within the GÉANT community, the special interest group on information security management – SIG-ISM – has been active for the past two years. And collaboration in this area on a global scale has found a home in WISE - Wise Information Security for collaborating E-infrastructures.

SIG-ISM is a forum for exchanging knowledge and experiences. Its main aims are to establish a community of security management professionals; to develop, maintain and promote a trust framework between NRENs, based on international standards; and to promote the use of international security standards and share best practices for security management.

Always very active, the group has published a white paper on information security management and a second one on risk management is on its way. Input for these papers came from themed workshops, in September 2015 and in

February 2016 respectively, with this being the group's favoured approach for focusing its twice-yearly roundtable and open discussion meetings.

Always looking to increase its knowledge and for new possibilities to share that knowledge, in Summer 2015 the SIG-ISM steering committee engaged in the planning of a workshop that would bring even more CISOs (Chief Information Security Officers) and other security experts together. In autumn 2015, 50 experts met in Barcelona to discuss security issues and potential ways to help each other. Coming from different e-infrastructures, during the 3 days spent together, the participants shared knowledge and concerns.

SIG-ISM actively contributed to the workshop, sharing the experience in information security management that CISOs within national research and education networking organisations have built up. The workshop participants found the event very useful and they expressed the wish to have more such meetings. On this basis, the WISE community was born.

WISE has been working since October 2015 to build a global trust community where security experts from different e-infrastructures can share information and work together. The WISE community - which includes SIG-ISM representatives in its meetings and steering committee - met twice in 2016, with a BoF at TNC16 in June and a workshop at XSEDE16 in July.

There are four WISE working groups, which focus on: Updating the SCI framework (SCIV2-WG) : defining best practices, trust and policy standards for collaboration, with the aim of managing cross-infrastructure operational security risks; Security Training and Awareness (STAA-WG) : collecting information about relevant existing training and mapping the need for joint training events on specific topics; Risk Assessment WISE (RAW-WG) : providing e-infrastructures and their member organisations with guidelines on how risk assessments can be effectively implemented; Security in Big and Open Data (SBOD-WG) : focusing on security issues that arise when dealing with big and open data, especially within the e-infrastructures.

These groups started work at the beginning of 2016 and periodically report on their progress to the community. At XSEDE16 in Miami, the groups reported to mostly American participants, and the US e-infrastructures talked about their security issues and shared experience on how to face them. Colocated with the DI4R (Digital Infrastructures for Research) conference in Kraków towards the end of September, WISE meets again, this time reporting on the working groups' progress to a largely European audience and listening to the EU e-infrastructures. On this basis, the direction of WISE work for the coming year will become clear.

FURTHER INFORMATION

http://www.geant.org/Innovation/SIG_TF/Pages/SIG-ISM.aspx

<https://wise-community.org/>

ALIENS: OUR ALLIES ON THE OPTICAL NETWORK

Photonic signals generated by different technologies share the same optical infrastructure and anticipate its future evolution by making 100G Ethernet services available throughout the network



Optical networks are infrastructures based on fiber-optics cables; nodes, where signals are generated, multiplexed and transmitted; and amplifiers at regular intervals that allow these signals to reach their destination. On a single-vendor network, the same manufacturer provides all components of the hardware platform, such as nodes and amplifiers. The management system, which is vendor-specific, enables the network operator to remotely manage, monitor and configure both the network equipment and the optical circuits.

Such infrastructure has some limitations in terms of flexibility in service provisioning and ability to follow the swift evolutions of optical communications. These limitations can be overcome with the integration of heterogeneous optical platforms. Thanks to this approach, it is possible to provide next-generation transmission services over the existing transport and regeneration equipment. At the same time, the integration allows for the evolution of the optical network by means of targeted interventions, while ensuring service reliability.

For GARR network, we have field-tested the alien wavelength technique, a hybrid solution based on the transmission and reception of optical signals generated by an infrastructure, which is different from the transport one. These two optical platforms need to interoperate at a very deep level, as the operational functionalities of the transit nodes (i.e. multiplexing, optical switching, routing, and amplification) must act in the same way both on native and alien signals.

However, alien wavelengths need to be adapted to the technology of the hosting platform, without disrupting its functionality, or its performance in transporting native lambdas. The management systems of the two interoperating platforms provide information only on their own network, as they are completely blind to each other's domain.

While planning this field test and considering its complexity, we realised that working with aliens was going to be very different from our daily operations. We took up the challenge with curiosity and with the hope that, should the technique work on our production infrastructure, we would be able to enhance and harmonise the optical transport network on a national scale only by letting alien wavelengths "invade" it.

ALIENS IN GARR-X

Our national optical network is based on technologies from two different vendors, which were deployed about four years apart. The older solution, Huawei, is in operation in Northern and Central Italy. The newer solution, Infinera, recently implemented within the GARR-X Progress initiative, is operational in Southern Italy. The two infrastructures are very diverse from the technological point of view. On the one hand, Huawei platform is based on non-coherent signals and it is equipped with compensation modules to correct chromatic dispersion, which are needed for 10 and 40 Gbps optical channel transmission, modulated in intensity on-off. On the other hand, Infinera platform exploits the innovative coherent signal transmission that can reach higher bit rates with a 500 Gbps super-channel including 10 carrier waves with phase modulation (e.g. QPSK or BPSK).

This heterogeneity between the technologies involved made the alien wavelength field test even more interesting. The field test was implemented at first between the two GARR PoPs in Rome and Naples, firstly over about 345 km of optical network (without any production traffic), and then over the live production network on a 1.200 km path.

In order to implement the alien wavelength technique on GARR network, we proceeded with the following steps. First, Infinera nodes are installed in the sites where the 100G Ethernet services are needed. Between the nodes, an adaptation layer is created, including an amplifier and a filter to split up the Infinera super-channel in its 10 carrier waves, which then need to be inserted one by one through the ADD/DROP section in the Huawei node and on the corresponding amplification chain. The Huawei platform sees each of the carriers as an alien signal; nevertheless, it manages to transport each of them over a pre-configured path from the ingress to the destination site.

Alien and native wavelengths passing through the network cannot overlap and need to be equalised. This is possible due to the presence of two elements within Huawei nodes, both of which can be remotely operated: spectrum monitoring boards and variable attenuators, both enabling the equalisation on each channel. Last, but not least, alien and native channels are monitored from the respective management systems.

RESULTS

The field test was a success: we were able to demonstrate - in a production environment - that the Infinera super-channel can be transported over the Huawei infrastructure with performance comparable to the one achieved on a single-vendor amplification chain. Furthermore, we proved that the signal to noise ratio (OSNR) is only marginally influenced by the presence of native signals on frequencies adjacent to those of the super-channel carriers. With a QPSK phase modulation, we ascertained that a 1.200 km distance could be covered with satisfactory performance. With BPSK modulation, which only transports half of the QPSK capacity, performance is even better, which suggests that longer distances could be covered without a complete regeneration of the signal. Stress and bit-error rate tests carried out on 100G Ethernet client circuits did not show any error. Huawei native channels proved robust as no changes were highlighted in their performance even when alien wavelengths used adjacent channels.

Thanks to these encouraging results, GARR is now planning to use the alien wavelength technique to provide 100G Ethernet client services also on the main backbone nodes of Huawei infrastructure, in the Northern and Central part of Italy. Indeed, the distance to cover to connect the BA1-BO1-MI1-MI2-RM2 nodes with a closed topology is compatible with the field test results. In this way, it will be possible to make available at least one super-channel, by equipping the MI1, MI2, BO1 PoPs with Infinera nodes and upgrading the one in RM2. From the perspective of the user community, the most important effect of this field test will be an increased availability of bandwidth, as Infinera platform is far more spectrum efficient, and a larger accessibility of 100G Ethernet services in these nodes. In conclusion, we can say that the 100G Age begins with the next-generation aliens on the optical infrastructure!

Moreover, at the European level, we are working to help the aliens invade also the GÉANT pan-European backbone. Indeed, GARR is actively involved in an area of the GN4-2 project whose aim is guiding the evolution of optical infrastructure interconnecting national European NRENs. The idea is that NRENs could share part of their infrastructure and use the alien wavelength technique to transmit signals and create Cross Border Fibers across different platforms. The approach studied in this field test could be especially beneficial in this context, as it is not possible (nor, maybe, desirable) that all NRENs build their infrastructure using a single-vendor technology.

