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CONNECT

THE MAGAZINE FROM THE GÉANT COMMUNITY

WOMEN IN STEM

CONVERSATIONS THAT MATTER

ALSO IN THIS ISSUE

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NRENS ARE MAKING THE CASE: RE-THINKING THE WORKS AND VALUES OF R&E NETWORKS

WOMEN IN STEM

CONVERSATIONS THAT MATTER

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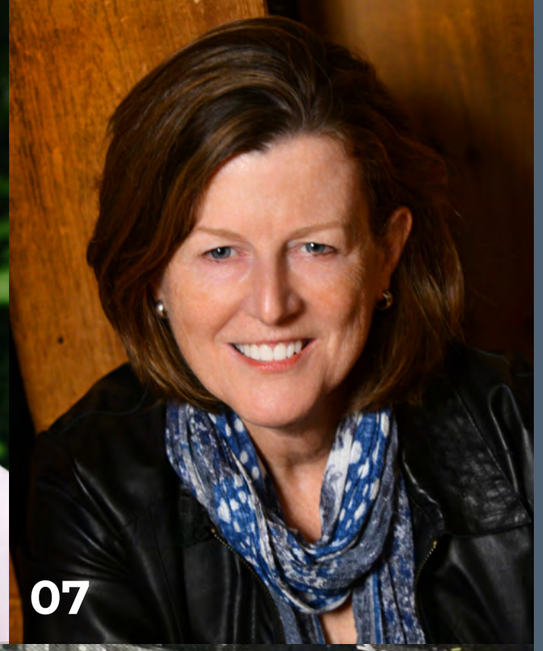

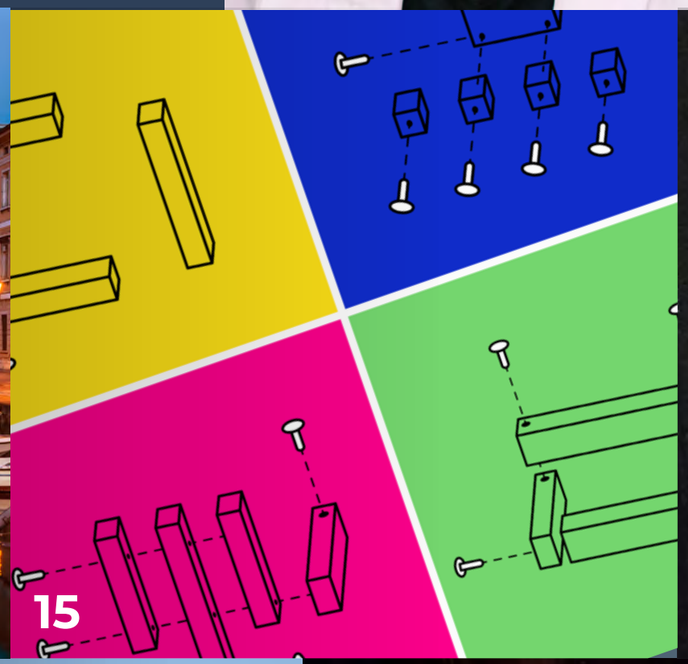

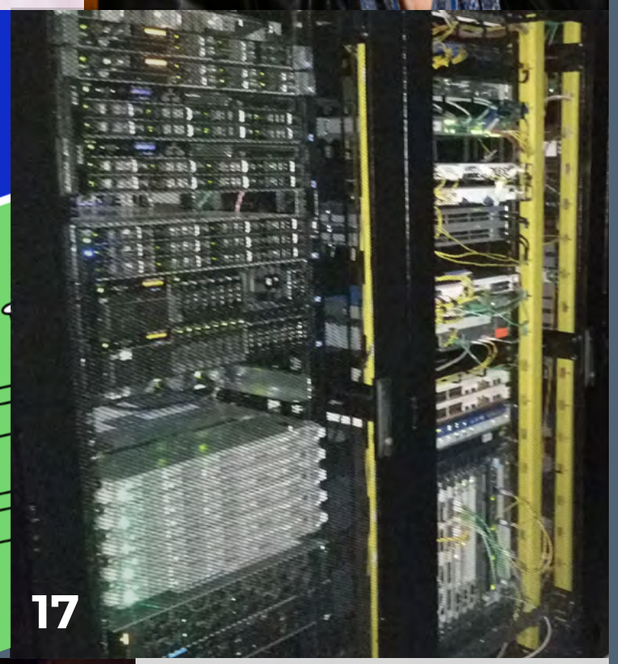

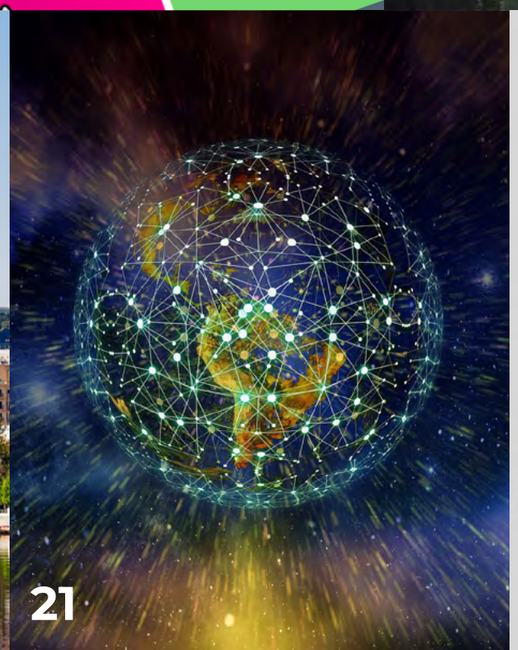

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Welcome from Cathrin Stöver

Our community proudly champions equality, diversity, and inclusivity and so it is with great pleasure I continue to follow this month's GÉANT Women in STEM campaign. The one-minute video and testimonials from women and men across our global community illustrate so well the ongoing commitment to increasing diversity and to bringing women and their voices to the table to be heard and seen and to influence community decision making. CONNECT 39 picks up on the campaign by adding four more important voices from our community: Simona Venuti, Dorte Olesen, Ann Doyle, and Carol Namuddu – it is a treat reading about their experiences.

The next big step for our community will be TNC22 live in Trieste, Italy, in June 2022 and this issue gives you some background information. Registration is of course still open, and you should also take the opportunity to vote for your favourite candidate for the GÉANT Community Award. I very much hope to see you again in Trieste. It's been too long since our community has come together to listen to each other, to learn, and also to celebrate. Let's do this in June!

It frightens me that once again there is military aggression and war in Europe. GÉANT is of course not a political organisation and therefore this issue of CONNECT makes no further reference to the terrible situation. As a community, we faced the challenge of the pandemic by coming closer together and making even better use of technology. The situation that faces us now will test our community again and we will need conversation and compassion to ensure that as a community we respond appropriately and consistently. With this, I send the hopes and best wishes of GÉANT to our Ukrainian partner, URAN. Our thoughts are with you.

Cathrin Stöver, GÉANT

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

The Team Behind CONNECT

Reflecting the breadth of our community, the articles you read in CONNECT are contributed by a wide range of people from the GÉANT Association, the GN4-3 project, and from our NREN and regional partners. The planning, production and editing is performed by a small team highlighted below.

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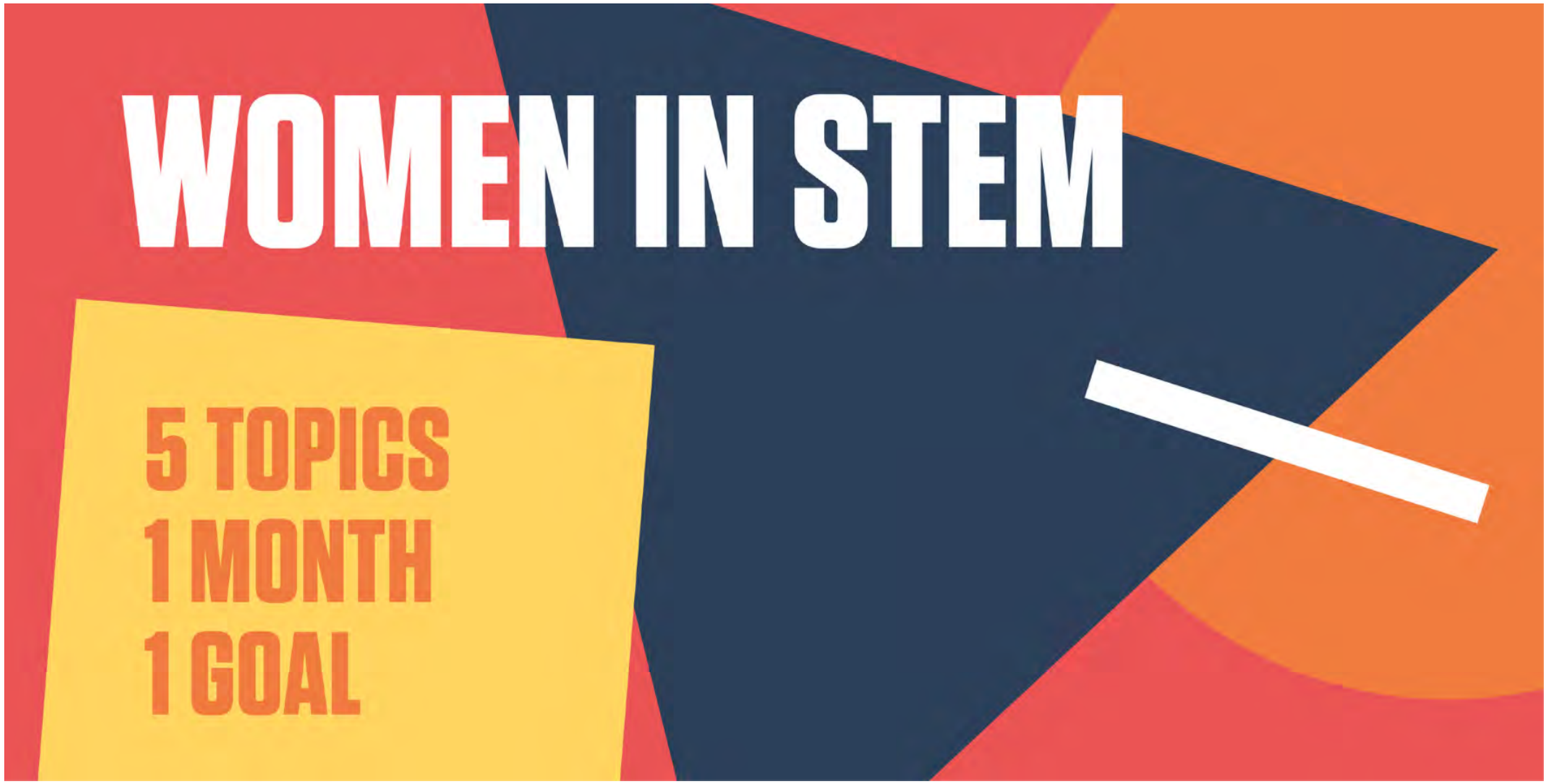


Conversations that matter

Women in STEM and male advocates from the GÉANT Community gather for a new campaign in celebration of Women's History Month

The month of March has been internationally recognised as "Women's History Month", an opportunity to celebrate the achievements and successes of women throughout history, to reflect on the progresses made in the fight for gender equality and to commit to better results. For this occasion, on 1 March we launched a campaign which brings together outstanding female and male representatives from the international GÉANT community to celebrate the contributions of women to Science, Technology, Engineering and Mathematics (STEM) and to empower future generations to increase female representation.

Words: Silvia Fiore, GÉANT

Over the past few years, the number of women entering the fields of STEM has increased as a result of significantly better opportunities in education and in the job market. However, we still have a long way to go in addressing what is still an alarming gender disparity, especially in the male-dominated STEM fields. Too many women are held back from pursuing STEM careers by prejudices, social norms and expectations. With computer science and engineering being considered the fastest-growing jobs of the future, it is important – now more than ever – to promote the empowerment of girls and women to be leaders in STEM.

With this campaign, we would like to stress an important point about why the STEM fields need more male allies to advocate for greater gender equality. Without men joining the conversation, the under-representation of women in STEM becomes and is destined to remain simply a "women's issue", discussed by women for a strictly female-only audience. Since men still dominate STEM fields in number, they need to be made an integral part of the push for more supportive work environments.

