Welcome to TERENA

The Trans-European Research and Education Networking Association

Today’s students, teachers and researchers rely on electronic media and computer networks more than ever before: for simple email communication; for remote learning, teaching and conferencing; for transferring and analysing large and complex data sets; and for experimenting with network technologies and applications.

Dedicated research and education networking organisations provide the necessary networking infrastructure and services to research institutes and educational establishments.

TERENA is the association in which Europe’s research networking organisations, research institutes, equipment vendors and telecommunications operators meet, exchange information and experience, and collaborate on a range of activities.

Those activities - projects, task forces and events - are open to any organisation or individual who can offer appropriate expertise, manpower or other resources.

www.terena.org
Foreword
I start by thanking my predecessor Janne Kanner who, as president, brought a new approach and dynamism to the organisation, in particular by initiating a stakeholders’ satisfaction survey that is allowing us to develop our activities in concordance with the fast-evolving needs of our community. I will do my best to continue his work with the same enthusiasm and energy.

During 2011 TERENA celebrated its 25-year anniversary. Founded under the name RARE in 1986, the association has proven its ability to bring forward new ideas and concepts, not only for the benefit of national research and education networking organisations (NRENs), but also the whole European Internet community. The most remarkable achievements of TERENA are:

- Setting up the first backbone interconnecting NRENs in Europe (COSINE) and the creation of an Operational Unit that later split off under the name DANTE.
- Creating the RIPE (Réseaux IP Européens) Network Coordination Centre, later a separate legal entity (RIPE NCC).
- Developing the concept of middleware, which quickly became vital in European networking collaboration.
- Embracing the concept of customer-owned dark fibre networks, opening a new paradigm of ‘quasi-unlimited bandwidth at affordable costs’.
- Supporting the international Lambda approach that led to the Global Lambda Integrated Facility (GLIF) collaboration on optical networking.
- Developing a portfolio of services including eduroam, Trusted Introducer and the TERENA Certificate Service.

To continue this success, we must collaboratively adapt to new challenges and priorities with the agility and openness that characterised our actions during the last 25 years.

The main challenges today are the free services now offered to end users historically catered to by NRENs, and the significant financial pressures on NRENs which are forcing them to extract maximum value from available resources.

On the basis of the stakeholders’ survey we have established a strategic vision to guide our actions for the next years:

- Increase and demonstrate the value of the organisation for members.
- Develop and strengthen relationships with members and stakeholders.
- Ensure long-term sustainability of the organisation.
- Establish and maintain a position of influence for the TERENA community.

This is a first step. We will adapt the strategy each year taking into account the evolution of our environment and new trends identified in the annual stakeholders’ survey. Moreover we will use the final report of the GÉANT Expert group, ‘Knowledge without Borders’, as an important inspirational document for the next version of our strategic plan.

Successful implementation of this plan will be heavily dependent on the experience and skills of the TERENA Secretariat staff, which the survey demonstrated has that capacity - but also on the support and resources TERENA receives from its members. Your continued contribution and participation is much appreciated.

I do not wish to finish without mentioning that 2011 was also marked by the tragic loss of Klaus Ullmann. For more than 25 years Klaus worked hard for the construction of a European community of research networks. He deeply influenced our activities and developments and will be sadly missed by us all.

Pierre Bruyère
President
TERENA activities are carried out under the guidance and responsibility of the TERENA Executive Committee and the ultimate authority of the TERENA membership as represented by the TERENA General Assembly.

A rapidly changing environment requires new strategies

Research and education networking is facing a rapidly changing environment. New technologies, user expectations, and service offerings by commercial companies challenge the portfolios and business models of national research and education networking organisations (NRENs).

The GÉANT Expert Group, which was created by the European Commission to articulate a 2020 vision for European research and education networking, presented its report to Commissioner Kroes in October. The report mentions a large number of challenges for NRENs. It says the situation is critical and that Europe risks losing out.

This sense of urgency was felt earlier by several European NRENs who reassessed their service portfolios and formulated new strategies. The TERENA Executive Committee undertook activities in 2010-2011 to develop new strategic directions for TERENA. Inputs were obtained from a stakeholder satisfaction survey, direct contacts with TERENA members and other sources.

A Strategy for TERENA

In the October General Assembly meeting the Executive Committee presented ‘A Strategy for TERENA’, which lists actions to meet the four strategic goals mentioned in the Foreword to this Annual Report. Those actions include:

- Develop and maintain close relationships with influential policy makers;
- Undertake more intercontinental collaboration and coordination activities.

Good reputation, increasing requests, limited resources

The stakeholder survey showed respondents were very satisfied with TERENA and its activities. Strong support was also expressed during bilateral contacts with TERENA members. It is therefore not surprising that TERENA receives ever more requests to undertake new activities. At the same time, resources are limited and priorities need to be set.