THE ALIEN TEST FIELD STEP-BY-STEP

- Installation of Infinera nodes at the terminal sites, back to back with Huawei equipment.
- Configuration of an alien super-channel on the Infinera node.
- Implementation of the adaptation layer (amplifier + filter to split up the super-channel into its 10 carrier waves).
- Configuration of paths across the Huawei infrastructure for each of the alien carriers, and check for possible conflicts.
- Equalisation of alien and native wavelengths transported.
- Performance monitoring for both alien and native channels (using the management systems of the two platforms).

GARR is the Italian Academic and Research telecommunication network. Its main goal is to provide high-bandwidth connectivity and advanced services to the national scientific and academic community. Consortium GARR is a non-profit organization constituted under the aegis of the MIUR (Ministry of Education and Scientific Research), and is a member of the GÉANT Association and partner in the GÉANT Project (GN4-2).

Words

Gloria Vuagnin, PHD (GARR Infrastructure department), with the English version by Elis Bertazzon in collaboration with Paolo Bolletta and Federica Tanlongo

UNIVERSITY OF BRISTOL JOINS SHARED DATA CENTRE FACILITIES FOR EDUCATION AND RESEARCH

VIRTUS Data Centres, the UK's fastest growing data centre provider, has announced the latest member of the first national shared data centre for research and education, offered by UK higher, further education and skills' digital services and solutions organisation, Jisc.

The University of Bristol joins 16 education and research establishments already benefiting from the shared facility at VIRTUS' LONDON4.

The university will use the data centre to host systems for business, teaching and research, including the next generation of BlueCrystal, their sector-leading high performance computing (HPC) facility. This is part of a ten-year strategy which will see the university shift the balance of their systems from on-site to third-party hosting.

The easy-to-use shared data centre framework agreement provided by VIRTUS and Jisc enables the University of Bristol to take advantage of the state-of-the-art, agile and flexible data centre ecosystem. It opens doors for increased collaboration for research projects and allows the 17 organisations to partner with each other to unlock innovations.

Other benefits include reducing their carbon footprint and improved efficiency across core IT and on-premise data centre facilities that will also be used for teaching and other operational requirements.

LONDON4 is directly connected to the core of Jisc's Janet network, the high capacity network for education and research. It means researchers can make use of fast, resilient and secure connectivity between data storage and high performance computing facilities, both nationally and globally.

Nick Skelton, assistant director of IT, University of Bristol, says: "We are delighted to be joining the shared data centre in partnership with VIRTUS and Jisc. This initiative delivers the capacity and flexibility we require and enhances our ability to engage with new opportunities. Working with experienced and trusted partners gives us the confidence that our critical systems are in safe hands. The quality of VIRTUS' facility goes beyond anything we could have achieved independently."



Jeremy Sharp, director of strategic technologies, Jisc says: "Many universities and research institutions are reviewing their data centre strategies and exploring off-site facilities to create efficiencies, free up valuable estate and increase their opportunities for collaboration; but in doing so they want assurances that their sensitive data will be secure. Our framework agreement with VIRTUS meets these needs, while providing quick, resilient access via a direct connection to Janet – all adding up to the agreement being highly popular with the sector. We welcome the University of Bristol as the newest tenant."

Kelly Scott, account director, education at VIRTUS Data Centres, added: "It is fantastic to see this shared services model paving the way to real innovation that advances meaningful research. It is gaining real traction in the public sector and education

establishments are leading the way by sharing infrastructure resources to be smart about organisational efficiencies. The more institutions that use the facility, the lower the cost for everyone else already there."



Jisc are the UK higher education, further education and skills sectors' not-for-profit organisation for digital services and solutions. Jisc are also a member of the GÉANT Association and partner in the GÉANT Project (GN4-2).

SHARING IS ABOUT CARING. SHARE YOUR INDICATORS OF COMPROMISE FOR IMPROVED GLOBAL SECURITY!



It has been recently stated in a number of international reports that information-sharing on threats has become highly critical, reinforcing the need for more cooperation across borders, individuals and organizations.

Information-sharing initiatives can potentially result in the improvement of cyber incident/attack prevention, detection, prediction, response and recovering. Information sharing is a key factor to improve security, but also a consistent approach is required. Following this global and urgent need, the Computer Incident Response Center (CIRCL), a Luxembourg based CERT, has co-developed the Malware Information Sharing Platform (MISP) in order to facilitate the exchange of Indicators of Compromise (IOCs) about targeted malware and attacks within a community of trusted members.

CIRCL is operating a large MISP installation that counts more than 300 connected organizations and 700 members, among them several Research and Education Networks already connected and active on the platform.

MISP is a distributed Indicator of Compromise database with both technical and non-technical information. Exchanging this information results in a faster detection of targeted attacks, improving the detection ratio and the countermeasures.

Today, MISP is used in multiple organizations to store, share, collaborate on malware, as well as to detect and prevent attacks.

The sharing of data is performed for two major objectives:

- Better ICT innovations and incident handling methodologies between sharing partners.
- Improving the security of network and system monitoring tools.

Another important factor to take into consideration is that cyber defense encompasses not only technology but more specifically focuses on people and processes.

About CIRCL MISP and how to connect to the platform:

<https://www.circl.lu/services/misp-malware-information-sharing-platform/>

More information about the benefits of MISP:

<https://www.circl.lu/assets/files/>

HAVE YOU MET CIRCL?

CIRCL is the CERT (Computer Emergency Response Team/Computer Security Incident Response Team) for the private sector, communes and non-governmental entities in Luxembourg. For more information about CIRCL: **<https://www.circl.lu/>**

Trusted partners, in Luxembourg and abroad, can contact CIRCL in order to join the MISP information sharing community operated by CIRCL: **info@circl.lu**

RESTENA is the very high speed network for the education and research community of the Grand Duchy of Luxembourg. Operational since 1989 and connected to the global Internet in 1992, the network is today deployed and operated by the RESTENA Foundation - a member of the GÉANT Association and partner in the GÉANT Project (GN4-2).



AARC ON TARGET TO DELIVER ON ITS STRATEGIC POTENTIAL

In the past five years, federated access has become established as a user-friendly way to access and share resources while preserving security and user privacy. Raised demand for federated access is shown by the growing number of national research and education identity federations and the increasing numbers of countries and entities participating in the GÉANT eduGAIN interfederation service.

In parallel, research infrastructures and e-infrastructure have started to deploy authentication and authorization platforms such as the EGI CheckIn service, ELIXIR AAI, Umbrella and EUDAT B2ACCESS, in order to provide easy access to their services. All these platforms are also able to consume federated credentials that users may have.

As the demand for federated access and the need for infrastructures to

provide authentication and authorisation platforms grow, it becomes essential to ensure interoperability among the various platforms.

The Authentication and Authorisation for Research and Collaboration (AARC) project was launched in May 2015 to address this specific aspect and to avoid a future in which such authentication and authorisation infrastructures (AAIs) continue to be developed as

independent, non-interoperable systems.

To achieve this the AARC project is working to provide building blocks and best practices to help new comers to build interoperable AAI.

The European Commission's reviewers recognised AARC's strategic value during the project's one-year review in June, and were very supportive of the work achieved so far.

AARC is a two-year EC-funded project to develop and pilot an integrated cross-discipline authentication and authorisation framework, building on existing AAls and production federated infrastructure. AARC also champions federated access and offers tailored training to complement the actions needed to test AARC results and to promote AARC outcomes.