The Women in STEM campaign includes five video episodes which are released throughout the month of March 2022:

1 March
Why diversity matters

8 March
Female role models and mentors

15 March
Overcoming challenges with resilience

22 March
The power of women's networks

29 March
Words for future generations

Want to take part?

The Women in STEM campaign features on our social media with the hashtag **#WomenInStem**.

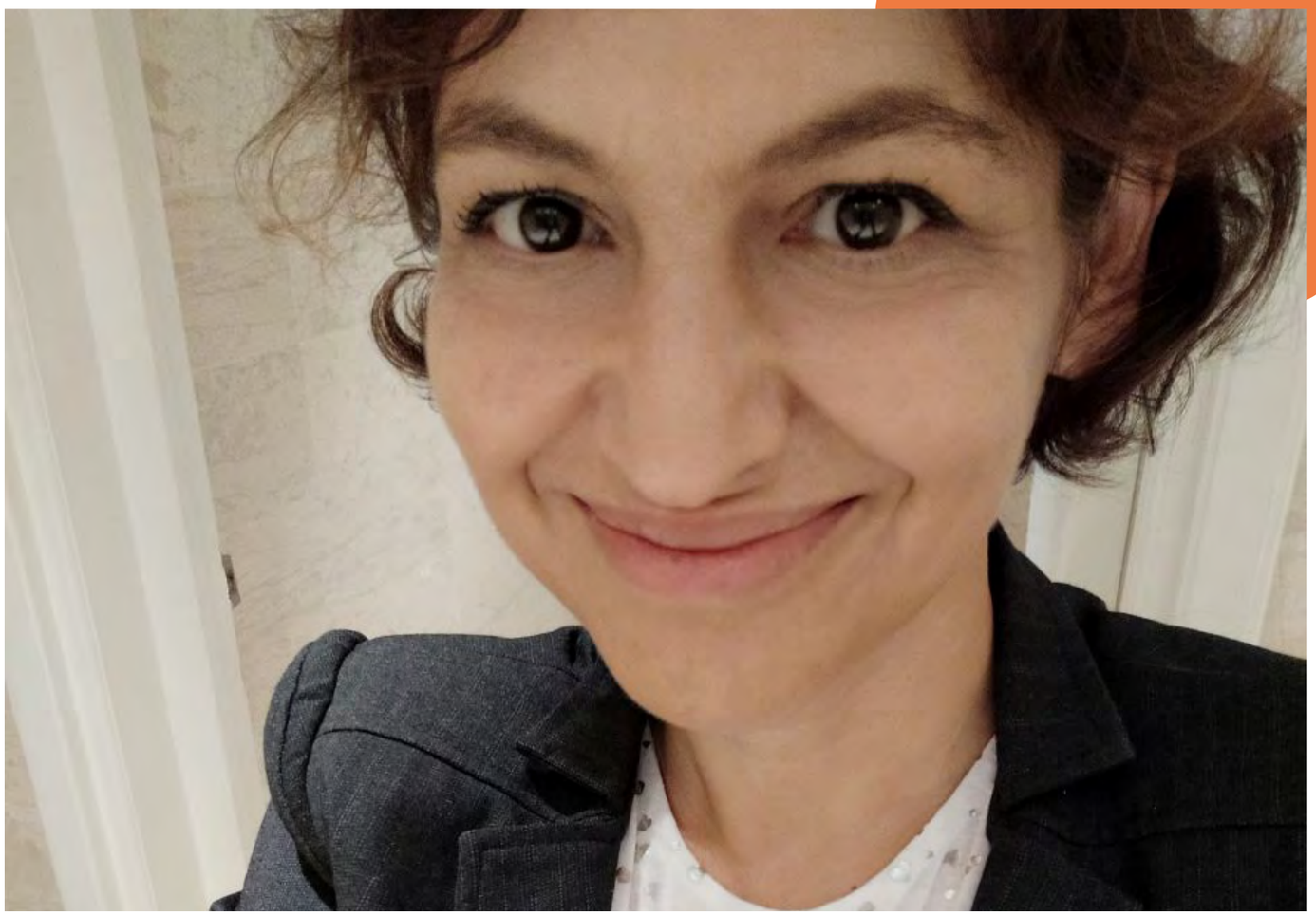
Blog posts and marketing resources can be found on the dedicated webpage **https://connect.geant.org/geant-women-in-stem**

2022 Women in STEM campaign

Be curious and don't fear technology!

Simona Venuti, Security Manager for GARR, the Italian National Research and Education Network, talks to CONNECT how stimulating curiosity and encouraging familiarity with technology from an early age can help to close the gender gap in STEM.

Interview by: Rosanna Norman, GÉANT



Simona, what influenced your study and career choices? Were you inspired by any Italian or international female role models in Computer Science or any other areas of STEM?

Curiosity influenced most of my choices!

Since childhood I have always been curious about what was inside things and how objects work. After "scuole medie" (secondary school in Italy), my parents would have liked me to opt for a more traditional field such as accounting. (But accounting was not my destiny.) By the age of 14 I was already able to program a Commodore64 and build electronic circuits, so I opted for "Liceo Scientifico" (science oriented senior secondary school). Later when deciding about my higher education path I chose Physics because I felt that this subject would have better satisfied my innate curiosity.

At university I discovered computers – mainly servers and a very big VAX9000 (yes, I'm that old) - and the internet. I fell in love with this 'magic world' and although I was not 'technically' allowed to use the faculty computers, one day, 'by chance', I came across a user password for network access, and … used it. I would have been in real trouble if caught.

During my university days, I also discovered information security after a friend from the USA managed to format remotely the PC I was working on (!). I was so fascinated by this field that I ended up learning more during my spare time until it became my passion and my beloved, fabulous job at GARR-CERT.

When I started studying information security, I didn't have a specific role model, although I did admire the determination, charm, and style of the great Italian scientist Rita Levi Montalcini.

Can you talk to us about a particular project you are currently working on?

I'm currently working on a project with Politecnico di Milano studying the traffic of DarkNets whose aim is to intercept more easily GARR infected/compromised IP and have a cleaner network as a result. I enjoy finding new and more efficient ways of doing things, I love working with people and participating in working groups, team building and brainstorming activities.

Would you share your experience where gender diversity in a team has helped to achieve better results?

In information security the more you are able to see things from a different perspective, the more you are likely to find inspiring and useful ideas.

A few years ago, I happened to be the only woman in a working group and remember struggling to connect with a very quiet and reserved team member. Guided by my maternal experience and instinct I realised that he was just very shy and insecure, so after I created a more comfortable working environment and tried to give a little boost to his self-esteem, he started to join in and contribute to the discussions with great and original ideas. With hindsight probably also a good father could have achieved the same results, but on this occasion my intervention made a difference to the group dynamic confirming how precious every element of diversity can be in such circumstances.

Have you experienced gender discrimination in your field? Do you think that the Italian society can do more to encourage young girls to learn about STEM?

Luckily, I haven't experienced any gender discrimination in my career to date. When I started, women in information security were such a rare find that I received so much support, experienced 'positive' gender discrimination and found myself in a very inclusive environment.

To bring more girls into STEM disciplines, I would start by stimulating their curiosity "to go inside things", which is something that can be learned from a very young age. For example, my daughter has owned a tablet since she was 1. Of course, I have always supervised her, even now (especially now) that she's 9. She grew without fear of technology and with the curiosity of "what if I do this or install that?" At the age of 5 she created multiple accounts on Roblox (an online game) to give herself more diamonds, a sort of an intelligent hack. By seeing what other people did in that virtual environment pushed her to create her own world, and she started to learn how to program new realities and new games all by herself. I don't know if she will study and work in STEM and do not intend to force her to follow my path, but I believe that a very important step was to make her comfortable with electronic devices and enable her to learn how to use them.

What advice would you give to other girls who aspire to work in your field?

Information security is a very fascinating field and its vast range of applications can take young girls in so many different directions. They will be learning constantly as every single future human invention will have a completely new information security impact. A keyword for me is "to study" as in this field one cannot stop studying or being curious not even for a day. So, my best advice is: follow your talent, study and be curious!

Consortium GARR

2022 Women in STEM campaign

Providing adequate bandwidth capacity to students and learners in Uganda: interview with Carol Namuddu

The COVID-19 pandemic made it clearer than ever that reliable and affordable internet connectivity is essential for research and education communities all over the world. Silvia Fiore recently spoke with Carol Namuddu, a proud woman in STEM and NOC Engineer at RENU (the Research and Education Network of Uganda) about her passion for science and technology, and her most recent project involving unlimited bandwidth capacity.

Interview by: Silvia Fiore, GÉANT

Carol, when you were younger, how did you first become passionate and involved in the fields of science, technology, engineering, and mathematics (STEM)?

I grew up in a family of engineers. The majority of my relatives work in various engineering fields. Growing up with my grandfather, who worked at the Uganda Electricity Board at the time, he always had all these wires, electric meters, and a walkie-talkie, which piqued my interest as a child and sparked my interest in STEM and, when the time of choosing a career path came, engineering more specifically.

Was there any female role model or mentor from the African National Research and Education Networks or wider research and education community who inspired your career in STEM?

TERNET's former CEO, Dr. Margareth Mushi, has been my biggest role model. Her ability to be an excellent NREN CEO while also being a wife and mother is an inspiration to me. It just goes to show that women can have it all.

You have an impressive list of accomplishments. Can you tell us about your involvement in the Ugandan community advocating for better female representation in tech?

Prior to the outbreak of the the COVID-19 pandemic, I used to volunteer for AfChix, an organisation dedicated to educating young girls in rural secondary schools about technology trends, and the roles and job opportunities available, as well as encouraging them to pursue a future in technology. The goal is to inspire one girl and then, as a result of that, create a domino effect. Other young women in STEM would lead outreach activities in rural areas spreading the word that technology is indeed a doable career path for women too! This is incredibly important for women living in rural areas in Uganda, where the lack of female role models in STEM is prominent.

More recently, you have been part of a team working on the use of the Google ISP portal to measure the impact of unlimited bandwidth utilisation. Can you briefly explain why your research is relevant to Ugandan students and learners, especially during the COVID-19 pandemic?

This study primarily focused on how the majority of traffic from research and education is Google-based, with the goal of highlighting the performance of Google traffic and the internet as a whole. It shed light on the need for adequate bandwidth for proper Internet usage, as well as how the work of most researchers and academics can be limited due to insufficient internet bandwidth, as internet bandwidth is still not yet affordable in most African countries, let alone institutions. Schools and higher education institutions in Uganda are facing very long lockdowns and have been closed for almost two years now, so students and researchers have to connect off-campus. The need for a reliable and affordable internet connectivity is now more relevant than ever.

Where do you see your research in a post-COVID-19 world? How does unlimited bandwidth utilisation help narrow down the digital divide gap in the wider African R&E community?

I see this research being used as a benchmark in other African countries to understand the challenges and limitations of NRENs but also as a basis to further subsidise bandwidth prices to foster affordability and hence enable research and education.

Thank you for introducing us to your precious work, Carol. You are a NOC Engineer, a role that is more commonly taken by men. How have you experienced gender discrimination in your field? Do you think African NRENs can do more to encourage young girls to join their teams?

RENU provides equal opportunities for all its employees. Unfortunately, I have many industry colleagues who have shared their experiences with me, such as scenarios in which they are given easier projects than their male counterparts. These projects end up being uninteresting and can even deter career development and advancement.

What advice would you give to other girls and women who aspire to work in NOC engineering?

Everything is conceivable! If someone was not born with a talent for STEM, just know that it is possible to learn anything and excel at it! Asking for help does not make you appear weak, and learning is a continuous process that occurs on a daily basis.