Diversification of income streams

TERENA’s long-term financial prospects need careful consideration. Membership fees have not been adjusted for inflation since 2008, and TERENA activities have become very dependent on funding from the European Union through the current GN3 project. Diversification of income streams is therefore a priority, but will take significant time. The possibilities to obtain additional funding for certain activities from TERENA members and other organisations will be explored further. Services are provided on a full-cost recovery basis and may lead to small surpluses. TERENA aims to participate in more externally funded projects that fit the strategic directions; for example, it was decided to participate in a number of proposals for small EU-funded projects that were submitted at the end of 2011. In December, TERENA was awarded a contract by the European Commission to carry out a study into authentication,
General Assembly

Meetings in 2011
19-20 May, hosted by CESNET in Prague, Czech Republic
26-27 October, hosted by Belnet in Brussels, Belgium

In May, Pierre Bruyère (Belnet) was elected President of TERENA in place of Janne Kanner (CSC), who had decided not to run for re-election. Marko Bonač (ARNES) was elected Treasurer and Agathoclis Stylianou (CYNET) was re-elected as Member at Large of the TERENA Executive Committee. Nokia Siemens Networks and Huawei Technologies were admitted as associate members of TERENA. In October Ciena Corporation was admitted as an associate member, effective from the date of receipt of its 2012 membership fee.

Presentations about outreach to non-traditional user communities and about joint procurement as an NREN service attracted significant interest in the May meeting. Joint procurement of hardware, software and services for universities exists as a full national service only in Norway and the Netherlands. It was felt that this is an area in which NRENs can learn from each other, also offering opportunities for international collaboration organised by TERENA.

The autumn meeting focused on strategy matters and the challenges for the European research and education networking community. A highlight of the meeting was the discussion of the document ‘A Strategy for TERENA’ and of TERENA’s Activity Plan for 2012, which both emphasise the strategic directions chosen. Prof. Žiga Turk, chairman of the GÉANT Expert Group, presented its report ‘Knowledge Without Borders’. Kostas Glinos, Head of Unit ‘GÉANT and e-Infrastructures’ in the European Commission’s Directorate-General Information Society and Media, discussed the possible role of the GÉANT backbone network for a European public-sector network proposed by the European Commission.

The assembly adopted TERENA’s budget for 2012, deciding not to correct the membership fees for ongoing inflation for the fourth consecutive year. TERENA’s 25th anniversary was celebrated at a special General Assembly dinner, with prominent guests from the European Commission services.

www.terena.org/about

TERENA’S ROLES IN THE GN3 PROJECT

Some of TERENA’s core activities are co-funded by the European Union through GN3: production of the annual TERENA Compendium, the Networking Development Support activities and the support provided by the TERENA Secretariat to TERENA task forces. The project also provides funding for ‘distributed GN3 workshops’ at the TERENA Networking Conferences and for GN3 training workshops, as well as the ASPIRE study, the European eduroam service, the eduPKI service, the eduGAIN service and the Partner Services Promotion activities. Two TERENA Secretariat staff members have a management role in the GN3 project, as leaders of the activities ‘Multi-domain User Application Research’ and ‘Status and Trends’. The TERENA Secretariat also contributes to the organisation of several GN3 events. All this work is reported on in this report.

www.geant.net
TERENA Membership in 2011

ASSOCIATE MEMBERS
ADVA Optical Networking
  Thomas Schneider
Ciena Corporation
  Rodney G. Wilson
Cisco Systems
  Klaas Wierenga
DANTE
  Niels Hersoug
EMBL
  Peter Stoehr
Extreme Networks
  Gerrie de Jongh
Huawei Technologies
  Bas van der Wal
Juniper Networks
  Jean-Marc Uzé
Level 3 Communications
  Robert van Beurden
Nokia Siemens Networks
  Ulrich Berger
NORDUnet
  René Buch
Tata Communications
  Yves Poppe

INTERNATIONAL MEMBERS
CERN
  David Foster
ESA
  José Fernández Balseiro

MOLDOVA
RENAM
  Petru Bogatencov

AZERBAIJAN
ANAS
  Rasim Alguliyev

IRELAND
HEAnet
  Victor Reijs
UNITED KINGDOM
  Janet
    Shirley Wood
NETHERLANDS
SURFnet
  Ilse Koning
BELGIUM
Belnet
  Pierre Bruyère
FRANCE
RENATER
  Patrick Donath
BELGIUM
RESTENA
  Antoine Barthel
SWITZERLAND
SWITCH
  Christoph Graf
PORTUGAL
FCCN
  Pedro Veiga
SPAIN
RED.ES
  Tomás de Miguel

ICELAND
RHnet
  Jón Ingi Einarsson
NORWAY
UNINETT
  Petter Kongshaug
DENMARK
UNI-C
  Ole Kjærgaard
LUXEMBOURG
RESTENA
  Antoine Barthel
CZECH REPUBLIC
CESNET
  Jan Gruntorád
SWITZERLAND
SWITCH
  Christoph Graf
AUSTRIA
ACOnet
  Ulf Busch
POLAND
PCSS
  Jan Węglarz
SLOVAKIA
SANET
  Pavol Horváth
HUNGARY
HUNGARNET
  Lajos Bálint
BULGARIA
BREN
  Krassimir Simonski
SLOVENIA
ARNES
  Marko Bonač
CROATIA
CARNet
  Zvonimir Stanić
ITALY
GARR
  Enzo Valente
MONTENEGRO
MREN
  Božo Krstajić
SERBIA
University of Belgrade
  Zoran Jovanović
ROMANIA
RoEduNet
  Sergiu Iliescu
FYRoMACEDONIA
MARNet
  Margita Kon-Popovska
GREECE
GRNET
  Panayiotis Tsanakas
SPAIN
RED.ES
  Tomás de Miguel
PORTUGAL
FCCN
  Pedro Veiga
MALTA
University of Malta
  Robert Sultana
TURKEY
ULAKBİM
  Cem Saraç
CYPRUS
CYNET
  Agathoclis Stylianou

TERENA Membership in 2011
Outreach

TERENA’s outreach programme disseminates information about TERENA’s activities and other developments, supports the development of research networking in less advanced regions, promotes information exchange and collaboration in the communications and business areas between research networking organisations, and looks into the future of research networking.