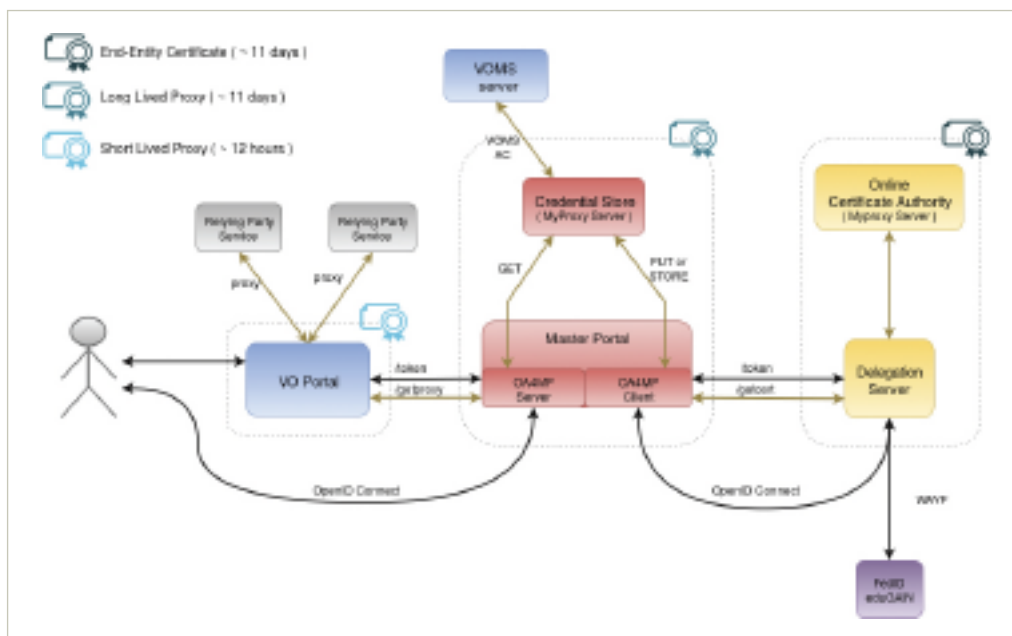
AARC's work is driven by the requirements of its partner communities: e-infrastructures, research infrastructures, national identity federations and libraries. The project is an opportunity for these communities to work together as equals and find mutual understanding and a satisfactory way forward.

During the past year, the AARC team worked with these communities and AAI architects and implementers to get a better understanding of their experiences and needs in sharing and accessing resources within research collaborations. The list of requirements gathered via these interviews and prior to AARC are shown in the graphic, and provided the starting point for one of the project's main achievements: the design of the AARC blueprint architecture.

AARc's high-level blueprint AAI architecture will help e-infrastructure operators, technical architects and implementers in the various research communities to enable secure, scalable, and interoperable federated access to their resources by using proven technical solutions and/or implementation patterns.

The initial draft architecture includes four layers:

- User Identities Layer - contains services for the identification and authentication of users.
- Attribute Management & Enrichment Layer - groups services that provide additional information about users. Such services exist in all authentication technologies.



- Gateway Proxy & Translation Layer - addresses the need to have centralised policy control and support for multiple authentication technologies on the services side.
- End Services Layer - contains the actual services the research communities are using. They range from simple web services, such as wikis, to portals for accessing computing and storage resources, to non-web-based resources such as Big Data access and management, interactive shell access etc.

This architecture is a technology-agnostic superset and does not require that all of these components exist in any implementation.

The blueprint architecture is already proving useful; EGI announced in May that they followed these guidelines in the implementation of their new AAI.

Further information about the AARC blueprint architecture can be found online at:

<https://aarc-project.eu/aarc-draft-blueprint-architecture-available-for-comments/>

Another set of achievements have come from the joint efforts of the AARC policy and pilots teams.

AARC has launched a pilot service that builds on the existing CILogon service (<http://www.cilogon.org/>). Research infrastructures operate web portals where users do their work, logging in with their institutional credentials. The CILogon pilot can generate a personal (proxy) certificate using the information obtained during the authentication process, so users can access resources that require a certificate. The AARC CILogon pilot aims to become a European service that will enable users to obtain and seamlessly use a digital certificate for secure access to e-science resources.

The CILogon software has a modular design and high user satisfaction. But it would have been difficult to get European institutes to release information to the IGTF-approved and accredited CILogon Certification Authority (CA) because it is based in the USA. The AARC CILogon set-up includes:

- A central online CA with a web front end (yellow in the diagram above). This has also been accredited by the IGTF and is therefore recognised by the R&E community.
- A caching and credential-handling master portal (red in the diagram above).
- Science gateways run by virtual organisations (VO portals - blue in the diagram above).

Successful proof-of-concept pilots have been carried out with both the ELIXIR and EGI infrastructures, each running copies of the master portal. The basic workflow has been proven and these pilots will go into a next phase in the coming year, in which AARC will finalise the CA and the master portal software.

Further information on the AARC CILogon pilot can be found at:

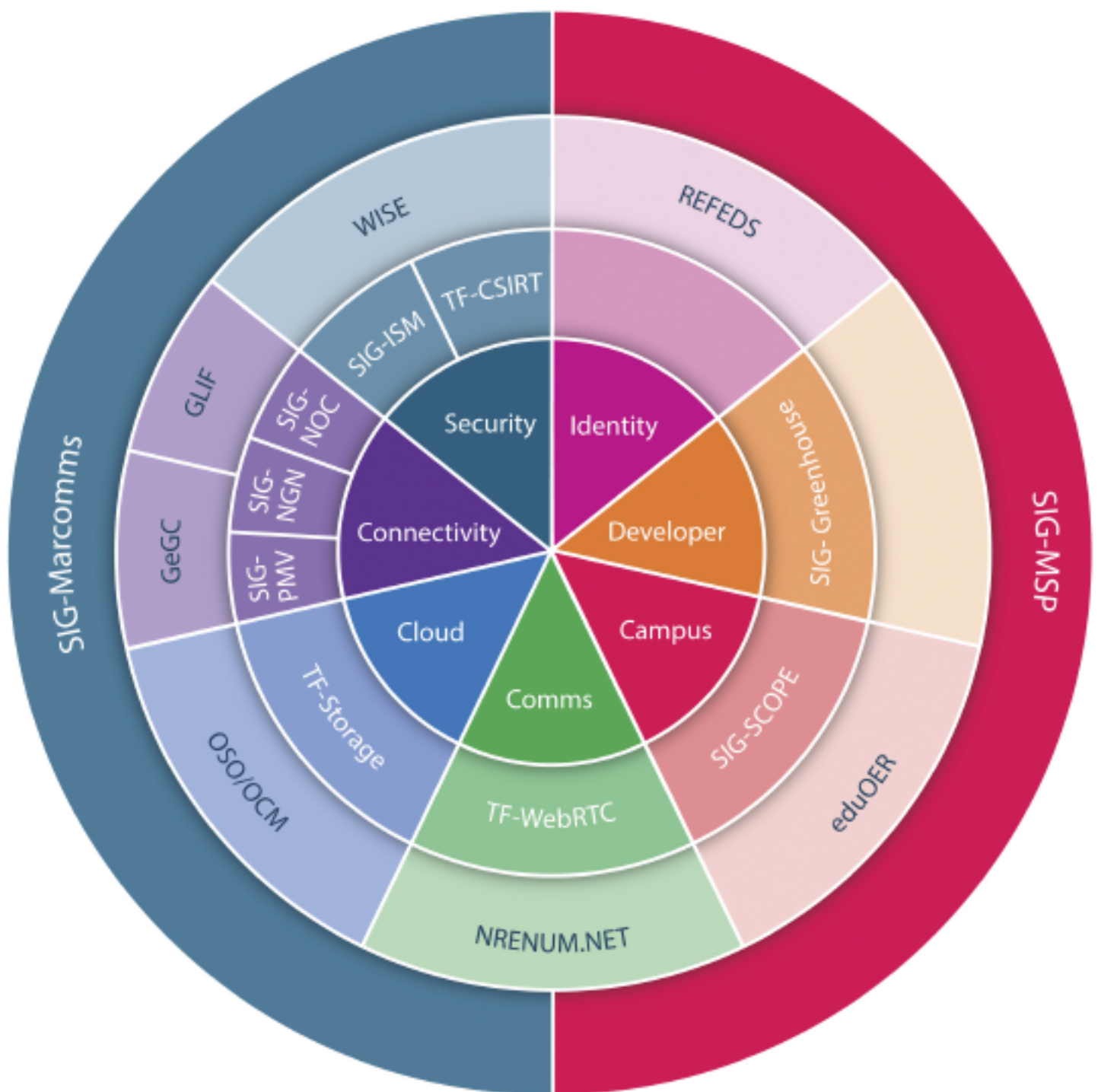
<https://aarc-project.eu/digital-certificates-behind-the-scenes-the-aarc-cilogon-pilot/>

With the follow-up project AARC2 having been approved to start in May 2017, it looks like AARC should have a long and productive life.