Picture
Typical maintenance day at RENU

To read more about RENU and their activities in the Ugandan R&E Communities, visit **https://renu.ac.ug/**

2022 Women in STEM campaign

CONNECT Interview: Dorte Olesen

Dorte Olesen is a mathematician with passions for advancing science and for empowering women – and the two have gone hand in hand through her career and her voluntary work for Zonta International, a global NGO working for equal rights and opportunities for women. She feels strongly about ensuring good education for girls all over the world and finds it crucial that girls are not scared away from entering studies in STEM. In her professional life she has held top leadership positions at universities and been Director General of the Danish Agency for Information Technology for Education and Research from 1989-2011. She has also been very engaged in the European NREN community as president of TERENA from 2003-2009 and later Chair of the NRENPC and member of the Board of Directors of GÉANT. She is right now working at the Technical University of Denmark in the Department of Mathematics and Computer Science and is the President of the Danish Society for the Dissemination of Natural Science and an International Director at Zonta International.

Interview by: Silvia Fiore, GÉANT

2022 Women in STEM campaign

Dorte, in 1988 you became the first Danish woman ever to be appointed as a full professor of mathematics and you also played a leading role in the development of Research and Education Networks in Denmark and more widely in Europe. What inspired you to give your contribution and make your own name in the internet world as a woman in STEM?

My interest in mathematics started at an early age, and for many years I found it really strange that when I visited some of my classmates at home, their parents asked funny questions like, "Isn't mathematics difficult for a girl?". At first, I was just surprised and said "no", but eventually it dawned on me that I was given a signal that girls were not supposed to be as good at maths as boys, and in fact it was not very feminine to be good at maths.

However, at that point in time I became stubborn, since I was clearly better at maths than most of the boys, and so I ended up choosing the maths and physics specialisation in the last three years of high school, even though we were only a few girls doing that at the time, and it was clear that it did scare off some of the boys from asking me out to dance.

In high school I did really well in maths and physics and found the subjects very rewarding to work with, so I ended up studying maths and physics at university as well. The internet came a lot later, I only got involved in that because I was elected to leadership positions at university and at some point this led to my becoming the Director General of the Danish IT-centre for education and research, which at that time had just started focusing on High Performance Computing and High Speed Networking.

You acted as president of TERENA (2003-2009), were the head of the Danish NREN from 1989 - 2011, and also served on the Board of Directors of GÉANT during the merger of DANTE and TERENA (2014-2017). Can you share with us an achievement or a moment in your career that you hold dear to your heart and that symbolises your passion for advocating the use of the internet for research and education?

When Danish university professors in the early 1990s discovered the ease and speed with which they could collaborate with foreign colleagues over the internet, they came to us at UNI-C and asked if they could also get connectivity at home – they were used to working at home in the evening and now this new tool could help them there as well.

However, the Danish universities were not willing to pay for this, so we had to tell them that even though we could technically establish an at home internet service over their normal phone line, to a small personal computer, it would not be free of charge, in fact it would be rather expensive at that point in time. This was of course before there were private companies offering such a service to an ordinary PC user.

Still, so many wanted this service that we ventured to launch it – without subsidies from the universities or the government – but I knew that if we failed to get enough subscribers, we would have a financial loss and I could most probably wave goodbye to my job as Director General, so it was really a crucial moment. And we would not have dared do this if we had not also received permission to sell this service to a broader public. Well, the short version of the story is that it was a roaring success, and UNI-C thus became the first Internet Service provider to PC users in Denmark, and we managed to have this business for seven years before the 'teleliberalisation' came to Denmark and new Telcos moved in – they then all offered to buy our ISP business, and we ended up selling it to Tele2 which for 10 years ran it as a daughter company, UNI2.

In all your years of experience in the Community, what have you seen changing and improving in terms of greater female representation in the male-dominated STEM fields?

One of the important steps has been for many universities all over the world trying to actively encourage female applicants, both for the studies and the research positions in STEM. But it has been a very slow process, since many girls have already early in life accepted the myth that they were not really good at STEM subjects or have given in to the fact that their surroundings did not see them as feminine enough if they were interested in these subjects.

For quite some time now, universities in Denmark have been keen to encourage girls to study in the STEM field. Apart from general communication about this, there are "Girls in Science", or "Girls in Information Technology" camps being arranged by several universities, where female high school students can come and spend a week, getting through a special programme. This is typically placed in a winter holiday week. Already many years ago, the physicists at the Niels Bohr Institute in Copenhagen started a "Women in Physics" campaign which has actually really encouraged quite a number of young women to study physics.

But these things take time, and if you want to enter a research career, there is a demand for spending a couple of years with a research group in another country – this can really be difficult for many young women since this is at a point in time when they would normally be starting a family, and having your husband move with you is still also more difficult than it is for most young men to have their wife go with them. If we want many young women to become researchers, we need a more flexible approach to the career paths than what we see today, at least here in Denmark.

On occasion of the Women's History Month, we have gathered together outstanding female leaders in STEM and male advocates from the GÉANT community in a series of video episodes to celebrate what gender diversity in the workplace can achieve but also to reflect on what we can do better. A bold mission with a potential impact that goes into the wider community and that, we hope, can influence sustainable changes. Can you tell us in a nutshell why you think gender diversity matters and what we, as organisations that aim to inspire change, can do to really build gender diverse teams?

If all the researchers and leaders in STEM were male, you would statistically simply only have half the talent mass available. To rule women out of these areas is to deprive the areas of half the talents. That is obviously a really bad strategy from the point of view of these sciences, and of course it is also bad with barriers for the women who are keen to go into these fields. So, it is really a lose-lose situation if you do not encourage gender diversity.

There is no reason to think that women are less capable than men in these areas – but as illustrated by my own childhood stories, that was the "myth" that seemingly both men and women had accepted and were propagating for quite some time, and that of course has affected a lot of girls during their upbringing, so they have felt less secure about their own capabilities.

So, I think a basic step is to make it clear to everyone that being good at Science, Technology, Engineering and Maths has nothing to do with gender. This is not a simple process, since such myths have existed for a long time, and are being presented to girls at a very young age.

But a good place to start for the NRENs and GÉANT is to make the great role models that are already working in the community very visible – exactly like you are doing right now with the Women in STEM campaign – so keep looking for opportunities to put a focus on the existing role models.

Before we go, looking back at your younger self just starting a career in STEM, what would you say to her? Is it the same advice you would give to a woman in STEM today?

Actually, if I had known how many obstacles there would be in the early stages of my career – when the basic view in Denmark at the completely male dominated Maths Departments still was that as a married woman I did not really need a job, so I really ought not apply for a permanent position if there were male applicants who had a family to support – I think I might be advising my younger self to choose a different career path, most probably as a medical doctor, since that was also an occupation that I seriously considered.

Fortunately, this situation has changed completely – so today my advice is to push on and just smile if you happen to run into some old timers who still think that women are not as capable as men in the STEM subjects. They do exist, but fortunately they now seem to be a clear minority.

2022 Women in STEM campaign

CONNECT Interview:

Ann Doyle, Community Engagement Manager, Internet2

Ann Doyle is the Community Engagement Manager for Internet2, where she liaises with over 100 institutions to assess their needs and inform Internet2's mission and goals. She founded and continues to lead cultural initiatives working with US and international partners in the arts and humanities, such as the very successful Network Performing Arts Production Workshops. Ann is a pioneer of our R&E community and her professional career has played a crucial role throughout the years in the development and fostering of global partnerships aimed at improving our services and helping the community grow.

Interview by: Silvia Fiore, GÉANT

Ann, you have been with Internet2 for over 20 years now and even longer in the education field. You have gained invaluable experience in funding, leading, and promoting cultural initiatives not only across the USA but also globally. You are a pioneer of our community and also a woman in the internet world, which is still a boys' club. Can you tell us more about your experience building and promoting Internet2's programs on advanced networks as a woman?

Thank you, Silvia, for taking interest and highlighting women leaders in Information Technology, especially with the goal of promoting future leaders. I have reflected, since you reached out to me, on being a woman in IT. And I want to share why I feel hopeful.

When I first started my career in IT, at a small tech firm, management expected my male colleagues would be successful, they invested time mentoring them, and they made sure that they succeeded. As a woman, I needed to prove my competence, over and over, and I felt management was watching and waiting for my mistakes. This did not promote confidence! And I think confidence is critical for success as a leader.

In my 20+ years with Internet2, I am seeing many more women in the IT sector than when I started – and we look out for each other, all across the globe! And there are many male advocates and mentors now that are willing to share the knowledge they gained from many years of being "on the inside track" when women were not. My work life has improved so much over the years, and if we can stay with these positive trends, I am hopeful for our future workforce.

We are curious to know what first sparked your interest in working in the education sector and what kept you motivated to being Internet2's face fostering global partnerships across all continents?

For me, it is the people in the education sector - my colleagues tend to be interested in life, interested in learning about new cultures, about differences, and embrace learning about and inventing new technologies. As a musician, the initial opportunity to join Internet2 and launch our cultural and performing arts initiatives was the opportunity of a lifetime. When this initiative quickly became global in nature – and I will point out, with my cherished colleague Claudio Allocchio, who respects women as his equal and is a great partner in this adventure - I was continually motivated and inspired.

For a period, I led Internet2's Global Programs, and it is there that I learned from so many women all across the world - GÉANT's own Cathrin Stöver was one of the women who I was privileged to learn from and work with toward building an inclusive global IT community.

In March 2022, we launched a women in STEM campaign, an opportunity to celebrate their achievements as well the progress we are witnessing in terms of greater female representation in the internet world, but also a moment to reflect that we can do more. You have always been working with students, at the University of Michigan first and now at Internet2, including organising the Network Performing Arts Production Workshops that feature the latest technologies for remote music production and performance. What do you think higher education organisations can do to ensure better female representation in STEM and more inclusive work environments?

I believe we need to work hard and be creative in where and how we recruit new talent, and we need to be intentional about building a diverse and therefore strong workforce. As we build that workforce, we need to pay very close attention to the subtle dynamics in the workplace that impede, in any way, the success of our next generation of leaders.

Working with partners all over the world, you must have connected with hundreds of women holding technical roles. One of the conversations in our campaign was about women's networks and how female peers with the same challenges and ambitions connect, support each other, and come out stronger. Throughout your many personal and work experiences, have you ever seen this power in action?

I would like to share my favourite story about this. Years back, Emma Smith from Jisc was interested in expanding cultural initiatives in the UK. She had attended the performing arts workshop and she wanted to gain hands-on expertise. I realised that, while I was building partnerships, I was not actually using the technology myself. So, we decided, without telling anyone, that we would try to configure and use the applications ourselves (with no one watching and judging our mistakes!). I snuck into my office's technology lab in the US and Emma was in her lab in the UK.

I will never forget the day we solved our big problem (the port needed to be configured to full-duplex) and we got the first codec to work. Then we were very excited and got the second application successfully running. Soon, we had three high-bandwidth connections running between the US and the UK when the head of Internet2's technical services group came running into the lab and said "What's going on in here?! Who is in here?!" I said, rather proudly, "It's me, Ann Doyle, running some connections with Emma Smith in the UK!" He started to laugh and said "Well done, Ann Doyle! You just saturated and brought the office network down!!"

Lastly, do you have any words of advice for female students aspiring to a career in STEM?

Yes, believe in yourself, and ask for help from each other and from male advocates. When you have gained your success, become a mentor to those around you. Trust that you can make a difference and be part of creating a better workforce of the future.

Explore Internet2's activities by visiting **https://internet2.edu**

tnc22
Trieste, Italy | **13-17 June 2022**

TNC22: See you in Italy

Earlier on this year GÉANT announced that TNC22 will be a real-life conference, it will be hosted by GARR, the Italian National Research and Education Network, and will take place in the beautiful city of Trieste from 13-17 June 2022.

"TNC22 in Trieste will hopefully be the first face-to-face conference after two years of online events. GARR, and Italy at large, are looking forward to the opportunity to rediscover existing connections and be inspired by the atmosphere generated by the relationship with such a special community. Trieste is a unique and splendid site for the renaissance of a real-life TNC and at GARR we can't wait to welcome colleagues from Europe and beyond."

Federico Ruggieri, Director, GARR and member of the GÉANT Board of Directors.

Full registration opened from 9 March and the conference's preliminary programme is now live and ready to be viewed. Also, the comprehensive programme provides a snapshot of activities in the global R&E community. Keynotes by acclaimed experts in their fields, 20 parallel sessions, Lightning Talks plenaries, demonstrations and community meetings will give shape to TNC22.