COMMUNITY INFORMATION ONLINE

In addition to information about TERENA’s many activities, the TERENA website holds other information that is of value to the research networking community. In 2011, the online calendar listed around 170 relevant events and the ‘Pearl’ Community News column published more than 260 news reports and announcements - around 43% posted by European NRENs and 32% by non-NRENs and non-European NRENs.

Information Dissemination

Sharing technical and non-technical information

TERENA makes its activities better known and establishes community contacts by participating in relevant research networking events.

The future of NRENs was the topic of presentations given by Kevin Meynell at the LITNET conference in Dubingiai in August, and by John Dyer at a December conference in Amman about integrating Arab e-infrastructures in a global environment. John Dyer spoke about the evolution of research and education networks at the EUNIS conference in Dublin in June, and about the mission of NRENs in 2015-2020 at an October conference in Vilnius celebrating LITNET’s 20th anniversary. He also presented e-infrastructure trends in Europe at the Forskningsnet conference in Korsør in November. In May, Karel Vietsch appeared on one of three TERENA conference editions of the Czech Republic’s prime-time national television programme ‘Millennium’.

At an IPv6 workshop organised by the GN3 project’s Campus Best Practices team, in Espoo in March, Dick Visser gave a presentation about issues related to IPv6 implementation in the TERENA Secretariat office.

Christian Gijtenbeek explained the TERENA-built federated event management tool ‘CORE’ at events throughout the year: its benefits to event managers were demonstrated in February to TF-CPR in Utrecht and to Internet2 via videoconference, and in March to EGI.eu in Amsterdam. Internet2 developers saw a technical demonstration in March, and in May participants at the TERENA Networking Conference had the chance to see demonstrations.

Anniversary celebrations

To celebrate its 25th anniversary, TERENA organised a video competition. More than 30 entries were received from members of the research networking community and the general public, who shared their ideas about how the Internet may change people’s lives in the next quarter century. Winners were announced during the annual conference, where participants could also record entries at the festively decorated TERENA booth. In October General Assembly members enjoyed a celebratory dinner.

Meetings with TERENA members

The TERENA Secretariat interviews TERENA member organisations in order to better understand their interests and priorities and their expectations of TERENA. In summer 2011, this effort intensified with telephone calls succeeding face-to-face meetings and all members being consulted. This exercise will be repeated in 2012.
Networking Development Support

Supporting emerging NRENs

TERENA’s Networking Development Support activity arranged both practical training and high-level events aimed at eastern Europe. The parallel focus on supporting the development and rollout of services benefited these and other regions.

The joint effort to support eduroam in six eastern European countries, begun in 2010 in collaboration with the GN3 project’s eduroam, training and Partner Services Promotion tasks, came to fruition in March 2011. A training workshop in Zagreb taught NREN technicians from eastern European and Caucasus countries how to set up eduroam and pass that knowledge on. Ongoing technical and promotional support continued thereafter.

Support for the development of identity federations and related services also took off. AMRES received technical consultancy for its activity to create a federation in Serbia. Several NRENs took training in building federated identity infrastructures through EuroCAMP workshops in June in Istanbul and in November in Amsterdam, both organised by TERENA in cooperation with the GN3 project’s eduGAIN service team.

Helping to raise awareness

A ‘Networking with Extra-Regional Partners’ session at the TERENA conference gave visibility to emerging research and education networks in Albania and Kosovo, as well as eastern Europe, and included presentations about ASREN, the Arab States Research and Education Network, and Africa Connect. In follow-up, the Networking Development Support leader, Valentino Cavalli, supported information exchange with the project developing the new Albanian research and education network ANA and arranged an event to provide feedback on ANA’s plans, to take place in Rome in January 2012.

One important goal was to raise the profile of e-infrastructures in the Eastern Partnership programme of the European Union. That programme covers Belarus, Ukraine, Moldova and the Caucasus countries, all of them either GN3 consortium associate members or connecting to GÉANT via links provided by the HP-SEE project. TERENA’s Networking Development Support activity facilitated an exchange of information between the Eastern Partnership, the EC Unit for GÉANT and e-Infrastructures, and the Romanian and Polish NRENs during a May meeting in Brussels. A resulting dialogue continued and is being followed up in the Partnership’s activities.

Eastern Europe Partnership Event

Following the success of similar events focused on the Mediterranean region, and in line with the goal to establish dialogue with the Eastern Partnership Programme, TERENA organised an Eastern Europe Partnership Event to raise awareness of the importance of developing e-infrastructures in eastern Europe. The meeting, on 7-8 November in Bucharest, targeted the geographic area from the western Balkans to Central Asia. Although many common issues affect this area, there are also differences across the regions and in the status of e-infrastructures.