CERN, CESNET, CSC, DAASI, DFN, EGI, GARR, GÉANT (lead), GRNET, Jisc, JÜLICH, KIT, LIBER, Moravian Library, NIKHEF, PSNC, RENATER, Science & Technology Facilities Council, SURFnet, SURFsara

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GÉANT COMMUNITY SUPPORT GROUPS – COME AND JOIN US!



Always bubbling up through the GÉANT community are new ideas, best practices, useful experiences, common issues and needs, and a desire to share and explore these and develop tools, materials and services together.

The working groups known as task forces (TF) and special interest groups (SIG) provide a forum for exactly this kind of community collaboration. Overseen by a committee of volunteers in the new GÉANT Community Committee (GCC), three new groups were approved this year, bringing the active total to 12 with additional areas continuing to be explored. These groups form the cornerstone of the GÉANT Community Programme (GCP) alongside a range of other projects and workshop series.

These groups are generally open to anyone with the relevant interest, expertise or resources to participate. Current participants include GÉANT member and partner organisations, universities, research institutes, e-infrastructures, user communities and vendors. They cover a cross-section of technical and business areas relevant to the R&E networking community.

“I am proud to work with the GÉANT Community Committee in guiding the focus of the new GÉANT Community Programme, because this plays an important role in helping NRENs and other organisations in our community to develop and become more efficient and effective.”

Valter Nordh, Chair of the GCC

The groups that are currently active, supported by relevant GÉANT staff, are:

SIG-ISM – Developing security expertise and excellence within the NREN community.
See page 24

TF-CSIRT – Coordinating training, services and knowledge-exchange for security teams worldwide.

SIG-NOC – Sharing and creating common best practices for the organisation and management of Network Operations Centres.

NEW! SIG-PMV – Identifying performance monitoring and verification approaches and establishing best practices for campus and interconnecting networks.

SIG-Greenhouse – providing a focus on software development and sustainability needs within the NREN community.

TF-Storage – Investigating data storage, data management and cloud storage protocols, platforms and application services.

TF-WebRTC – Embracing the challenges and opportunities of Web real-time communication technologies.

SIG-MSP – Supporting management across the product life cycle and sharing service ideas.

SIG-Marcomms – Sharing and collaborating on marketing, communications and public relations.

NEW! SIG-SCOPE – Providing experience and resources to IT professionals in research and education.

TF-MNM – Developing and deploying mobile technologies and interoperable roaming. Coming to the end of its lifespan.

NEW! SIG-NGN – promoting and coordinating development and testing of innovative next-generation networking technologies.

Words

Nicole Harris of GÉANT, who coordinates TFs and SIGs (with funding from the GÉANT Project) and supports the GCC.

The working groups are just one mechanism to support community collaboration within the GCP. Anyone with strong ideas for small community projects or workshops can also submit proposals to the GCC by contacting Nicole Harris (nicole.harris@geant.org). The committee's objectives are to:

- mutually assist NRENs in providing students, lecturers and scientists the best possible internet and ICT facilities by sharing ideas and best practices, harmonising procedures, recommending the best technologies, and jointly tackling issues;
- assist GÉANT in matters related to community-driven collaborative initiatives.

GÉANT appreciates the time and expertise contributed to the working groups by all their participants, and to the GCC by its members:

- Valter Nordh, SUNET – chair, member of the GÉANT Board of Directors
- Guido Aben, AARnet
- Claudio Allochio, GARR
- Damien Le Carpentier, CSC
- Andrew Cormack, Jisc
- Simon Leinen, SWITCH
- Alf Moens, SURFnet
- Peter Schober, AConet
- Anna Wilson, HEAnet

FURTHER INFORMATION

The GÉANT Community Programme (pdf) and more information about the GCC are available through the GCC wiki page:

<https://wiki.geant.org/x/BgCjAQ>

An overview and links to all SIG and TF pages is at:

http://www.geant.org/Innovation/SIG_TF/Pages/Home.aspx

THE CREACTIVE NETWORK: A PLACE TO SHARE AND CREATE NEW KNOWLEDGE

**GARR CONFERENCE,
30 NOVEMBER – 2 DECEMBER**

WHO SHOULD ATTEND?

The GARR User Conference gathers the National Research and Education Network users and technical operators, with the aim to share experiences and ideas about the use of the network as a cross-disciplinary and cross-context tool for research, education and culture.

WHAT IS ON THE AGENDA?

Thanks to the network, today different communities can: meet and establish truly interdisciplinary collaborations; find and share services and data; use new methods and ideas (originated in other fields) in their discipline; and find the most diverse applications such as scientific experiments, virtual exhibitions or live performances.

Within such an enriching and stimulating open space, new competencies are developed and contribute to overcome the many-fold digital divide that is still existing in Italy and elsewhere.

Thus, the conference will give space to the presentation of success stories and the discussion on interesting ongoing technical issues. Also, the event will be the occasion to offer an insight on successful strategies to transform research initiatives into innovation that can make a tangible contribution to the development the country.

CONTRIBUTE TO THIS EVENT: THE CALL FOR PAPERS IS OPEN!

The Programme Working Group invites you to submit contributions on the following topics (as well as others related to the conference):

- Open Educational Resource Commons (OER), competencies and learning
- Archiving, retrieving, using and reusing: Open Data; Long-term Preservation, Data Stewardship, Big Data, Research Infrastructures, accessibility
- Things, places, people... Everything is connected: Smart Cities and the Internet of Things
- Services and user needs: collaborative environments, Cloud and more
- Intangible/Immaterial Digital Cultural Heritage: Digital Culture, immaterial and intangible creation, Augmented Reality, Immersive Reality
- Network Cultures: Open Source, Software Culture, computational thinking, Social and Creative Media
- Technology transfer: from research to innovation, from real development to the benefits for the society
- Rules of the network, in the network and for the network: ethics and intellectual property rights



Contributions, in the form of extended abstract in Italian or English, shall be between 1 to 3 pages long (i.e. 2.500-9.000 characters including spaces), plus, optionally, multimedia attachments. The Programme Committee will evaluate the submitted contributions and authors will be notified of the results. In the case of acceptance, authors will be requested to send their presentation in advance.

In order to submit your proposal, and for more information, please visit <http://www.garr.it/conf-2016-en>.



WHO ARE WE:

GARR is the Italian Research and Education telecommunications network. Its main goal is to provide high-bandwidth connectivity and advanced services to the national scientific and education community. This high-speed fibre optic network is distributed on the national territory, connecting about 1000 sites among universities, research hubs, hospitals, archives, cultural institutes and schools. At the international level, GARR network is fully integrated into the worldwide Internet. This infrastructure is managed by Consortium GARR, a non-profit organization founded by the MIUR (Ministry of Education and Scientific Research) and its associate members are: the National Research Council (CNR), the Agency for new technologies, energy and environment (ENEA), Italian Institute of Nuclear Physics (INFN) and Fondazione CRUI (Conference of Italian University Rectors). Consortium GARR is a member of the GÉANT Association and partner in the GÉANT Project (GN4-2).

IMPORTANT DATES

- **Call Opening:** 21 July 2016
- **Call Closing:** 2 October 2016
- **Notifications of acceptance and programme:** 26 October 2016
- **Conference:** 30 November – 2 December 2016

● Point of Presence (POP) / Point de présence (PdP)
 — High-speed Network / Réseau haute vitesse
 - - - Ultra-high-speed Network planned / Réseau super haute vitesse planifié
 ☉ Satellite CSA/CRC via Vancouver / Satellite ASG/CRC via Vancouver

Date: March 2015 / mars 2015



CANARIE SNAPSHOT

CANARIE's role in Canada's innovation ecosystem was set out in its 1993 Articles of Incorporation: to contribute to Canadian competitiveness in all sectors of the economy, to wealth and job creation and to the quality of life of Canadians.

This means that CANARIE works to ensure Canadians in academia, the private sector, and government have the digital infrastructure and tools they need to create, innovate, and contribute to a sustainable and robust Canadian economy.