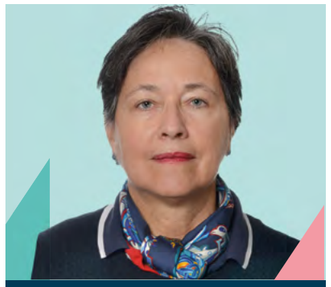
To whet the appetite of CONNECT readers here's just an overview of some session titles: The Quantum Scenario, Fixing the World, Sniffing it Out, Optics: Shine a Light, Network Evolution, From Space to the Ocean Bed, Building Real Stuff for Research Communities and more. And the TNC22 organising committee is delighted to announce the confirmed keynote speakers.

Keynotes

Filippo Giorgi

Head of Earth System Physics division, International Centre for Theoretical Physics (ICTP), Italy

Keynote: Earth Systems: Simulating climate change



Monique Morrow

Senior Distinguished Architect, Syniverse Technologies, USA

Keynote: Making the case for New Generation Identity

Niall Murphy

Site Reliability Engineering Leading Expert, Ireland

Keynote: Ghosts in the machine: adaptive capacity in the age of endless automation

What about COVID-19?

The TNC22 organisers recognise the impact that COVID-19 is having (and will continue to have) on international travel in particular. For those unable to travel TNC22 will offer a free of charge basic online participation option with live streaming and chat rooms, and recorded sessions will also be available. **Registration** is also required for online participation.

The TNC22 website has a **dedicated page** for relevant COVID-19 updates and all participants are encouraged to familiarise themselves with the mandatory COVID-19 requirements before travelling to Italy.

Navigating the Unexplored

You are invited to navigate the unexplored with us in Trieste! Throughout the centuries, Trieste has been the departure point for many explorations and expeditions. It is also renowned for its historic international sailing regatta – the Barcolana.

For the last two years we have all been navigating the unexplored as we have learned to manage new ways of working, new ways of living, and new ways of interacting. As we look to the future and beyond the pandemic, the ways in which we interact will be forever changed. TNC22 is an opportunity to reflect on how we will reconnect with each other, on ways to explore and manage our changed environment, and on how we can emerge stronger together.

About GARR

GARR is the Italian R&E network providing high-speed connectivity and advanced services to the research and education community in Italy. GARR network boasts about 15,000 km of optical fibre and serves 4.5 million users in over 1,000 sites among research organisations, universities, research hospitals, cultural institutions, libraries, museums, music conservatories and schools. GARR also operates a federated cloud for its community and offers cybersecurity, video communication, trust & identity, and mobility services. GARR is linked to other European and worldwide NRENs through GÉANT.

TNC for the first time?

The largest and most prestigious research and education networking conference, TNC attracts a truly diverse audience of over 800 participants from more than 70 countries, representing national and regional research and education networks, schools and universities, technology providers, and many of the world's most exciting scientific projects. By bringing together decision-makers, networking and security specialists, identity and access management experts, researchers, academics and students, TNC offers a unique collaborative experience.

2022 GÉANT Community Award

The GÉANT Community Award is a sign of recognition for the individual efforts that make up our community collaborations. It is presented every year at TNC and this year the award ceremony will take place in Trieste on the opening day of TNC22.

Nominations for the 2022 GÉANT Community Award closed on 28 February, but the opportunities to choose a candidate are not over yet as this year we have made some changes to the process.

So, what's new for 2022?

- Nominations can be submitted via an online form on the new GÉANT Community website.
- A shortlist of nominees selected by the award panel will be published on the GÉANT Community website.
- The community can vote for their favourite nominee from the shortlist.
- For the first time, GÉANT employees are also eligible for the award.

Visit the **Community Award** pages on the brand new **GÉANT Community site** for further information also on award categories and eligibility, or contact the organisers at **communityawards@list.geant.org**.

GARRLab: let's restart from innovation!

How the research and academic community can lead Italian ICT to a digital renaissance

Words: Damiano Verzulli and Carlo Volpe, GARR

There is a new virtual place for Italian experts in digital technologies, who want to meet peers and enrich their competencies through skill-sharing and discussions about innovation.
This place is called GARRLab and it is an evolving informal community of practice in the ICT field. GARRLab is built around people who are actively involved in the management of technological infrastructures in Italian universities and research institutions. Key discussion topics are cybersecurity, digital transformation, cloud technologies adoption, data privacy, digital sovereignty, and so on. But GARRLab is much more than just an experts' forum: within the community, these topics are translated into concrete activities, which are analysed, assessed and implemented on the IT systems and equipment of the different organisations connected to the GARR network.
The GARRLab community, which today welcomes around 150 people from 46 different organisations, kicked off after one of the annual workshops organised by GARR and has been growing ever since.

Taking stock of the first year of GARRLab activities, it is clear that having a continuous exchange of information in near real-time is an advantage, bust there are still some limits in the capacity of the Lab to actually affect and contribute to the evolution of ICT both at the level of the single organisations and, more generally, at the country level. As a matter of fact, in a historical period characterised by a general by a lack of advanced ICT skills, GARRlab resources and a highly skilled community can become an important asset in helping to implement the best ICT strategy for the country.

One of the objectives of the initiative is also to multiply these much-needed skills, thus GARRLab has opened its doors to university students. Thanks to the setting up of a dedicated laboratory, students are given the opportunity to independently experiment on cloud technologies, following the paradigms of automation, orchestration, reproducibility and traceability.

In just over six months, 23 projects were launched, with the progress of each project tracked and documented on the internal Gitlab. The most used words in the group are: container, continuous-delivery, pipeline, build, deploy, commit, branch, trigger, automation. GARR's role in this initiative was essential. If GARRLab managed to easily aggregate these IT experts it's because a community was already in existence since the creation of the Italian NREN. It just needed to have a common space to gather and exchange ideas. This space was provided by GARR, together with the GARRLab cloud infrastructure, thus demonstrating that it is possible to contribute to the development of skills by leveraging existing infrastructures and, therefore, at low costs.

Thanks to the synergy with GARR, new collaborations have started especially with colleagues of European research networks. A first example comes from the GÉANT NMaaS project, which was implemented in a short time also for the GARRLab infrastructure. It brought together people from the Italian NREN (GARR) with representatives of the French NREN (RENATER) and the Polish NREN PSNC. Other forms of collaborations are now starting with the Irish NREN (HEAnet) and with Tuke University in Slovakia, with the aim of investigating specific aspects of cloud computing and IP traffic aggregation and processing techniques in the cybersecurity field.

Picture Credits to Edoardo Angelucci (GARR)

HEAnet
Ireland's National Education & Research Network

HEAnet's Brokerage Services saving the education and research sector in Ireland €7 million annually

A recent value for money analysis indicated that HEAnet's Brokerage Services generates savings of approximately €7.34 million annually across the education and research sector for the ICT Procurement activities.

Words: Barbara Caroll, HEAnet

HEAnet is Ireland's National Education and Research Network, providing internet connectivity and associated ICT shared services across all levels of the Irish education system. Included in the ICT shared services are HEAnet's Brokerage Services.

The purpose of HEAnet's Brokerage Services Team is to design, establish and promote ICT procurement agreements that deliver value to HEAnet Clients.

This is achieved in terms of cost and subject matter expertise, compliance, reduced effort, and time-saving. HEAnet Brokerage Services assist Clients in streamlining their ICT procurement processes by running aggregated procurements, including framework agreements, mini-tender competitions via the Office of Government Procurement (OGP), collaborating with international partners such as GÉANT for access to brokered agreements throughout Europe as well as providing advice and guidance.

To better understand the Brokerage Services' positive impact on the education and research sector, HEAnet appointed Mazars as an independent auditor. Mazars conducted a targeted value for money (VFM) review of Brokerage Services across quantitative and qualitative VFM indicators. Four areas were examined: contract discounts VFM, resource and time VFM, net saving VFM, as well as expertise and strategic VFM. The outcome of the VFM analysis indicated that the Brokerage Services Team achieve savings of approximately €7.34 million annually for the ICT Procurement activities across the education and research sector.

Garvan McFeeley, Brokerage Services Manager, commented:

"We are delighted to share the result of the Value for Money study and the impact that our small team is having on the education and research sector in Ireland.

The Brokerage Services team mantra is to save Clients time, effort, and money, and we look forward to continuously improving our service offering. We invite all HEAnet Clients to get in touch with us to learn more about our full portfolio of services, from hardware, software licensing to professional services and student & staff offers."

To learn more visit
www.heanet.ie/brokerage

Picture
Alzheimer Researcher, Henne Holstege

Alzheimer's research collaboration hub: "We are pioneering"

Making genetic sequencing data from Alzheimer Disease patients and healthy controls available to researchers from other countries, so that we can accelerate Alzheimer's research? Strict European privacy legislation makes this quite difficult. Alzheimer researcher Henne Holstege, together with colleague Marc Hulsman, is collaborating with SURF to design a platform that should make this possible.

Words: Josje Spinhoven, SURF

Memory loss, caused by the loss of brain cells, is one of the first symptoms of Alzheimer's Disease. "There will never be a cure that can restore these cells," says Holstege. "Therefore, treatments should be designed to prevent the onset of the disease and any clinical symptoms, so that brains cells can be retained."

Some 60-80% of the risk to develop Alzheimer's Disease depends on genetic elements. "One day, we hope to predict, based on each person's genome, who is vulnerable to developing the disease later in life, and which treatments they may benefit from. We currently know only a fraction of all the genetic elements involved."

To identify which genetic variants play a role in Alzheimer's disease, researchers have to compare the genomes from tens of thousands of Alzheimer's Disease patients and non-demented individuals. To obtain such large sample sizes, it is necessary to collaborate with other Alzheimer Disease researchers so that datasets can be merged and analysed together.

Holstege adds, "However, the data is huge (currently almost 2 PB and growing) and we need supercomputer power and infrastructure to analyse it. Another obstacle is the General Data Protection Regulation (GDPR), which states that a person's DNA is privacy sensitive, similar to a photo, telephone number or social security number. This has severely complicated genetic research. To solve this problem, we are developing the 'Alzheimer Genetics Hub', a platform that runs at SURF. Here we will merge datasets from around the world and make them available to other researchers. This way, our American and European research partners can all access and optimally benefit from being part of this collaboration."

Secure yet flexible environment

Spider technology allows for the designing of a secure yet flexible environment for collaboration on large datasets. The Alzheimer's Genetics Hub is behind a firewall, and has some specific services that enable logging in, selective file transfers and intensive logging. The technology offers various authorisation and authentication roles, such as a data manager who has all rights to the data, and a regular member who only gets access to certain data.

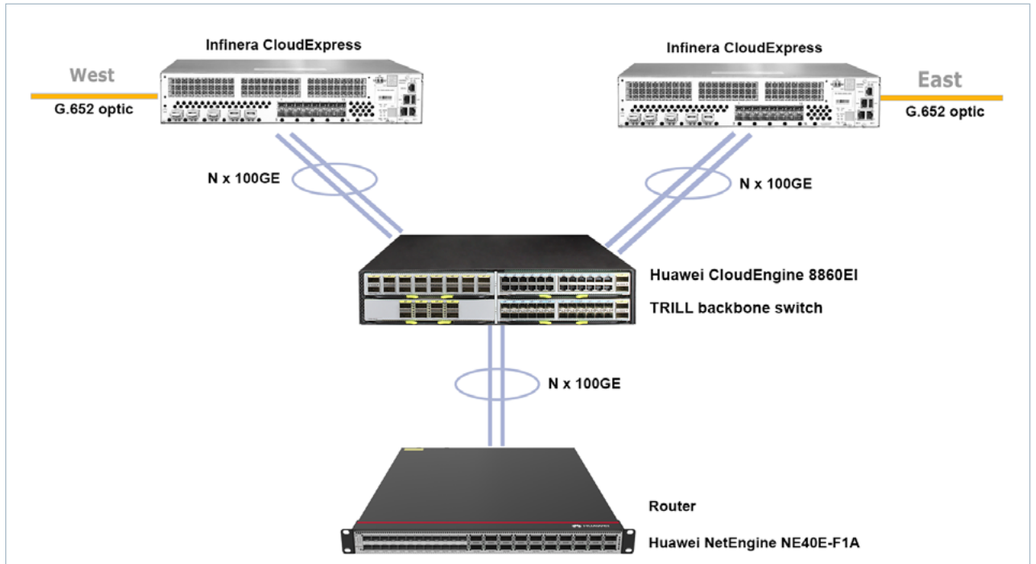
"The data that is uploaded by others is not ours. Researchers have to request access from the data owners and sign several legal forms. After that, they can analyse the data on the platform. Since part of the service is that we provide both storage and compute, there is no need to download any datasets. The amount of data you can download is limited, so it is impossible to download entire genomes. We also keep track of what is downloaded and by whom. This way, we can collaborate with other researchers while observing the rules and regulations of the GDPR," states Holstege. "I hope that with the availability of this platform, many more researchers will share and analyse their data on the hub, and that the best bioinformaticians in the world will be attracted to work with this data. I realise that we are very much pioneering, but I have a feeling that with this, we are giving Alzheimer's research a big boost."