Managers of NRENs, research and development advisors and e-infrastructure experts discussed the enhancement of e-infrastructures and services and their further integration with pan-European e-infrastructure activities. Politicians, civil servants and funding agency representatives heard examples of best practices in the way NRENs, Grids and e-infrastructures are organised and funded in other European countries.

The event was hosted by the Romanian National Authority for Scientific Research and organised in collaboration with RoEduNet and the EU co-funded projects SEERA-EI, HP-SEE and CEENGINE.

The first day’s presenters at the Eastern Europe Partnership Event.
An official report was prepared for publication in February 2012.

**New country needs assessments**

**Azerbaijan**

After the Azerbaijan National Academy of Sciences became a TERENA member in 2010, priority was given to understand the country’s research networking needs and to include it in efforts to support the rollout of services. Three organisations in Azerbaijan currently provide networking services to its research and education community – AzScienceNet, AzEduNet and AzRENA. In March 2011, Valentino Cavalli and Kevin Meynell (TERENA Secretariat) met representatives of the Academy of Sciences, AzRENA and AzScienceNet, to discuss issues of external representation, how to maximise investment in external connectivity, and how to improve accessibility for all research and education users in the country. Support for eduroam deployment was also discussed; by the end of the year the Academy of Sciences had signed the eduroam policy and made technical progress towards deploying the service.

In June the result of the country needs assessment was reported in a confidential document sent to key stakeholders and the European Commission.

**Armenia**

Work to assess the research networking needs of Armenia began in summer 2011. Two organisations, ASNET-AM and ARENA, currently provide networking services to research and education institutions. In November, Valentino Cavalli and Kevin Meynell were hosted by the Academy of Sciences of the Republic of Armenia and met its president and vice-president as well as other stakeholders including scientists, members of the State Committee of Science and representatives of the Armenian chapter of the Internet Society, ARENA and various institutes. There was enthusiasm for research networking and participation in TERENA and GÉANT activities as well as a strong interest in setting up services such as identity federations and eduroam. As follow-up, the Academy of Sciences later sent participants to training events initiated by the Networking Development Support activity. The study’s confidential report was due to be finalised in January 2012.

www.terena.org/development-support
New services documented

The eleventh edition of the TERENA Compendium of National Research and Education Networks (NRENs) in Europe assembled data from more than 50 organisations from Europe and other world regions. GN3 project activity leaders were invited to help formulate the questionnaire, and for the first time, the 2011 edition grouped together NRENs participating in GN3.

Almost all NRENs in the GN3 project currently provide an Authentication and Authorisation Infrastructure (AAI) or are planning to do so and, as a result, it is possible to offer a platform of bundled services for collaborative groups of users: nine NRENs participating in GN3 currently offer this and eight more are planning to introduce this.

Developments in services and technologies are closely related and interdependent. Many NRENs have made substantial progress towards deploying hybrid IP-optical networks and offering the associated end-to-end services. An example of this is that twenty of the NRENs in GN3 currently offer dedicated wavelengths (lambdas) to their customers.

NRENs now support more users, a greater usage volume and a wider range of services than ever before. All this has been achieved even though, over the past five years, overall budgets remained virtually unchanged. Staff levels have increased slightly as a result of the introduction of a new generation of networked services.

Positive review

The Compendium is appreciated as a benchmarking tool for NRENs and as an indispensable source of information for policy makers. External reviewers of the GN3 project’s second year made positive comments about the Compendium, stating that the explanations and interpretations are of good quality, it clearly identifies trends in national research and education networking, and it presents a comprehensive set of information in an understandable form.

www.terena.org/compendium

WHAT IS THE COMPENDIUM?

TERENA gathers information about national research and education networking organisations and the issues they face. An annual Compendium documents the work, budgets and users of these networks in Europe and beyond. Basic data and information about the organisation, staffing, finances, user base, capacity, services and developments are available online. The more important information is available in an online and printed publication that signals and analyses trends over time.

The TERENA Compendium provides an authoritative reference source for anyone with an interest in the development of research and education networking.

Production of the TERENA Compendium of National Research and Education Networks in Europe is financially supported by the European Union through the GN3 project.

TF-MSP

Task Force on Management of Service Portfolios

Chair: Walter van Dijk (SURFnet)

Meetings in 2011

1-2 March, hosted by Belnet in Brussels, Belgium
19-20 September, hosted by GRNET in Heraklion, Greece

Procurement and clouds

The recurring themes for TF-MSP in 2011 were procurement and clouds. An interest in the business aspects of roaming services also grew during the year.

The task force’s March meeting covered issues related to procurement - negotiating for the right deal, implications for single organisations procuring on behalf of their communities and of other NRENs, community procurement and inter-NREN service provision. The possibility of joint procurement using framework agreements was explored. The meeting resulted in the creation of a mailing list of people with a legal background and those more generally interested in exchanging further information about procurement.
The second part of the meeting questioned how NRENs might best provide cloud services to the community, either through their own private clouds or by offering access to clouds on the market.