For Canada's **academic community**, CANARIE:

- Provides interprovincial and international connectivity for **Canada's NREN**, facilitating data-intensive research collaboration for researchers at institutions across the country

- Enables fast, secure, and seamless access to data and services nationwide and around the globe via the **Canadian Access Federation**, a service offered by CANARIE that enables participants to benefit from eduroam and federated single sign-on
- Gives researchers a first-mover advantage by leading the development of reusable **Research Software** platforms and tools that ease access to big data resources and accelerate discovery
- Supports national initiatives to further Canada's capacity to share research data through its financial and operational support of **Research Data Canada**

For Canada's **private sector**, CANARIE:

- Empowers entrepreneurs to accelerate their product development with free cloud resources available through the **DAIR** program
- Supports the rapid commercialization of next-generation networking technologies through participation in the **Centre of Excellence for Next Generation Networks (CENG-N)**

For Canadian **government** stakeholders, CANARIE:

- Connects government research labs to the NREN
- Explores and pilots innovative models to enable access to commercial cloud services to support government research
- Provides context and guidance on issues in technology and on the evolving digital research infrastructure ecosystem

FAST CANARIE FACTS

- Traffic on CANARIE network has **increased by about 50% per year** over the last several years
- **381 research and education institutions connected** to Canada's NREN
- CANARIE and its 12 provincial and territorial network partners have developed and are implementing a **strategic plan** governing the evolution of Canada's NREN
- CANARIE's Research Software Portal has over **70 reusable research software platforms and tools** available for use by the global research community – find them here at <http://www.canarie.ca/software/canarie-research-software-portal/>
- CANARIE is supporting an average of **10 million eduroam logins** per month
- Over 700 small businesses are using DAIR's free cloud resources
- Research Data Canada facilitated the development of the **Research Data Management Statement of Principles** as a guide for universities in Canada evolving their research data management policies

CANARIE AND GÉANT

CANARIE is also the voice of Canada's NREN on the international stage, and works with the team at GÉANT to maximize opportunities for collaboration, share best practices, and work towards a coordinated approach to the evolution of global infrastructures supporting research and innovation.

CANARIE CULTURE

CANARIE is a small team of only 35 – but we are mighty! The team combines technical, administrative and marketing expertise, and all share a commitment to ensuring that Canadians have access to world-class digital infrastructure. While some of you may be familiar with members of our executive team, here's a snapshot of a couple of CANARIE team members that you may not know:



DAMIR POBRIC
SENIOR NETWORK ENGINEER

Originally from Bosnia and Herzegovina, Damir is one of CANARIE's longest-serving team members, and joined CANARIE after working at the NREN in Italy. Damir has been instrumental in the ongoing technical evolution of the CANARIE network. When he is not busy contemplating how to further enhance the resiliency of the CANARIE network, he enjoys long walks with his family in the beautiful countryside in and around Ottawa.



TRACY MURRAY
DIRECTOR, FINANCE

Tracy has been with CANARIE since 2011, and she and her team ensure that CANARIE's financial processes and systems enable efficient and transparent deployment of our funds. Tracy's obviously a whiz with numbers, and in her off hours lets off steam by exploring Ontario on her bike.



SCOTT HENWOOD
DIRECTOR, RESEARCH SOFTWARE

Scott joined CANARIE three years ago after a successful career in software development in the private sector. When he's not working with his team and academic software developers across the country, you'll find Scott with a camera slung around his neck and a backpack full of lenses, scouting out his next great shot.

WHAT'S NEXT FOR CANARIE?

EVOLVING THE ECOSYSTEM

CANARIE is funded by the Government of Canada and is in the midst of its current mandate, which runs from 2015 – 2020. While we are busy running programs and services, we are also involved in a Government of Canada consultation on the evolution of Canada's digital research infrastructure ecosystem. To maximize the opportunity for Canadians to accelerate discovery using advanced digital technologies, CANARIE is supporting a more coordinated, less fragmented, and holistic approach to the components in Canada's digital research ecosystem.

CANARIE NATIONAL SUMMIT - NAVIGATING OUR DATA-DRIVEN FUTURE NOVEMBER 22-23, MONTREAL

The National Summit is CANARIE's premier annual event, and draws senior leaders from academia, the private sector, and government. Our Summit is not a technical conference, but rather an opportunity for participants to get a preview of Canada's future digital economy by showcasing innovation in the public and private sectors. Our theme this year is Navigating our Data-Driven Future, and speakers include entrepreneurs using data to develop innovative new products, leading researchers who are accelerating discovery by leveraging open data, along with policy, privacy and security experts. If you are in the neighbourhood we'd love to welcome you! More information on the Summit may be found at <http://canariesummit.ca>

NEW NKN INTERNATIONAL NETWORK TO BOOST EU-INDIA COLLABORATION



As part of a new international network being deployed by the National Knowledge Network (NKN) – India's main NREN – a further 10Gbps of R&E connectivity is now operational between India and Europe. The new capacity is provided over two diverse cable systems from Mumbai to Amsterdam where it interconnects with

GÉANT via Netherlight. This is additional to the TEIN project's EU-India connection which was upgraded from 2.5 to 10Gbps earlier this year, with NKN co-financing the link as a TEIN project partner.

Funded by the Indian Government, NKN delivers a state-of-the-art backbone for R&E across India. It currently connects over 4 million users across 1500 institutions at gigabit speed, providing robust and reliable network connectivity, cloud-based services and applications support. Its new international network will also connect India to North America and other parts of Asia.

The new link to GÉANT has been welcomed in particular by the high-energy physics community, as it is set to further support participation of Indian scientists in the LHC and other experiments at CERN. Additional R&E collaborations between Europe and India expected to benefit from the capacity boost include environmental monitoring, telemedicine, genomics, remote instrumentations and e-learning.

For more information on NKN, visit <http://nkn.gov.in>

ASEM SUMMIT ENDORSES TEIN



Attending the 11th ASEM Summit held 15-16 July 2016 in Ulaanbaatar, Mongolia, Heads of States and Government from 52 Asian and European countries, the President of the European Council and the President of the European Commission recognised the achievements of the

EU-funded TEIN initiative in fostering collaboration between the two regions and endorsed its continuation under the management of the TEIN* Cooperation Center (TEIN*CC).

Under the overall theme of 20 Years of ASEM: Partnership for the Future through Connectivity, this year's Summit took stock of the challenges and opportunities of Asia-Europe connectivity in all its dimensions, including political, economic, digital, institutional, socio-cultural and people-to-people.



EXCERPT FROM THE ASEM11 CHAIR'S STATEMENT

Leaders also highlighted digital connectivity as a key element of increasing social and economic connectivity within and between the two regions, and expressed interest in examining ways of enhancing digital connectivity to fully realize its potential of driving growth, creating jobs and promoting innovation. In this context, they appreciated progress of the Trans-Eurasia Information Network (TEIN) over the last 16 years as well as the role of the TEIN Cooperation Centre in the ROK, reiterating their further support for the project's implementation.

GEO WELCOMES ASREN

The Arab States Research and Education Network (ASREN) has recently been accredited as Participating Partner to the Group on Earth Observations (GEO) – which includes Member Governments of 102 nations, the European Commission, and 103 Participating Organisations (international bodies with a commitment to advance Earth observations (EO)). GEO operates on a voluntary partnership basis to leverage and co-ordinate EO activities aimed at tackling major global environmental challenges. ASREN will contribute towards GEO's objectives by helping connect existing

North African EO centres to the North African R&E networks, thus providing the e-Infrastructure essential for EO data acquisition, processing and distribution. ASREN will engage with the EO research community to assess and meet its data-communications needs and liaise with governments and other stakeholders in the Arab region.

ASREN's primary objective is to assist the implementation of GEO's new African Global Earth Observation System of Systems (AfriGEOSS) which sets out to focus current GEO activities across Africa. AfriGEOSS aims to engage at governmental and scientific

levels and concentrate initially on strengthening EO for food security, agriculture and sustainable forest management. To support the implementation of AfriGEOSS, ASREN will work closely with GÉANT – which is already a GEO Partner – as well as with WACREN in Western and Central Africa and the UbuntuNet Alliance in Eastern and Southern Africa as part of their efforts to promote pan-African R&E networking through the AfricaConnect2 project, remote instrumentations and e-learning.