For more information about the Alzheimer Genetics Hub, visit **https://alzheimergenetics.org**.

SURF is the collaborative organisation for IT in Dutch education and research. For more information, see **https://www.surf.nl/en**. Further reading on this **dedicated webpage**.

sanet.

New development of SANET network infrastructure



SANET has been operating the research and education network in Slovakia since 1991, and connects universities, research institutes, and schools to the GÉANT backbone. Schools are connected to SANET by 1Gbps links, universities and research institutes by 10-100Gbps.

Words: Pavol Horvath, Marian Durkovic, Robert Jaroska, Peter Hanzel, Markus Melicher, SANET

The operations team at SANET have been working on a project to research and further develop the SANET network infrastructure.

The research and development will in the initial stages deal with methods of in-depth data flow analysis in the existing large-scale network of the SANET infrastructure, where it will focus on the design and extension of optimisation mechanisms in terms of security and protection of access to information resources.

The research task will include the design of algorithms for segmentation analysis of the backbone of a robust academic network with a transmission capacity of n x 100 Gbps and connection to the R&D institution's access networks based on the optimisation of access to relevant information sources.

This work is aimed at bringing a new generation of network traffic monitoring mechanisms, with the ability to filter relevant data on attacks and irregularities in the network, analysis of their source and activities related to security systems.

Furthermore, the research task plans to conceptually extend the TRILL protocol on the principle of omnidirectional data transmission with even distribution of IPv4 and IPv6 traffic based on the affiliation to individual TCP / UDP streams with packet order consistency.

The new development and innovation of the SANET network infrastructure provides:

- redundant N x 100GE Huawei NE40E-F1A-14H24Q
- N x 100GE routers providing IP packet routing, which is necessary for the entire backbone network to supports the transmission capacity of N x 100GE and that all backbone routers have N x 100GE interfaces.

The following Huawei NE40E-F1A-14H24Q network devices were procured and gradually installed in the SANET network during the last three months.

The installation of the new routers took place in several steps. However, the most important step was to prepare a new configuration of the router itself according to the current configuration from the old Cisco Catalyst 6509.

The transmission system consists of Infinera Cloud Xpress CX-100E-500SB-3C2 devices, which are devices that enable the creation of 100GE interfaces from unlit optical fibers over the existing infrastructure.

Huawei CloudEngine 8860 Ethernet switches are another part of the SANET backbone network. They provide high performance, high port density and low latency. The main function is the support of the TRILL protocol with which the switches enable the creation of L2 virtual networks over the transmission infrastructure with 100GE channels.

The result of the research activity will be the design of a methodology for the identification of attacks, their intensity and direction and the subsequent identification of an infected or infected network node or terminal device in order to eliminate damage in the entire network.

The research task will bring new architectures of network mechanisms based on the interoperability of network probes and virtual collectors applicable on backbone nodes, access networks or surveillance centers. Research will bring a laboratory prototype of omnidirectional network operation with the deployment of the extended TRILL protocol.

The proposed result methodologies will bring an extension of standards and measures for the management of individual network nodes as well as measures for end users.

For more information, see the **https://www.sanet.sk/**

Iceland Liechtenstein Norway grants

CARNET

ATTEND: creating equal opportunities in education for pupils with disabilities

In early July 2021, the Croatian Academic and Research Network - CARNET - officially launched a new project called “Enhanced Tools For Creating Equal Opportunities In Education For Pupils With Disabilities - ATTEND”.

Words: CARNET

Worth more than €3.5 million this is the first comprehensive project in Croatia that aims at improving the education of pupils with disabilities by equipping special educational institutions with assistive digital technologies and providing training of their educational staff.

During this three-year project, 34 centres for upbringing and education in Croatia will receive valuable and quality digital assistive equipment for education - both hardware and software related. This ranges from regular computer equipment such as keyboards and adapted mice for people with disabilities, to special screens, switches, different communicators, equipment that allows eye control, equipment for the visually impaired, smart boards, and virtual or augmented reality equipment.

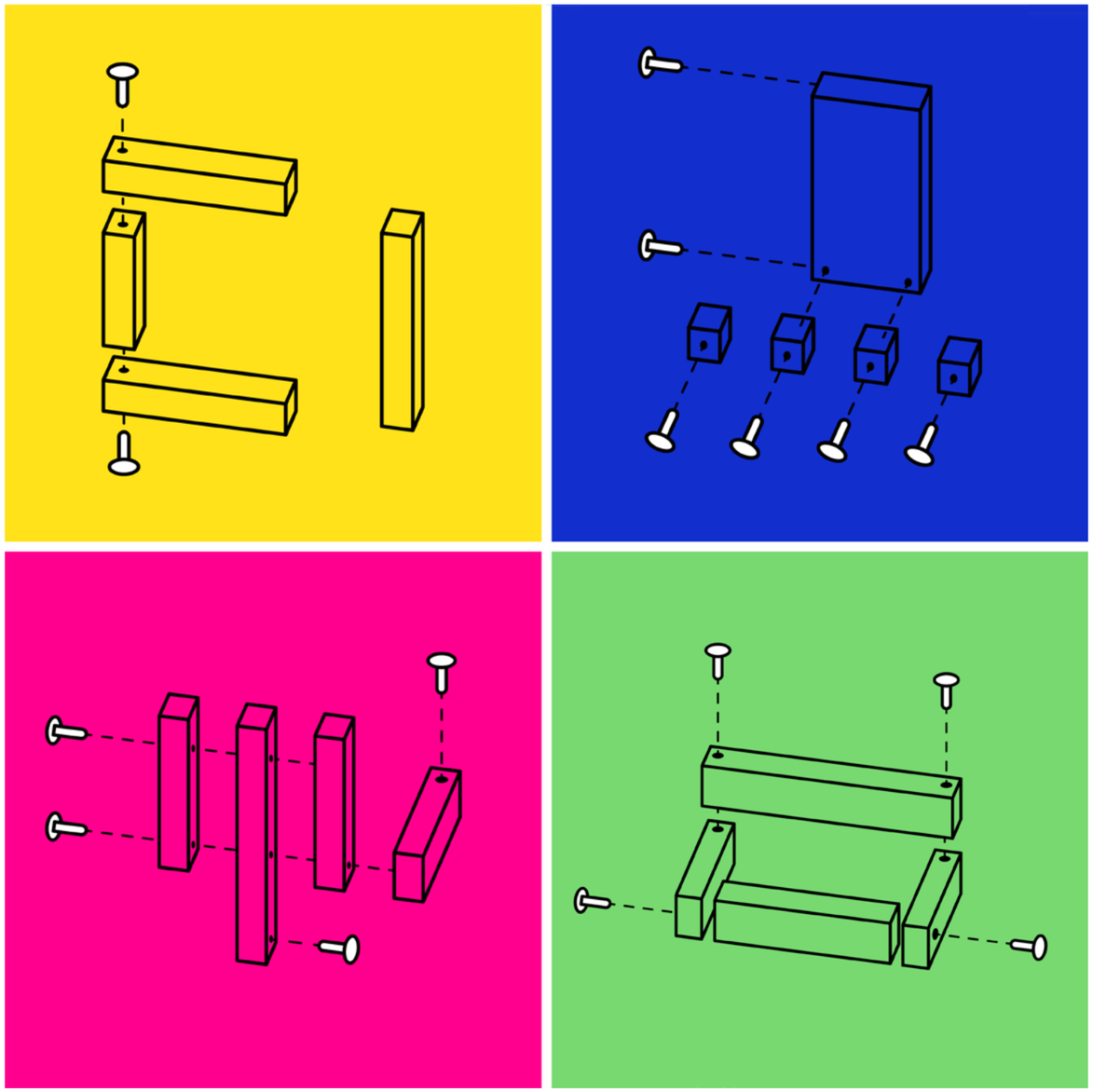
The equipment will help children with disabilities to receive education and support as required by their needs. To ensure the effective use of digital assistive technology it is crucial that employees are ready for the use of new technologies and new approaches to teaching.

Therefore, training and networking will be provided to educational staff and directors of the project beneficiary institutions through a series of workshops, online activities, face to face meetings and events aimed at sharing knowledge and experience, which will be the basis for future projects and cooperation between the participating institutions. Training will include topics such as benefits and opportunities of digital assistive technologies in education of children with a range of disabilities, but also training on specific application of each type of assistive technology that centres will receive.

The ATTEND project is led by CARNET in partnership and cooperation with relevant academic institutions: Faculty of Education and Rehabilitation Sciences (University of Zagreb), Faculty of Electrical Engineering and Computing (University of Zagreb), with assistance and expertise of the partner from Iceland - City of Reykjavik, Department of Education and Youth.

This project is part of a broad cooperation between Norway, Iceland, and Liechtenstein with 15 members of the European Union, including Croatia. It is financed through The Financial Mechanism of the European Economic Area (EEA Grants), within the Local Development and Poverty Reduction Program. For the period from 2014 to 2021, donor countries have allocated a total of €2.8 billion for 15 European countries. In the mentioned perspective, Croatia will receive €103.4 million.

The total value of the ATTEND project is €3,529,412 euros, of which €3 million or 85% is financed from the financial mechanisms of the European Economic Area, while 15% is national co-financing.



The Network Automation eAcademy will take your network Ops to the next level

Learn end-to-end service and resource lifecycle management – and make your life easier – by following the new network automation courses on the GÉANT eAcademy.

Digital transformation in R&E organisations has as a main objective: providing their customers with the best possible experience. In order to achieve that, a complete transformation of the organisation's culture, technology, and processes is required. More specifically, the first step to take when going through the digital transformation of network and associated network services should be network automation.

Words: Maria Isabel Gandia, CSUC

Even though there are many tools and best practices available to support in this process, it's not always easy for organisations to get started and to find the correct path towards the adoption of automation principles.

That's why the Network Automation eAcademy is continuously releasing new learning units to help R&E institutions improve their knowledge about automation principles and the practical implementation steps associated with them. By undertaking this training, organisations can continue to manage their networks with the excellence their users need, while processing all the information required to allow their services to evolve smoothly.

The courses are built around short and modular units, focusing on all sorts of topics about automation in the R&E networking community. Additionally, the training includes hands-on exercises in the more technical units, as well as examples and case studies from various NRENs.

The Network Automation eAcademy is expanding – new courses and learning tracks

In **CONNECT38**, we introduced a visual guide for the courses in the form of a metro map, presenting the published and planned units as different steps (or stops) and connecting them into dedicated learning paths (or metro lines).

Since then, the Orchestration, Automation and Virtualisation (OAV) team within WP6 of the GÉANT (GN4-3) project released new visual representations of the available learning paths, to facilitate even further the users' navigation through the training.

That's not all – the Network Automation eAcademy keeps growing, with the release of:

- Five new units with technical content (GitlabCI, Ansible, NSO, XML and NETCONF).
- One unit on the production block of the Open Digital Architecture (ODA) blueprint (specifically the TM Forum ODA).
- Two architecture mappings to ODA (Network Management as a Service, or NMaaS, and GRNET).

Network automation for all

The Network Automation eAcademy is suited to the needs of both experienced users and starters. Students willing to learn the basic principles can get started by following the introductory track, offering an overview of all the essential aspects of OAV and the key concepts of Open Digital Architecture. Moving on from this starting track, they can then choose to take different and more advanced paths, as the units listed in the **OAV training portal** under the training packages, or even to explore further by taking the Architecture Deep Dive training.