Clouds were explored in more depth at the September meeting, with presentations from organisations active in the clouds arena, for example JISC and SURFnet. Cloud-related challenges regarding security, privacy and trust were considered in a presentation from ENISA, and various NRENs presented ‘Infrastructure as a Service’ initiatives. An outcome of the TF-MSP discussions was the setting up of a small community cloud panel, which met in the TERENA offices in October to explore and put together a community cloud strategy. It was agreed to contribute to the ASPIRE study on the adoption of cloud services and to create a new area on the TERENA website to bring together relevant information.

ROAMING INTERESTS

The task force expressed a growing interest in mobility issues during the year. In November, participants of TF-MSP took part in the TF-MNM meeting in Bologna, to discuss the possibility of making business arrangements to provide mobile network access to researchers and teachers when roaming across countries. In anticipation of updating the TF-MSP terms of reference in February 2012, the task force was polled about topics of future interest. Mobility and clouds joined customer service and client and user satisfaction assessments as the most popular suggestions.

www.terena.org/tf-msp

GOALS OF TF-MSP

TF-MSP promotes collaboration between research and education networking organisations in Europe in the management of service portfolios. It explores common organisational aspects of finding, developing and introducing new services and supporting them during their production phase and eventual withdrawal.

GN3 STATUS AND TRENDS

TERENA leads the GN3 project’s ‘Status and Trends’ activity, which consists of five separate tasks. Three of them are reported on elsewhere in this document: the production of the TERENA Compendium, the support provided by the TERENA Secretariat to TERENA task forces, and the ASPIRE foresight study. Another task, led by HEAnet, is a study of the environmental impact of research and education networks. In 2011, earlier baseline audits of the greenhouse gas emissions of GÉANT and some national networks were validated, and a new audit was carried out, of GRNET. In addition, case studies on the effect of, for example, videoconferencing and teleworking were published. The fifth task, led by UNINETT, publishes best-practices documents for campus networkers on a number of technical and organisational topics. In 2011, a substantial effort was made to disseminate these results, among others through presentations at research networking conferences.
TF-CPR
Task Force on Communications and Public Relations

Chair: Goran Škvarč (CARNet) (until 30 September 2011)
Gitte Julin Kudsk (UNI•C) (from 1 October 2011)

Meetings in 2011
10-11 February, hosted by SURFnet in Utrecht, Netherlands
15 May, Prague, Czech Republic
15-16 September, hosted by AMRES in Belgrade, Serbia

Practical training and extended collaboration

Closer integration with other groups in the research networking community is a key area of development for TF-CPR, concluded participants at the task force’s May meeting. In 2011 TF-CPR strengthened collaborative relationships with organisations not previously involved with the task force and continued its tradition of meeting back-to-back with the GN3 PR Network. Revised terms of reference were approved by the TERENA Executive Committee in September, granting another two-year mandate to TF-CPR.

Representatives from EGI.eu, Internet2 and RIPE NCC presented overviews of their communications and outreach work during the February meeting, while participants at the May meeting heard about the organisation of RedCLARA and PR communications developments in Latin America. As a result of attendance by a TF-CPR member at the RedCLARA PR meeting in Montevideo in November, the Chilean and Mexican NRENs, REUNA and CUDI, signed up to post their news on PeaR – the online community news service originated and maintained by TF-CPR. This brought the number of non-European or non-NREN contributor organisations to fourteen.

As participants reviewed TF-CPR’s terms of reference in May, they considered the evolution of the task force since its inception in 2003. Challenges now are to extend collaboration to more task forces, to promote the services they develop, and to build areas of common interest together. The use of social media by NRENs was seen as such a topic of common interest and a new work item on this area was added, with a wiki-based collaborative effort to gather social media policies, strategies, use cases and so on. Virtual meetings of a sub-group in December provided input and plans to develop this further in 2012.

Interactive approach to meetings continues

A hands-on training workshop on social media in September was fully subscribed, with participants from TF-CPR and other organisations learning strategic and practical tips for developing their social media skills and activities. This was the first time that TERENA had commissioned professional training for this group, on a shared-cost basis, and feedback showed it was worthwhile and welcome. Course materials and discussions were added to the ‘Social Media in the NREN Community’ wiki space, which is available to all TERENA wiki users.

Earlier in the year, the task force heard about other practical developments when Paul van Dijk presented the new SURFnet collaboration infrastructure SURFconext in the February gathering. This meeting included parallel workshops that focused on topics relevant to NREN communications staff and other participants alike: IPv6, Grids and multimedia.

About TF-CPR
TF-CPR promotes collaboration between research and education networking organisations in Europe in the areas of communications, marketing and public relations. It helps exchange ideas, experiences, methods and techniques among research and education networking organisations in order to improve their communications with organisations and individuals that use their services, and with other organisations that are relevant for the research and education networking community.

TF-CPR regularly brainstorm with EGI.eu participants at the February meeting.
Partner Services Promotion

Progress towards promotion of services

An expanded team tackled the promotion of eduroam, eduGAIN and connectivity services and developed relationships with relevant groups.

The PSP team grew in 2011, with the addition of a part-time project assistant at the TERENA Secretariat. As well as forging its own team approach, PSP met with the GN3 project’s teams for international cooperation, partner cooperation and project liaisons, leading to agreements about how to better support each others’ objectives.