MAGIC GLOBAL SCIENCE COMMUNITIES IN ACTION



The research and education global family comprises many virtual communities. These have been described as a “group of people who communicate with each other via electronic media such as the Internet. They share common interests, and their geographical location, physical location, physical interaction or ethnic origin does not impose any constraints for the formation of the community”. Our engineers, our colleagues in NRENs, scientists and educators all collaborate within their respective virtual communities.

The MAGIC project (Middleware for collaborative Applications and Global virtual Communities), which aims to significantly improve the ability of researchers and academics around the world to collaborate, is promoting and supporting four very specific virtual communities of a global nature. These are e-Health, Biodiversity, Environment and Remote Instrumentation and each is moderated by a champion who is an expert in the field.

The overall goal for developing these Global Science Communities (GSCs) is to establish and support virtual common interest communities that enable practitioners, researchers, academics and students to interact with their peers and advisors and share experiences from across the globe. The communities collaborate and interact through the virtual platform Colaboratorio.

So far, since February 2016 when each thematic GSC held its virtual opening conference, a number of activities have been developed, including webinars dedicated to specific topics of interest identified by members, such as how to communicate scientific data and findings. All the material (speakers slides and videos) of the respective virtual activities are available for consultation:

<https://trello.com/c/jLuRs7zi/89-magic>

Global e-Health sessions

In September the e-Health GSC is hosting a Global e-Health series of “Grand Rounds” focusing on:

- eHealth (Health informatics, Telemedicine and Telehealth)
- Cardiology
- Child and Adolescent Health

These sessions have received 20 submissions from around the world and will provide the opportunity to share experiences and learn from experts and to explore areas of collaboration. To learn more about the Grand Rounds visit:

http://eventos.redclara.net/e/eHealth_Grand_Rounds

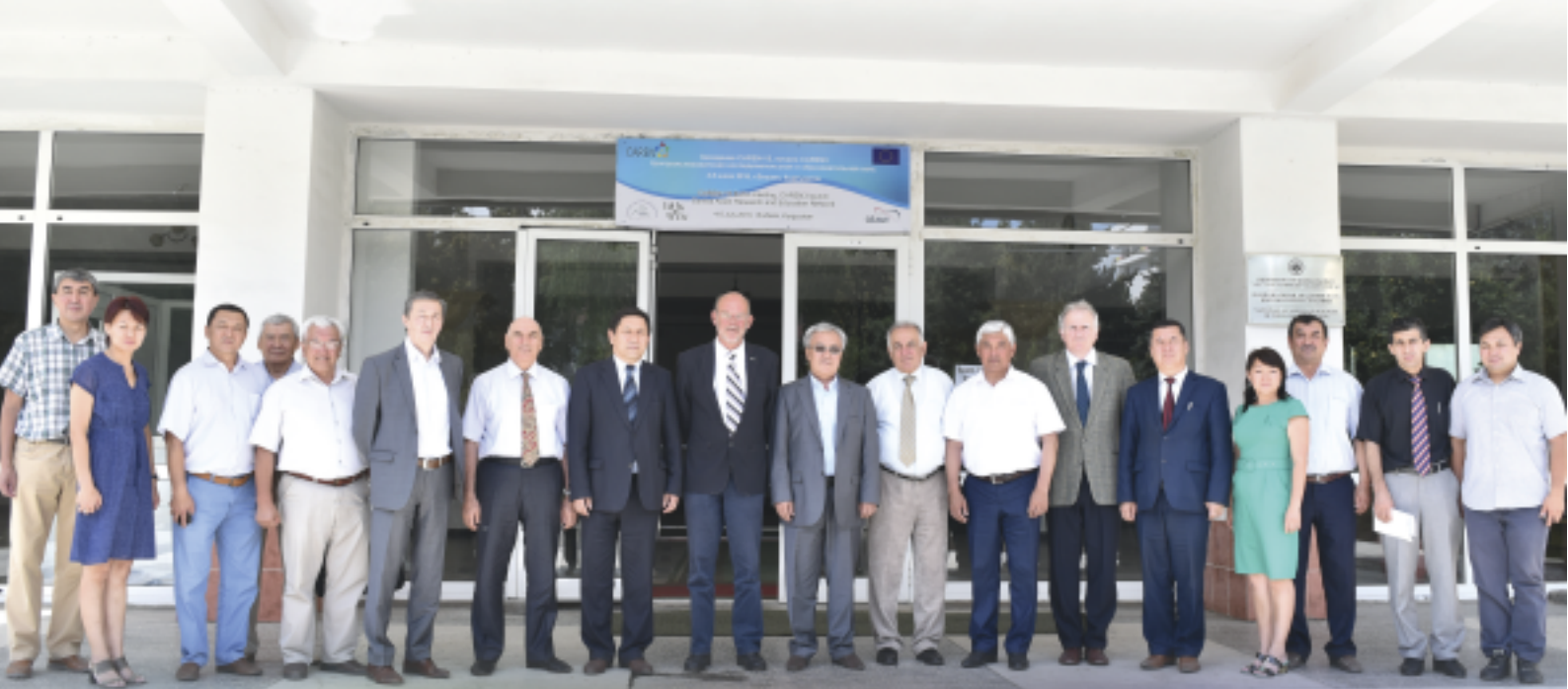
Also, look out for MAGIC at the UbuntuNet-Connect 2016 conference on 3-4 November 2016 where we will be joining forces with the TANDEM and Sci-GalA communities.

How to Join a GSC?

The door is still open to those interested in joining any of the four GSCs. If you have an account on Colaboratorio, then just go to the Communities list, click on the community you are interested in and join it. If you are not registered, please contact Tiwonge Banda, MAGIC Coordinator of the GSC:

tiwonge.banda@ubuntunet.net

Supporting GSCs is one of the six major activities of the MAGIC project, and is led by UbuntuNet Alliance, with participation from RedCLARA, CKLN, CAREN, WACREN, GÉANT, ASREN, CSIR (SANREN) and NIIF. MAGIC is a Horizon 2020 project supported by the European Commission.



R&E CONNECTIVITY PROJECT IN CENTRAL ASIA REBOOTED

Over 500,000 researchers, academics and students across Central Asia stand to benefit from the launch of the 3rd phase of the EU-funded Central Asia Research and Education Network (CAREN) project which resumes regional R&E connectivity after the previous project phase ended in August 2015.



The contract signing between the European Commission and GÉANT at the end of June was welcomed by the CAREN project partners gathered at the CAREN Executive Committee meeting which took place 4-5 July in Bishkek, Kyrgyzstan. Holding this first project meeting immediately after the signing reflects the urgent need to re-launch the CAREN project as soon as possible.

With 4.5M Euro initial EU co-funding (through its Development Co-operation budgets) the project will run up to 2019. CAREN3 will initially reconnect Kyrgyzstan and Tajikistan where the governments have signed bilateral financing agreements with the EC. Kazakhstan, Turkmenistan and Uzbekistan are also eligible to join the project subject to EC approval and similar government financing agreements.

Building on the previous two project phases, a new tender is already underway to re-establish a high-capacity regional network in Central Asia and to maintain and further develop advanced connectivity for R&E communities with counterparts in Europe and in other parts of the world. Existing and future collaborative projects span areas such as environmental monitoring, solar energy, telemedicine, the digitalisation of cultural heritage and e-learning which are to be re-started and further developed.

WE MET: ASKAR KUTANOV, REGIONAL CAREN COORDINATOR

Central Asia is unfamiliar to many in Europe, tell us a little about the region and how R&E networking started up

Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan are the five countries generally associated with Central Asia – a region protected by vast deserts and massive mountain ranges and, as the Eurasian heartland, a region of strategic geopolitical importance.

Traversing Central Asia, the ancient Silk Road served as the conduit not only for goods but also for the transmission of knowledge and ideas between east and west. Just as this trade route brought regions closer together, more than 2000 years later the 'Virtual Silk Highway' (aka Silk project) was launched to facilitate the exchange of information between academic institutions in Europe and Central Asia. Funded by the NATO Science Program between 2001 and 2009, the Silk project catalysed the development of NRENs in the 5 Central Asian countries and started to connect academic communities across the two regions via satellite. As a natural progression and to overcome capacity issues, the EU-funded Central Asia Research and Education Network (CAREN) replaced the Virtual Silk Highway in 2010, providing half a million scientists, university professors and students across the region with fibre optic connections to GÉANT and with a gateway for global collaboration.