For all advanced modules, students will find the necessary pre-requisites listed in the first tab of each unit. For instance, if they are interested in learning Ansible and visit the Ansible unit, they will find the recommendation to go through the module on YAML first, with the related link, or similarly if they are willing to follow the course on NSO, they will be recommended to follow the courses on YANG and XML.

Stay tuned: more units are coming soon!

You can find the Network Automation eAcademy in the OAV Training portal: **https://wiki.geant.org/display/NETDEV/OAV+Training+Portal** and in the GÉANT eAcademy (supported by GLAD, the GÉANT Learning and Development team): **https://eacademy.geant.org/moodle**

Remember: you can suggest new topics to include in the Network Automation eAcademy!

The OAV team is available to help identify the best learning experience and answer your questions at **oav@lists.geant.org**

Automate your services using SPA blocks

We are experiencing a shift to a new normal for “business as usual” where teams and tools need to work together in a highly flexible way to adapt to the dynamic environment. In these times of change, terms such as orchestration, automation and virtualisation are becoming persistent companions on the top of our priority list for enabling fast new service deployment, quick troubleshooting, and eliminating human error. This is the point when you start thinking along the lines of, “Could it be possible for all of my tools to talk to each other, exchange information and draw upon a single source of truth about the network?”

Words: Sonja Filiposka (UKIM), Roman Łapacz (PSNC)

As it happens these are the goals around which the Service Provider Architecture (SPA) platform is being built. It envisions the network management platform as a set of fully automated microservices that can be orchestrated together to implement the intents of the network operations manager.

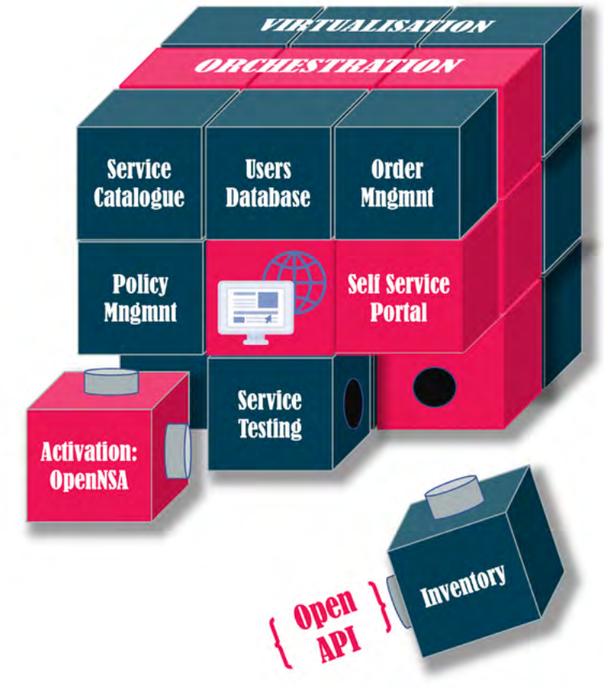
By interfacing with physical or virtual network device managers, SPA can provide a complete service lifecycle management integrated into a single self-service portal. Each of its components is a unique feature puzzle piece that is integrated into the whole via the orchestration engine. The information stored in each component is accessible via a TM Forum specified Open API and an accompanying data model. This includes a machine-readable service specification in the Service Catalogue, based on which new service instances are stored in the Resource and Service Inventory.

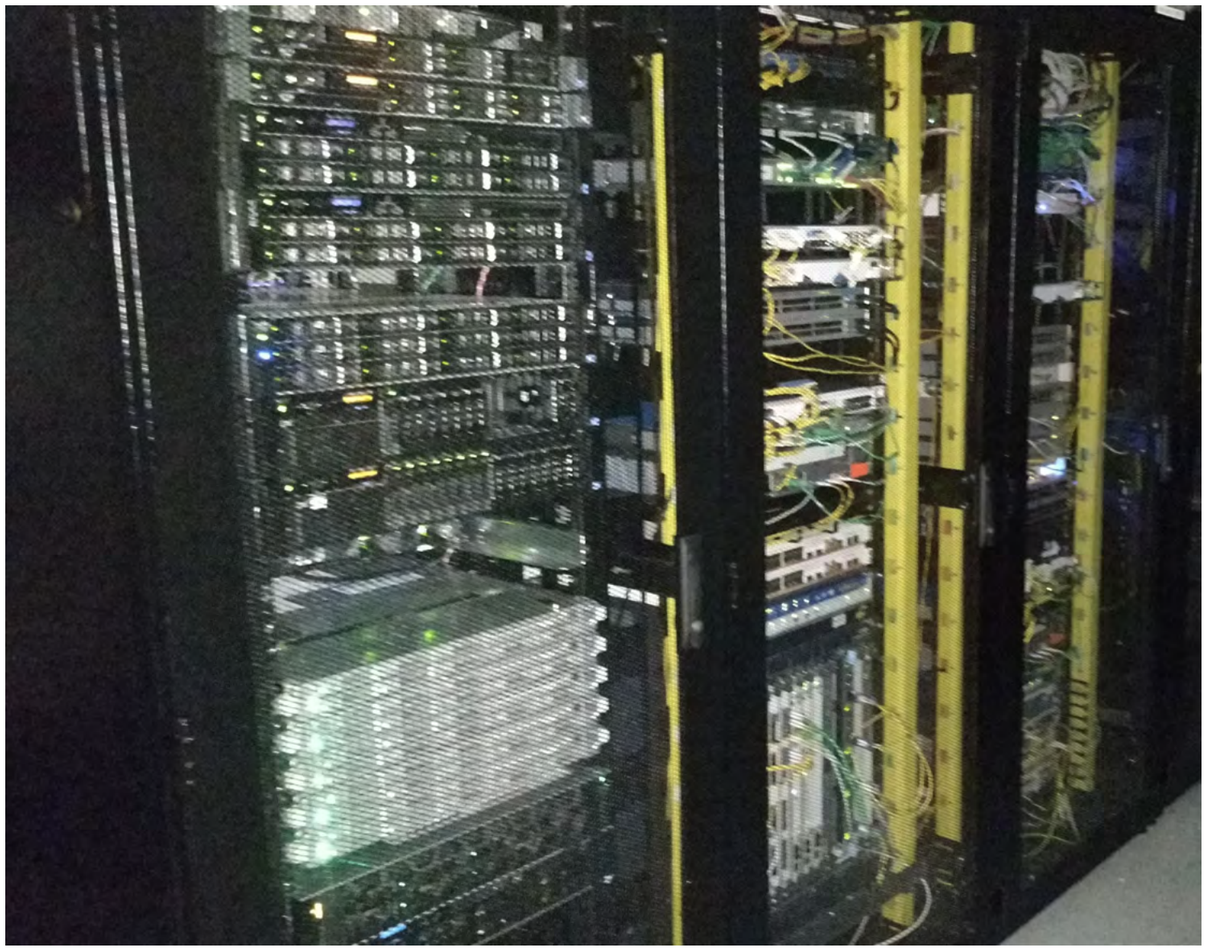
There is also Order Management that stores and tracks the history of all orders made by users whose information is managed in the Users Database. The rules are specified in the Policy Management component, while the Service Activation component interfaces with the correct manager to translate the intent into network configuration changes. Service Testing allows for defining regular or ad-hoc service tests to be conducted to make sure the network and services are running smoothly and there are no problems.

SPA is based on a pluggable architecture design allowing new components to be added or existing components to be replaced or removed as required. Legacy applications can be integrated through open APIs. The processes defined in the orchestration engine define the fabric of the system that specifies the steps that need to be executed in order to create a new service instance, make a modification, or terminate a service. Thus, it is a very flexible approach that can easily fit all services and implementation styles.

At the moment most of SPA’s components are being used to manage the lifecycle of the GÉANT Connectivity Service (GCS) used to implement GÉANT Plus services where SPA interfaces with an OpenNSA management agent to be able to configure circuits in the live network infrastructure.

If you are interested in testing SPA or maybe just some of its components, we are happy to inform you that it is currently being prepared to be released as a new application in the NMaaS catalogue. In the meantime, you might want to take a look at SPA’s Inventory which is already available for testing purposes in NMaaS.





Moving towards 400G services – Supporting the emerging needs of Europe's NRENs

When the first NREN networks were developed, speeds of 64-256Kbps were considered perfectly adequate to support the limited numbers of researchers and students needing access to remote services or networks – only a very few students had access to computers let alone owned their own.

Words: Karl Meyer, GÉANT

Progressively the needs of research and education have accelerated and so connection speeds between networks have grown and grown.

The current maximum speed at which an NREN can connect to GÉANT has now reached 100Gbps which seems, to those of us who still remember 64kbps services, to be an unimaginably fast connection but even now NRENs are demanding increased capacity to support advanced research, the needs of cloud computing services and larger numbers of remotely working staff and students.

As the existing 100Gbps connections to the NRENs become full we need a new solution, the obvious and easy approach would be to simply add extra 100Gbps connections, but this results in difficulties.

- Hardware - each separate 100Gbps connection requires its own interface equipment adding to the implementation costs and also ongoing maintenance.
- Power and Cooling – More hardware means more power and that requires more cooling adding to the costs.
- Flexibility – NRENs use connections to GÉANT not just for IP traffic but also for a range of point-to-point connections. Managing the distribution of these bandwidth allocations across multiple 100Gbps circuits is difficult and can result in wasted capacity or capacity available in unusably small allocations.
- Cost - often the cost of two 100Gbps connections would be the same or greater than an equivalent 400Gbps service.

For these reasons, GÉANT is working to be able to provide NRENs with connections to the new GN4-3N network at speeds of 400Gbps. These services are in operation in the dedicated lab test-bed in GÉANT's Cambridge office and staff are working to ensure they can be integrated into the GN4-3N network and fully supported by the GÉANT NOC before being made available to NRENs.

These connections will provide greater capacity, increased flexibility and lower overall costs than the current multiple 100Gbps connections and help GÉANT and the NRENs support the needs of research and education into the next generation.

To find out more about the new GÉANT network visit **network.geant.org**

Picture
GÉANT's Test Labs

eduVPN philosophy: less code means a more secure service

In 2014, eduVPN started as a small project to provide students and employees with a reliable VPN solution that integrates with federated authentication. Currently more than 100 organisations worldwide use eduVPN. An important event in 2014 greatly influenced the development of eduVPN and led us to embrace an important principle: less code means a more secure service.

Words: Rogier Spoor, SURF

So, what happened in 2014? At that time a serious vulnerability was discovered in OpenSSL, a widely used library for establishing secure connections. OpenSSL is used, among other things, on web servers, but also for VPN products. After analysis, it turned out that the software was too complex. Erik Poll, Associate Professor at Radboud University's Digital Security Group, advises that when software has to be secure, complexity should be limited. This produces clearer software that can be better penetration tested and audited.

Complexity = bad for security

In his lectures Erik Poll has been saying for years that complexity is bad for security. One of the first scientific papers he often cites is that of Gary McGraw (2004): "With software's ever-expanding complexity and extensibility adding further fuel to the fire, by any measure, security holes in software are common, and the problem is growing."
In the classic article, "The protection of information in computer systems", by van Slatzer & Schroeder uit 1975 (!) they mention several design principles for security, including "Economy of mechanism. Keep the design as simple and small as possible."

KISS - Keep It Simple Stupid

However, such views are much older. One of the oldest and best-known engineering principles is KISS: Keep it Simple, Stupid. The US Navy already used this principle in 1960. They already knew that systems work better if they are kept simple. This applies in a broad sense to systems, but particularly including software and security.

Therefore: Keep eduVPN as simple as possible

With this in mind, we have developed eduVPN. This is reflected in the software architecture of the eduVPN server. Over the years, it has only become smaller in terms of code, in contrast to an average software package that only expands. We try to keep the functionality of the product limited in accordance with our 'less is more' philosophy. For example, we regularly perform (source code) audits on the server and client software, especially in the event of major changes to the source code. eduVPN customers can view these audit reports. In addition, we use a vulnerability scanner to check whether the service is properly set up in practice.

Open source and public values

Furthermore, the premise of eduVPN was that all resources, such as software, documentation and images, had to be available under an open-source license. Not only for (international) education and research, but also beyond. Think, for example, of Internet Service Providers (ISP), government, companies and SMEs. This was reinforced by the fact that the SIDN fund supported software development with the aim of realising good and reliable VPN software that everyone can use.