A GN3 project deliverable completed in December 2010 was presented to the PR Network in February. At this event the nascent educonf service was first presented to the NREN communications-PR community, and PSP liaised with the service throughout the year to plan for PSP support in 2012.

Promoting eduroam

Early in the year the PSP team finalised adaptable templates for a poster, leaflet, sticker, information card, web banner and beermat promoting eduroam to end users. These were presented at a March training event for eastern European countries and were made available via the eduroam website, along with case studies of eduroam developments in Serbia and Japan. The materials were adapted for local use by RedIRIS, ARNES, Belnet, and universities in the United Kingdom, Alaska, Germany and Bulgaria, with positive feedback about their value. The task also handled requests by AzScienceNet and Belnet for the eduroam video provided in 2010 by AARnet to be translated into local languages, and produced news reports about the first use of eduroam at an IETF event and about technological developments related to the ‘F-ticks’ tool and eduroam’s use of the eduPKI service. In December PSP agreed a plan with AzScienceNet to promote eduroam and prepared materials targeting campus IT managers, to be made available via the service’s website.

Highlighting benefits

PSP led an interactive eduGAIN workshop at the February PR Network meeting, which provided input to the service’s developing marketing plan. With eduGAIN becoming a production service in April, the PSP team reviewed existing web content and online promotional materials and surveyed participating countries about promotional plans. A focus on promoting the benefits of inter-federation to service providers and identity providers was agreed. Slides highlighting benefits were created and provided to the eduGAIN team to support their presentations at NREN and other conferences. The slides were also later used by the Networking Development Support team during a visit to Armenia and by the GN3 project’s International Cooperation team during a November RedCLARA meeting in Uruguay.

PSP also explored synergies with the work of REFEDS (Research and Education Federations). The eduGAIN and REFEDS websites were cross-linked and existing federations’ promotional materials were gathered in the wiki-based community repository and publicised to the NREN PR and federation mailing lists. An update on eduGAIN progress and promotion was presented at the PR Network meeting in Belgrade in September. Detailed improvements to the eduGAIN website were proposed in December, when a short presentation about PSP support for federations’ promotion to service providers and identity providers was given to EuroCAMP training participants in Amsterdam.

Keeping you connected

The task supported the developing Bandwidth-on-Demand service by coordinating interactive discussions at both the September and February PR Network meetings, yielding ideas that were incorporated in marketing plans and service developments.

More generic support for connectivity services took shape in 2011. The PSP team proposed and developed a concept and storyboard for a simple, modular video about NREN and GÉANT connectivity services. Feedback on the idea and content was provided by NREN communications-PR staff during the September meeting, by relevant GN3 project team members, and by Péter Szegedi (TERENA Secretariat), who advised on technical aspects. Options for production, costs and cost-sharing were explored and an indication of interest was sought from the NRENs, showing a majority in favour of taking the video into production early in 2012.

www.terena.org/activities/psp/

WHAT IS PSP?

TERENA leads the Partner Services Promotion (PSP) task in the GN3 project’s Networking Activity ‘Communication and Promotion’. PSP helps national research networking organisations to prepare and implement plans for the promotion of end-user services, by facilitating the exchange of ideas, experience and expertise between organisations in different countries, by coordinating collaborative work to create and adapt promotional and training materials, and by offering individual support to NREN-specific activities. The GN3-related services that were ready for PSP promotional support during 2011 were:

- eduroam
- eduGAIN
- point-to-point services (lightpaths)
ASPIRE
A Study on the Prospects of the Internet for Research and Education

Looking to the future of research networking

ASPIRE was launched with a workshop on 23-24 May in Berlin. Around 60 invited participants from a range of backgrounds discussed many topics that the study could focus on and identified strategic areas for future development of the research and education networking community.

Students from three European institutes presented position papers on mobile computing and mobility in education, the use and advantages of virtualisation for study purposes, IPv6 mobility and opportunistic encryption, and next-generation social networks built around European institutions.

Participants considered how NRENs could build on their strengths and experience by playing a brokerage role and by integrating services from diverse sources for their users. NRENs’ knowledge in developing and using middleware was also seen as a strong, rich area for development. Participants envisioned an increasingly important role for social media in supporting teaching and research, although NRENs may not have a central function in developing these services. Community cloud services may also be a long-term area of growth.

During the summer, the ASPIRE team consulted with several commercial companies to get their perspective on how the Internet might develop to support research and education. In October the study’s topic areas were confirmed:

- the adoption of cloud services;
- the integration and use of mobile device connectivity;
- middleware and managing data and knowledge in a data rich world;
- the future roles of NRENs.

Four small panels of experts were set up, involving representatives from the commercial and research and education worlds, including people from radio astronomy, genomics, performing arts, digital culture, high-energy physics as well as NRENs. Each panel will produce a report using their own knowledge supplemented with surveys, research and community discussions. The panels held several videoconferences towards the end of 2011, with the first physical meetings planned for January 2012.

Spreading ASPIRE’s reach

To spread the word about ASPIRE and gain maximum input, John Dyer (TERENA Secretariat) gave presentations about the study at the April meeting of e-IRG in Budapest and at the October GN3 Innovation Workshop in Copenhagen.

www.terena.org/aspire

ABOUT ASPIRE

TERENA’s ASPIRE foresight study follows the SERENATE and EARNEST studies that were completed in 2003 and 2008. ASPIRE is funded by the European Commission as part of the GN3 project and runs from 1 April 2011 until 31 July 2012.