How did you come to be the regional coordinator for CAREN and what does your job entail?

Being a physicist by training, I was privileged enough to be part of the global academic community and to collaborate with fellow scientists around the world. And I felt first-hand the need for good connectivity to make such collaborations work. I therefore had a vested interest in the creation of KRENA, the NREN in my home country Kyrgyzstan, and got actively involved in the Silk project. Subsequently, when the CAREN project came up I saw an opportunity to bring my understanding of the role of NRENs as a mechanism to foster science and education to the table and accepted the position of Regional Project Coordinator. I link GÉANT's project management with regional activities which entails facilitating cooperation between the Central Asian NRENs, developing

applications, organising regional conferences and interacting and seeking synergies with other regional networks. And most importantly, getting the word out that Central Asia has its place on the global R&E connectivity map and ensuring that CAREN is bridging the digital divide which our region is still suffering from.

There've been 2 phases of CAREN so far. What have been the key challenges and achievements?

Well, there's a big difference of how GÉANT builds its fiber optic network in Europe and how CAREN had to get going. In Central Asia the telecommunications sector is much weaker, there are strong national monopolies and an inadequate fibre optic capacity spread over a huge area. As a result, connection between neighbouring countries had to go via Europe or Asia. This had the disadvantage that data communication within Central Asia had to first travel to the Frankfurt hub, then back to the region, and sometimes even via Hong Kong!

The other challenge we faced was the financial instability of the NRENs and the lack of funding support from their governments which are being addressed in the new phase.

On the plus side, CAREN has successfully replaced satellite-based connectivity with high-speed fibre optics, has contributed towards strengthening regional cooperation and has facilitated collaborative research and education between Central Asia and Europe and other regions. We have seen IPv6, eduroam and other services being rolled out and we have successfully held our first CAREN regional network conference in 2014 in Almaty. I am glad to see that universities, research institutes, hospitals, libraries have come to realize the benefits of CAREN and the opportunities it offers for regional and international collaborations.

What are the main user applications CAREN has been supporting?

Central Asia's researchers have been enthusiastic about using CAREN's connectivity for collaborating internationally in areas of direct relevance to the region, such as seismology and environmental studies. Central Asia is under constant threat



from earthquakes, mitigating their effects requires a joint effort among scientists in the region and other parts of the world, notably between CAIAG in Kyrgyzstan, IGEES in Tajikistan and GFZ in Germany. I would also like to emphasize the importance of keeping a watchful eye on our melting glaciers. The Tien-Shan glacier range, which plays a vital role in the region's water supply, has lost over a quarter of its mass in the last 50 years, and nearly a fifth of its area. Monitoring climate change is therefore becoming an increasingly important element in the socio-economic decision-making process. Gathering that information requires international scientific collaboration and reliable connectivity.

Also, thanks to CAREN, our doctors are now able to participate remotely in telemedicine sessions at APAN and TEMDEC conferences whilst participation in e-culture performances fosters intercultural dialogue and understanding and opens up our rich culture to the outside world.

Now that CAREN3 is launched what are the key things you would like to accomplish?

I am thrilled that the new phase gives us assured funding from the EU up to 2019 to re-establish and benefit from high speed R&E networking. The first countries to benefit will be Kyrgyzstan and Tajikistan, but the clear objective is to extend CAREN3 as widely as possible across Central Asia. We aim for the new network to enable users to exchange data directly between neighbouring Central Asian countries as well as with Europe and provide further network services for the NRENs and their users. I want to increase regional cooperation between the academic communities of Central Asian, Europe and Asia and help the NRENs show their governments that CAREN is worth supporting now and in the years to come.



E-AGE 2016: UBIQUITY AND COHESIVENESS OF E-INFRASTRUCTURES



The e-AGE platform has established itself as an important venue for networking among experts and scientists from all over the world. In e-AGE 2016, and in addition to our main focus on connectivity, we will pay more attention to users, applications, services and inclusion of stakeholders in research and education and related services to enable and to facilitate collaboration to encourage resources and knowledge sharing. We will facilitate discussion and more sessions, panels, meetings and workshops to present and exchange research and education experience and

innovations. Access to resources, services and applications will be another area of focus during the conference. In short words, e-AGE 2016 is coming with "Ubiquity and Cohesiveness of e-Infrastructures" as the main theme of the conference and all activities will be centered on it.

Following on from the success of e-AGE in 2011, 2012, 2013, 2014 and 2015, e-AGE 2016 will be held at the American University of Beirut (AUB), during 1-2 December, 2016.

e-AGE 2016 will include events, workshops and meetings centered around the following themes:

- The 9th Event on Euro-Mediterranean e-Infrastructure
- The 6th annual meeting of ASREN
- AROQA 8th Annual Conference
- OSSCOM 2nd Annual Conference, OSSCOM 2016

- EUMEDCONNECT3 and Africaconnect2 Project Meetings
- Technical workshops on R&E networking including AAI, Clouds, Global Applications, etc.

Moreover, special sessions will be dedicated to specific domains, mainly focusing on experiences in connectivity and e-Infrastructure, applications and services across a variety of scientific domains. It is also important to show how research infrastructure creates tangible benefits to communities and collaborations. It is still critical to demonstrate how research connectivity can promote collaboration and innovation. Different discussions will be stimulated during e-AGE to drive outcomes and concrete results on practical steps towards developing a regional e-Infrastructure.

UBUNTUNET-CONNECT 2016: OPTIMISING THE IMPACT OF NRENS ON AFRICA'S RESEARCH

UbuntuNet-Connect is the Annual Conference of UbuntuNet Alliance that focuses on research and education networking activities in Africa. It is organised by UbuntuNet Alliance and hosted by member NRENs. The Conference brings together practitioners in the research and education networking community, researchers, policy makers, academicians, connectivity providers, and a pool of expertise from across Africa and beyond. In previous years,

the conference has attracted sponsorship from leading commercial companies and service providers.

UbuntuNet-Connect 2016 will be held at Golf View Hotel in Entebbe, Uganda on 3-4 November 2016 and will be preceded by a series of other pre-conference events from 31 October to 2 November. The events will be hosted by the Research and Education Network for Uganda (RENU), the NREN of Uganda.

The annual networking conference and pre-conference events provide opportunities for people with special and common interests to share their experiences, ideas and plans in the light of research and education networking and applications.

For further information and sponsorship opportunities, contact uc2016@ubuntunet.net.



UBUNTUNET ALLIANCE PARTNER WITH SEACOM TO BUILD NEW LINK IN EASTERN AND SOUTHERN AFRICA

UbuntuNet Alliance has awarded a 15-year contract to pan-African telecom enabler SEACOM to provide point to point connectivity services to National Research and Education Networks (NRENs) of Eastern and Southern Africa through the European Union co-funded AfricaConnect2 project.

This contract kicks off the procurement of connectivity services in Eastern and Southern Africa – the first of three regions in Africa taking part in the €26.6 million project that seeks to create a first of a kind high speed pan-African research and education network.

SEACOM will provide capacity between Kampala (Uganda) and Dar es Salaam (Tanzania), and from Dar es Salaam to Amsterdam (Netherlands) where the UbuntuNet network peers with the European Research and Education Network, GÉANT.

The link between Kampala and Dar es Salaam will complete a ring between the NRENs of Uganda, Tanzania and Kenya and will provide a resilient network for research collaboration in the sub-region. The Dar es Salaam to Amsterdam link provides a diverse path between East Africa and Amsterdam.

This will ensure that more research and education institutions in Eastern and Southern Africa benefit from seamless connectivity to each other and to the Internet, thus enabling faster access to information, knowledge sharing, collaboration on projects and application of best practice with researchers from across the globe.

AfricaConnect2 builds on the success of the AfricaConnect project which rolled out the UbuntuNet regional network for research and education in Eastern and Southern Africa between 2011 and 2015.