This open approach ensures that organisations have control themselves, without being dependent on big tech and they thus strengthen their digital autonomy. This is in contrast to commercial VPN solutions where you do not have access to the (often far too complex) technology and documentation such as audits. This creates a strong dependence, for example the commercial provider is the only party that can make and release bugs and/or security fixes.

"In general you can say that closed source mainly benefits the producer of the software and that open source benefits the buyers."

Professor Bart Jacobs, Radboud University

For the implementation of VPN technology, we opted for OpenVPN in 2014. This is the only product we had enough confidence in, especially because it is the only VPN product that has been internationally audited by security professionals, researchers and governments.

Writing code is deleting

Because we apply this principle, thousands of people in education and research have been using eduVPN for years without any problems. We will of course continue to apply this principle in our product development, because the world in 2022 shows that you can never rest on your laurels when it comes to safety. The same applies when writing code: writing is deleting!

eduVPN is the open-source VPN solution for education and research. More than 100 organisations worldwide already use this service. Via eduVPN, employees and students can securely connect to their institution's network from home. This gives them secure access to protected internal applications such as scientific articles, financial systems, student information systems, license servers and file servers.

To find out more about eduVPN and how to implement it within your organisation, visit **eduvpn.org**

CONNECT Interview: Nicole Harris, Head of Trust & Identity Operations, GÉANT

Let's talk about Multi-Factor Authentication for the Research & Education community

Over the last couple of decades, multi-factor authentication (MFA) has become a popular term in the cybersecurity industry. Whether to protect an email account, log into a service, or perform a bank transaction, most of us have dealt with multi-factor authentication. CONNECT met with Nicole Harris, Head of Trust & Identity Operations at GÉANT, to talk about MFA and its benefits for the Research & Education community.

Interview by: Rosanna Norman, GÉANT

What is Multi-Factor Authentication and how does it work?

Multi-Factor Authentication (MFA) is a simple concept – instead of just asking a user to provide a username and password when logging into a service, they are asked to present multiple different pieces of evidence – or factors. Each factor should typically be different: if the first factor is a password (something you know), then the next factor may be an auto-generated short-lived code (something you have) or a biometric (something you are). Using MFA increases the confidence that the user is who they say they are and this in turn increases the trust within the service.

The importance of Multi-Factor Authentication in cybersecurity has grown exponentially in the last few years. Could you explain why?

MFA has been around for a long time, but many organisations have not prioritised adoption, or have seen it only as a tool for privileged or administrative accounts. There were good reasons for this – MFA adds a layer of complexity and difficulty for the user and affects the look and feel of the login process. Services have perhaps been more focused on improving the experience for users than on the security element.

Things are changing because of the increased sophistication of attacks on traditional username and password combinations. The normalisation of certain patterns (e.g. email as username) has made it easier for attackers to perform simple phishing attacks that can gain access to a wide variety of different services and accounts. Alongside this, the attacks have become more sophisticated. Spear-phishing, where individuals or organisations are specifically targeted, means that phishing emails look more convincing and are harder to identify as dangerous. Attackers will also use any opportunity to exploit and confuse users with emotive topics – examples of this have been seen during the pandemic where people have been "invited" for vaccines or testing or asked to accept fake bonuses for excellent work in difficult times.

With any security feature, MFA can be exploited so it is important to remember that no one will ever ask you to read out or send them a code generated for MFA. If a helpdesk is asking you to read a pin or a code out to them or asks you to send or type it, just say no.

How can the R&E community adopt MFA to strengthen its cybersecurity capabilities?

There are many different apps and processes that can be used to implement MFA. These can be categorised as follows:

- Commercial services as a "one stop shop" for MFA.
- Time-based One Time Password (TOTP) Authenticators – typically Google or Microsoft.
- Community developed apps such as SURF's TIQR.
- Hardware tokens, such as a YubiKey.

As an organisation, we decided not to purchase a commercial product given the complicated work needed to integrate with a large range of services. For our MFA project we are using a combination of TIQR, TOTP and hardware tokens depending on the service and users in question. As a rule, we are avoiding SMS-based approaches due to security concerns.

How does GÉANT help the R&E community to implement MFA?

By adopting the GÉANT Security Baseline (**https://security.geant.org/baseline/**) NRENs can help document the maturity of their organisation across a wide range of different security capabilities as well as having a tool for managing improvements to their maturity level. Within the Trust & Identity space, NRENs can also use the REFEDS Assurance Framework (**https://refeds.org/assurance**) and the REFED MFA Profile (**https://refeds.org/profile/mfa**) to flag MFA compliance to the services they wish to connect to.

For further information on MFA for the R&E community please contact Nicole Harris at **Nicole.Harris@geant.org**

EaPEC 2022

EU4Digital

Save the Date – EaPEC 2022: 'Building Connections' with EaPConnect

Baku, Azerbaijan will provide a spectacular backdrop to EaPEC 2022, the 5th Eastern Partnership E-infrastructures Conference on 28-29 September. Organised by the EU-funded EaPConnect project and hosted by AzScienceNet and IIT of ANAS – the Institute of Information Technology of the Azerbaijan National Academy of Sciences – the event will explore the theme 'Building Connections'.

Words: Rosanna Norman, GÉANT

Knowledge sharing is crucial to research and education; individuals form communities that learn and develop together. Human connections and common information, tools and services are vital. These have been challenged by the COVID-19 pandemic. Research and education networks and other e-infrastructures help researchers, students, teachers, and academic staff connect with each other and the resources they need, to collaborate internationally and maximise their potential. Eastern Partnership countries are supporting open data, information digitisation, online learning and working, and secure access to resources. EaPEC 2022 will welcome policy makers, researchers and research managers, and experts on networking, high-performance computing and information technologies for research and education, as well as anyone interested in exploring the conference topics; "Open Science and Clouds, Cybersecurity, e-Learning and Education, e-Health, Earth Observation, Digital Humanities, ICT Innovation and Network as a Service."

With keynote presentations, panel discussions, lightning talks, and opportunities for participants to interact and contribute to the conference conversation, EaPEC 2022 will serve as a platform for collaboration on policy and research. EaPEC conferences also support EaPConnect's goal to interconnect the research and education communities in the EU and Eastern Partnership countries.

How can you participate?

The EaPEC 2022 conference schedule and related information is under development, so please save the date!

To stay updated about this and future EaPEC events, subscribe to the mailing list: **http://eepurl.com/dvZ0PL**.

Follow the event on social media: **#EaPEC**

NRENs are making the case: re-thinking the work and values of research and education networks

For around thirty years, Yousef Torman has been working in ICT at highly reputable institutions in the higher education and scientific research sector. The focus of his work has always been to make use of technology for the development and enhancement of the lives of people in his community and beyond through better use of new technologies in education and scientific research.

Interview by: Yasmeen Al-Kouz (ASREN) and Silvia Fiore (GÉANT)

He worked as a Director of the Computer Centre at Jordan University of Science and Technology, then he contributed to establishing the Jordanian Universities Network, the official National Research and Education Network of Jordan, and worked as an Executive Director there.

Since 2011, Yousef has been the Managing Director of the Arab States Research and Education Network (ASREN), which works on establishing Pan-Arab e-Infrastructures dedicated to research and education (R&E).

Yousef, you have been representing ASREN and the AfricaConnect3 project Partners in several scientific international conferences in the past months, advocating that we should move beyond "making the case for NRENs" and rather start thinking that "NRENs are making the case". Why do you think that now is the time to re-think the work and values of R&E networks?

Throughout the years, NRENs have been struggling with many challenges making their own case towards their stakeholders, funders, and users. This has led to the joint efforts between national and regional RENs to establish the "Case for NRENs" portal which provides arguments to address stakeholders to support the creation of NRENs. Global efforts have also launched the "In the Field Stories" blog supporting the case for NRENs through featuring success stories from around the world empowered by these networks.

Today, many stakeholders and decision makers have recognised the necessity of NRENs as development enablers. For instance, NRENs were explicitly mentioned at the UNESCO's Recommendation on Open Science, emphasising their role. The European Commission has always supported NRENs, in addition to the World Bank and other national, regional, and global bodies around the world. The outbreak of the COVID-19 pandemic has also offered the opportunity for NRENs to position themselves as critical for the member institutions to keep learning going and to cope with the pandemic.

I believe that NRENs now have the opportunity to make use of this recognition and the desperate national and regional needs for robust and reliable infrastructures and services. This is why I keep saying that "NRENs are making the case", and they are!

In one of your presentations, you say that African NRENs will become "more than just a network." What do you mean by that and how can they grow beyond their typical role?

I believe that NRENs have to move beyond the sole role of connectivity providers, by seeking to habitually identify and deploy new demand-led value-added services, keeping up with the constantly changing needs of the stakeholders and strengthening the overall case of NRENs from within.

Furthermore, NRENs need to evolve to stand the test of time, remain relevant, be able to adapt to global trends and respond to unforeseen national, regional, and global challenges. NRENs can be owner, facilitator, enabler, operator, host, and secretariat. For example, NRENs can be the host and operator of a national harvesting infrastructure for the institutional open data repositories. NRENs can also host/lead the deployment of R&E cloud infrastructures and the adoption of national/regional "Open Science Cloud Services".

Digital infrastructure has proven to be crucial to support research activities and science cooperation. How are African NRENs positioning themselves in this field in order to meet their communities' needs and keep up with the evolving trends?

In addition to dedicated connectivity, NRENs and RRENs provide advanced services that enable and facilitate collaboration and include applications, tools, and access mechanisms to the R&E communities. NRENs and RRENs are key elements in adopting "Open Science" and "Open Access" to support science and science cooperation.

RRENs and NRENs should take the lead and the responsibility associated with the new role related to "Science Collaboration" through collaborating with national, regional, and global initiatives in this regard.

ASREN is taking the responsibility as enabler for science cooperation and strongly promoting "Science Cooperation" through engagement with (1) science communities to promote joint science activities, (2) policy and decision makers to encourage developing and adopting policies on science cooperation at national, regional, and global communities and (3) availing technological infrastructures with tools and services to facilitate this cooperation.

Also, ASREN featured at the Science Summit of the United Nations General Assembly 76 with a focus on Arab Science Cooperation and will be the convener of the Arab Science Summit of the United Nations General Assembly 77 in September 2022.

Recently, the three RRENs ASREN, GÉANT, and RedCLARA have started cooperating on supporting Climate Actions and Earth Observation forming a "Cooperation Triangle for Climate Action" between Africa, Europe, and Latin America.

African NRENs contribute to the United Nations Sustainable Development Goals (UN SDGs), particularly in the fields of education, gender equality, economic growth, innovation, and global partnerships for sustainable development. What impact do you think UN SDGs have on the strategic planning and branding of African NRENs as full-time innovative and leading actors in the R&E communities?

I agree that NRENs in Africa and around the world are contributing directly and indirectly towards achieving the UN SDGs, especially by supporting science and science cooperation. As achieving the UN SDGs is a global priority, I consider them as an excellent opportunity for NRENs to bring the attention of policymakers and decision makers to further support them in terms of funding and resourcing to achieve these objectives.