The TERENA General Assembly heard an update about ASPIRE during its October meeting.

BELOW: John Dyer (TERENA Secretariat – right) with students Julius Kriukas (Kaunas University of Technology, Lithuania) and Anton Karneliuk (Belarusian State University of Informatics and Radio Electronics (BSUIR)) and RIGHT: with Steven Newhouse (EGI.eu) at the Berlin ASPIRE workshop.
Through its projects and task forces, the TERENA Technical Programme supports European collaboration in developing, testing and evaluating innovative networking technologies, applications and services. It brings together technical specialists in the research networking community from many countries. Two TERENA bodies assist the management of the Technical Programme: the Technical Advisory Council and the TERENA Technical Committee.

Technical Advisory Council

Meeting in 2011
16 May, Prague, Czech Republic

Participants in the annual meeting of the Technical Advisory Council discussed various topics: three they prepared in advance in response to questions sent by the TERENA Secretariat; two led to concrete actions to be followed up in 2011 and 2012.

Jan Meijer (UNINETT) presented some views on how the European research and education community could address cloud services in a coordinated fashion. The ensuing discussion contributed to a decision that TERENA should arrange a meeting later in the year to identify actions and initiatives. A Cloud Panel meeting was held in the TERENA office on 17 October and, ultimately, led to TERENA leading two initiatives that would potentially materialise early in 2012: the submission of an FP7 project proposal and a pilot for a Trusted Cloud Drive Facility.

Another question was whether TERENA has a role to play in gathering together the NREN community to discuss new network architectures, as for some time there has been no forum for NRENs to exchange information about their national network architectures. The suggestion was mentioned in phone calls between representatives of TERENA member organisations and the Secretariat management team during the summer. It was agreed that TERENA would follow up by organising a one-off event.

Other topics presented during the meeting were about the interest of NRENs in supporting requirements of network researchers, the Janet 3G service, a short talk by Robert Kisteleki (RIPE NCC) to raise awareness of World IPv6 Day, and SURFnet’s OpenSocial platform, which was presented by Niels van Dijk (SURFnet), who explained how federations can leverage social networking applications.

www.terena.org/about/tac
www.terena.org/about/tech

TERENA Technical Committee

Committee members
Christoph Graf (chair)
Vicente Goyanes (from 19 December)
David Groep (from 19 December)
Josh Howlett
David Kelsey (until 19 December)
Jan Meijer
Lígia Ribeiro (until 19 December)
Esther Robles
Karel Vietsch (ex officio)
Valentino Cavalli (secretary, ex officio)

Meetings in 2011
17 March, 21 June, 24 November, Amsterdam, Netherlands
13 April via webconference

The technical and non-technical sides of TERENA work drew closer together in 2011: a new mechanism was established to cross-pollinate between the task forces, and the TERENA Technical Committee shifted its interest to a broader ground.

The need for cross-linking between TERENA’s technical and non-technical activities and a recognition that many non-technical activities have technical relevance were discussed during the year’s first meeting and were revisited

Vicente Goyanes (University of Vigo) joined the TTC in 2011. He also became a work item leader in TF-Media.
throughout the year. As a result it was clarified that the Committee’s role is not limited to technical task forces and projects, but is to advise TERENA on any technical elements across all types of activities. One result was the inclusion of more Secretariat staff in Committee meetings. Another was the creation of a mechanism, coordinated by TERENA’s Chief Technical Officer, to ensure synergy and avoid fragmentation between different task forces. This initiative brings together all task-force chairs and secretaries in a limited number of meetings per year and through a dedicated mailing list. These changes and other new ideas will be reflected in a revision of the terms of reference of the Technical Programme in 2012.

During the summer the Committee approved the TERENA project to add IPv6 support to the popular open-source GNU Gatekeeper, which is described elsewhere in this report. In November the committee also approved the new terms of reference for TF-Media, to come into effect in January 2012.

www.terena.org/about/ttc

TF-CSIRT
Task Force on Collaboration of Security Incident Response Teams

Chair: Lionel Ferette

Meetings in 2011
1-2 February, hosted by la Caixa in Barcelona, Spain
2-3 June, hosted by Jumper C-SIRT in Malahide, Ireland
22-23 September, hosted by RESTENA and CRIC in Luxembourg, Luxembourg

Old and new relationships examined

The task force reconsidered its modus operandi during 2011, and contemplated its relationship with an emerging security community. TF-CSIRT also contributed legal and technical expertise to ongoing European developments.

The task force received regular updates about the CERT.EE-initiated project ‘AbuseHelper’, a framework to automate incident report processing based on various inputs such as blacklists, intrusion detection systems and Whois. A May workshop, hosted by Belnet, drew several task force participants to help identify improvements to be made, tools to modify, legal issues to overcome and how to implement statistical analysis. AbuseHelper allowed for automated collection and handling of incident data, but lacked an easy way of tracking trends and creating alerts. One solution would feed AbuseHelper data into the widely used RTIR (Request Tracker for Incident Response) software, generating and linking tickets to allow batch resolution of common incidents. A modified version of WikiBot, ‘RtirBot’, which uses pre-configured templates and the RT REST API to submit tickets, was demonstrated at the September meeting.