EAPEC 2016: LEARN FROM WORLD-CHANGING THINKERS AND INNOVATORS IN OPEN SCIENCE AND E-INFRASTRUCTURES



The 1st Eastern Partnership E-Infrastructure Conference (EaPEC 2016) aims to serve as a platform for collaboration on policy and research and supports community building in e-Infrastructures between the Eastern Partnership region and the EU member states.

Held in Tbilisi, Georgia on 6-7 October this two-day conference will focus on e-Infrastructures for Open Science in Europe. Speakers will lead interactive discussions about Open Science and foster the exchange of ideas in research areas such as physics and seismology, biomedical sciences, robotics, data analytics, climate and ecology.

In the keynote, the Human Brain Project will present participants with cutting-edge, ICT-based scientific Research Infrastructure for brain research, cognitive neuroscience and brain-inspired computing. The Human Brain Project (HBP) is a European Commission Future and Emerging Technologies Flagship.

Enlighten Your Research (EYR), the internationally renowned programme to encourage collaboration between researchers using specialised IT and network services, will have its award ceremony for its regional EYR @ EaP programme.

EaPEC 2016 is organised by the EU-funded project EaPConnect and 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.

The conference will be hosted by GRENA, the Georgian network for research and education and beneficiary partner of the EaPConnect project, in cooperation with the University of Georgia.

For more information, see www.eapec.eu

EaPEC 2016

TBILISI, GEORGIA
6-7 OCTOBER 2016

**1ST EASTERN PARTNERSHIP
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PROJECT PARTNERS



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MORE INFORMATION

For more information, please send us an email at eap_info@geant.org

Read more about Enlighten Your Research at: www.eapconnect.eu/research

Visit www.eapconnect.eu

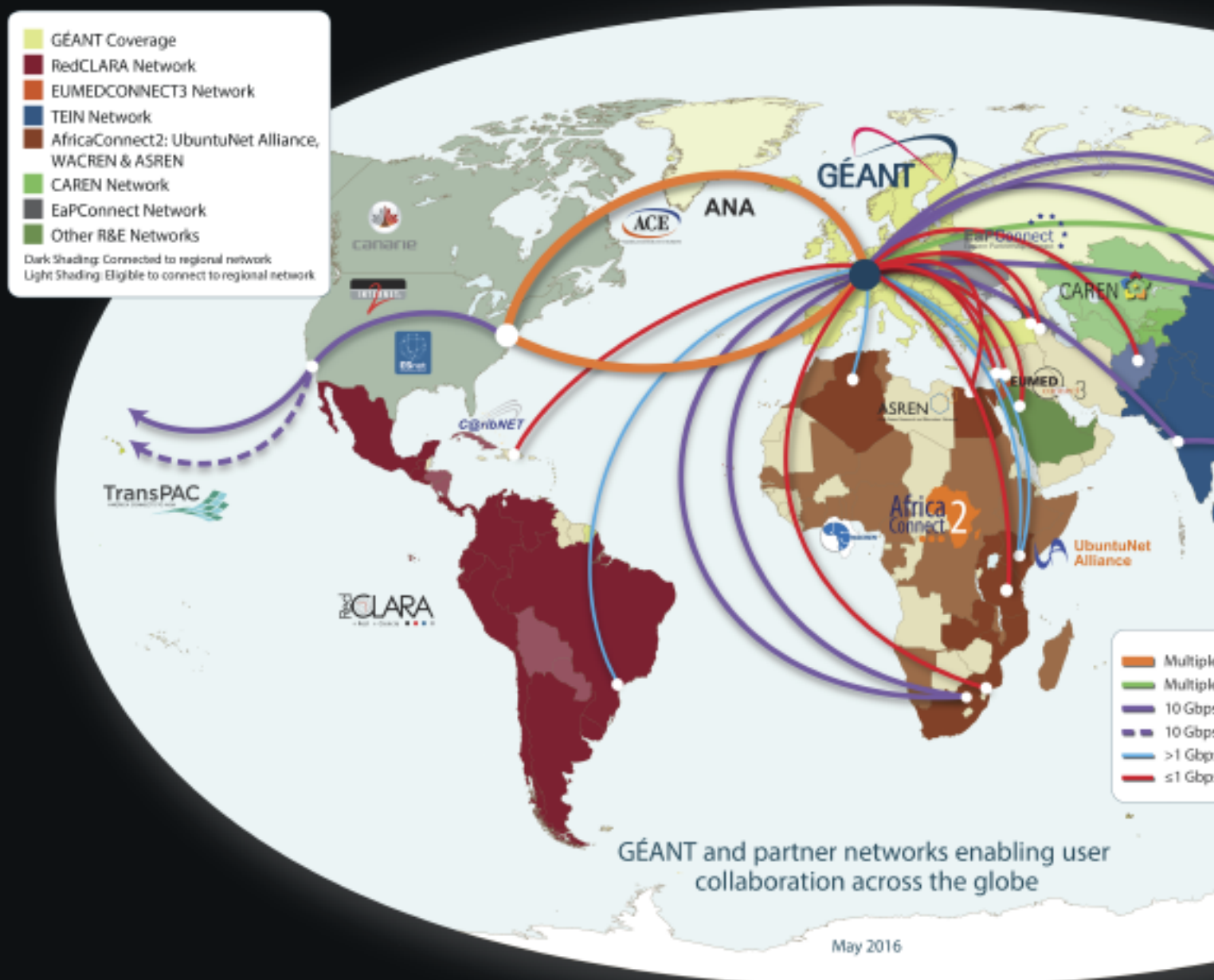
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GÉANT AT A GLANCE

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.



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.

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.

PEOPLE

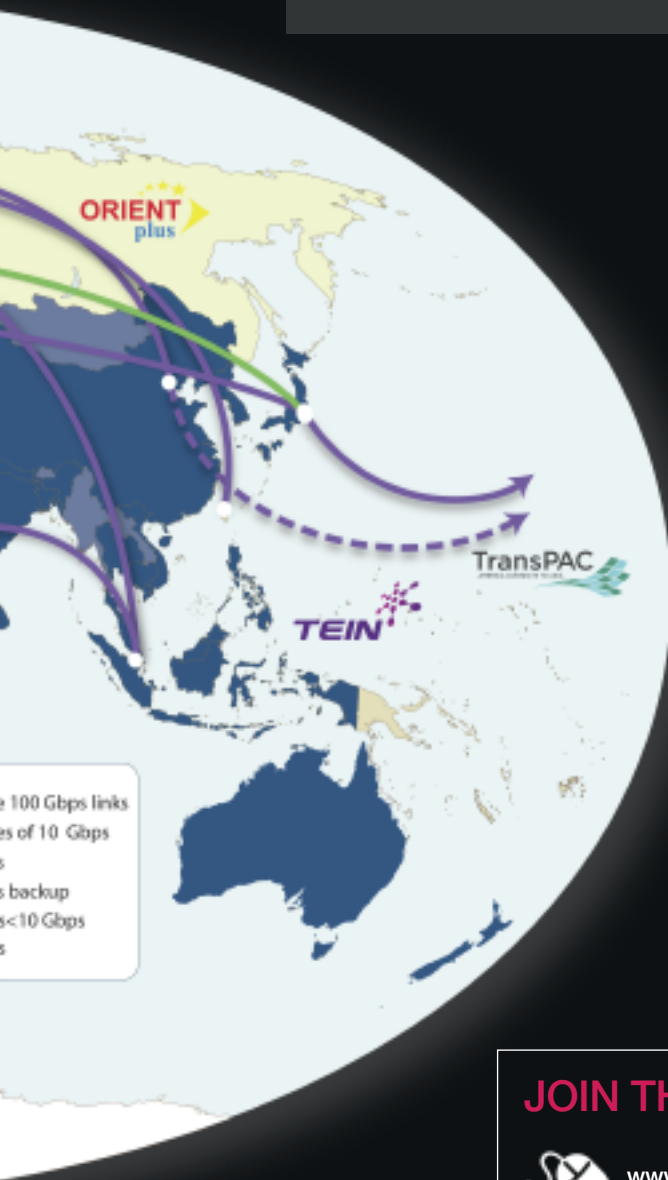
GÉANT collaborates with its members, partners and their research, education and innovation communities to drive research and discovery, keeping Europe at the heart of global research and education networking.

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.

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.



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