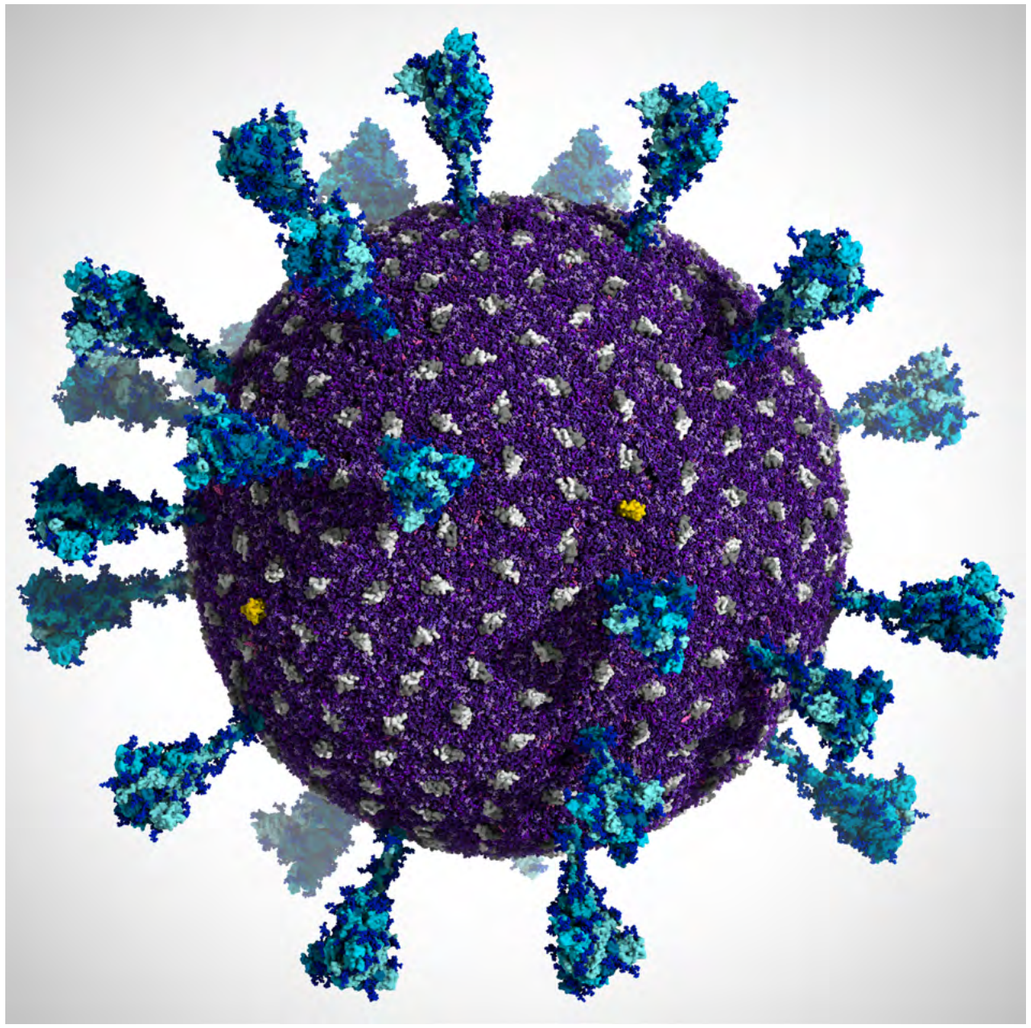
In this context, what do you think is the role of regional projects, like AfricaConnect3, in supporting the work of national networks for their end-users?

Since 2011, the EU co-funded AfricaConnect project has had a very positive impact on the evolution of the African NRENs, at both levels of expansion and upgrade of connectivity for NRENs and deployment of R&E services and applications. Currently in its third phase, AfricaConnect3 (AC3) includes substantial activities that focus on engagement with science communities, supporting open science, clouds, and community services, all of which contributes greatly to the benefit of end-users from universities, research centres, public libraries, and teaching hospitals.

Furthermore, through the AC3 project activities ASREN is engaging successfully with science communities in Africa, namely AfriGEO (The African Group on Earth Observations), GMES and Africa (Global Monitoring for Environment and Security), AERAP (The Africa-Europe Science Collaboration and Innovation Platform), ASFAP (The African Strategy for Fundamental and Applied Physics), DE Africa (Digital Earth Africa), and AfLS (The African Light Source).

For more information about the impact of African NRENs, visit **https://africaconnect3.net/**

The diverse, international consortium making breakthrough discoveries about COVID-19



A “computational microscope” reveals insights around COVID-19’s airborne transmission

Words: Andrew Bell, Oracle for Research

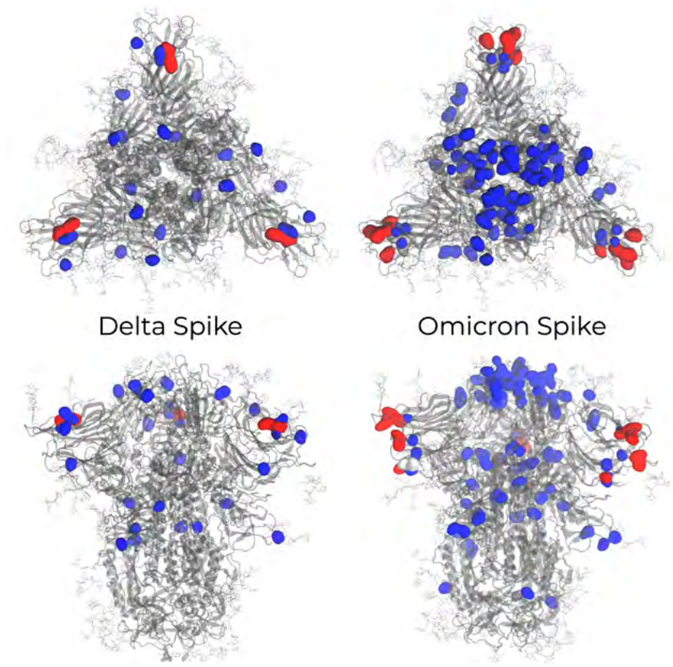
With 15,400 tagged tweets and counting, **#CovidIsAirborne** has become one of the most important hashtags of the ongoing pandemic. Why? The fact that COVID-19 travels in tiny droplets of respiratory aerosol poses a serious problem for controlling the virus, necessitating a deeper understanding of how airborne transmission occurs.

Until recently, researchers have not been able to see how a virus behaves in aerosol particles. Now, a multi-institute consortium led by Professor Rommie Amaro at the University of California, San Diego (UC San Diego) has provided a significant leap forward in our knowledge of airborne SARS-CoV-2, which is key to understanding its transmission. In recognition, her team were finalists for the prestigious Gordon Bell Special Prize for High Performance Computing-Based COVID-19 Research in 2021, an award they actually won the previous year.

The team consists of forty-seven members from nine universities, two national labs, two companies, and four of the leading supercomputing sites in the world. This international consortium of researchers rapidly pooled their knowledge, resources and models to create never-before-seen views of the COVID-19 within a respiratory aerosol. These are the particles we breathe out that cause viral transmission.

The researchers created a one billion plus atom simulation which is essentially a ‘computational microscope’, enabling them to study how the virus responds structurally over time and to various environmental conditions. This shows, at the molecular level, how the virus – including its spike proteins responsible for initiating infection – behaves in a respiratory aerosol particle.

This simulation was recently featured in the New York Times, and is of immense significance, representing



the first atomic level view of any virus in an aerosol. This model will help in understanding and designing experiments. The consortium also established how the SARS-CoV-2 delta variant viral spike protein responds to the changes in pH that are expected to occur in aerosols, bolstering our understanding of how the virus survives as it spreads through the air and suggesting factors involved in infection.

To provide an ‘engine’ to analyse these models, Oracle for Research offered free HPC computing resources to the University of Bristol arm of the consortium led by Professor Adrian Mulholland and Dr Sofia Oliveira. Their initial dynamical non-equilibrium molecular dynamic (D-NEMD) simulations were completed in two days for $6,125 USD, highlighting the profound cost savings and ‘time-to-science’ benefits provided by Oracle Cloud. This ability to probe SARS-CoV-2 behaviour rapidly is particularly important as the researchers now turn to investigating emerging variants of concern, such as Omicron, to see how they differ.

Congratulations to Drs Amaro, Mulholland, Oliveira, and team on this outstanding and potentially lifesaving research. This work will not only advance our understanding of the COVID-19 pandemic but will also lay the foundation for countless future experiments studying viral airborne transmission.

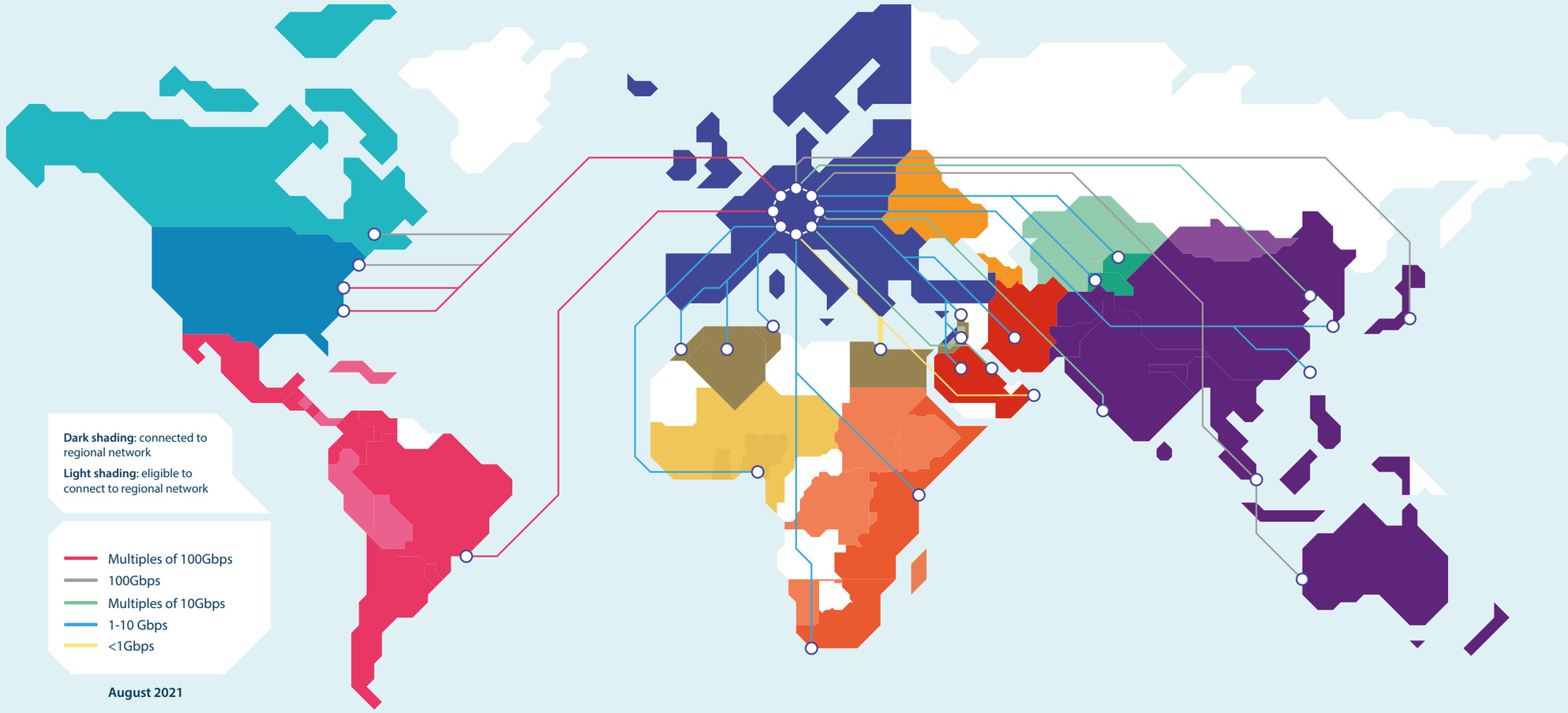
Pictures
Top right: Professor Rommie Amaro, University of California, San Diego

Right: Professor Adrian Mulholland, University of Bristol

GÉANT at a Glance

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

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



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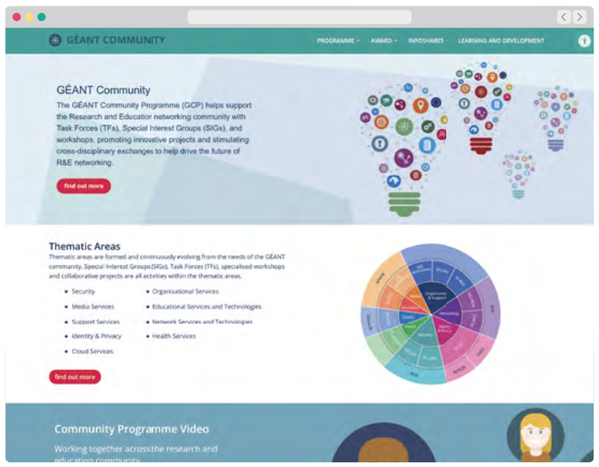

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WOMEN IN STEM

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