At this event, Andrew Cormack (Janet) presented an update to his 2010 paper on incident response and data protection. The amendment addressed how improved automated processing can limit the need for manual inspection, and issues surrounding the identification of DDoS (Distributed Denial of Service) victims. TF-CSIRT published this version on its website as input to an ENISA report on legal barriers to information sharing, and as advice to EU Data Protection Directive revisions.

TECHNICAL TASK FORCES

TERENA task forces are open groups of experts from the research and education networking community at large. Each task force is a forum for discussion and information exchange as well as a platform for collaboration on specific work items. Task force participants work together on defined and focused programmes laid down in the task force’s terms of reference. Secretariat support for the technical TERENA task forces is funded by the European Union through the GN3 project.

Old and new community contacts

A hot topic in 2011 was DoS attacks on the global DNS (Domain Name System). Country Code Top Level Domain (ccTLD) registries are heavily regulated and follow similar security lines as in the CSIRT community. CENTR, the European ccTLD association, invited TF-CSIRT participation in a June meeting in Trondheim to consider incident handling and coordination. This sparked discussion about how the task force could best involve this emerging community in its activities and a return invitation was issued.

During the course of the year, the task force heard about the activities of new and established security teams, including: CESICAT-CERT - part of a foundation set up by the Catalan government to support information security in the region; Team Cymru – a Chicago-based non-profit organisation; BTCERT - an investigatory team that coordinates internal computer and network security incidents across the BT enterprise; GOVCERT.LU - created in July 2011 to provide incident handling and response capabilities to Luxembourg’s government ministries; and CERT-DEVOTEAM – the re-branded former APOGEE SecWatch, which provides CSIRT activities for DEVOTEAM across 24 countries.

The task force continued its successful collaboration with FIRST, combining meetings and a seminar early in the year,
GOALS OF TF-CSIRT

TF-CSIRT promotes collaboration between Computer Security Incident Response Teams (CSIRTs) at the European level and liaises with similar groups in other regions, providing a forum where members of the CSIRT community can exchange experiences and knowledge in a trusted environment. Participants in TF-CSIRT are actively involved in establishing and operating CSIRT services in Europe and neighbouring countries.

Proposal to restructure

Average attendance at TF-CSIRT meetings in recent years has been 65 participants, around 60% of whom were from academic CSIRTs, 20% from government teams, 15% from commercial CSIRTs, and 5% from other types of organisations. In recognition of this, the fact that TF-CSIRT has established itself as the primary European forum where CSIRTs can discuss and exchange experiences and knowledge, and that the task force has established significant spin-off activities such as Trusted Introducer (TI), TRANSITS and RTIR, the group re-examined its purpose and structure during 2011.

A proposal to restructure TF-CSIRT and TI was presented to the TERENA Technical Committee in March, progressed in the June task force meeting where a working group was formed to give feedback, and continued to develop at the end of the year, with plans to implement changes in 2012.

www.terena.org/tf-csirt

REFEDS

Research and Education Federations

Meetings in 2011
15 May, Prague, Czech Republic
14 September, co-located with IRISC workshop in Helsinki, Finland
2 October, BoF at Internet2 Fall Member Meeting in Raleigh, North Carolina, United States

Steering Committee:
Andrew Cormack (Janet)
Joost van Dijk (SURFnet)
Ken Klingenstein (Internet2)
Ingrid Melve (UNINETT)
David Simonsen (WAYF)
Milan Sova (CESNET)

REFEDS strengthens its identity and voice

The success of work completed in the first REFEDS year (August 2010 to August 2011) and the progress made in raising the profile of REFEDS as the single point of contact for research and education federations led to agreements in summer 2011 for renewed sponsorship by REFEDS members. A steering committee of active community experts was appointed in July, for a two-year term, to oversee the execution of the yearly REFEDS work plan and to provide recommendations for future activities. A new work plan (from September 2011 to December 2012) and the budget to execute it were approved in October.

A new website was launched in March to give a focus and voice to the combined efforts of identity federations worldwide, to provide organisations making use of federations with tools and information, and to highlight REFEDS activities. Federations’ promotional materials were collected on the REFEDS wiki and shared with the NREN communications-PR community via the GN3 project’s Partner Services Promotion task.

Engaging with other communities

A key objective is for REFEDS to engage with other communities that have an interest in using federations. In November, Licia Florio (TERENA Secretariat)
presented REFEDS activities at a workshop on federated identity systems for scientific collaborations that was organised by CERN at the Rutherford Appleton Laboratory (UK). It was agreed that REFEDS and the e-science community would engage more closely to address the identified usability issues that affect federations. Nicole Harris (JISC Advance) collected issues, as perceived by service providers when joining federations, and compiled an initial set of recommendations for them, ‘Barriers for Service Providers’. A final set of guidelines is included in the new REFEDS work plan and will allow REFEDS to better engage with service providers.

PEER project
In June 2011, on behalf of REFEDS, TERENA contracted a Spanish firm, YACO Sistemas, to develop PEER (Public Endpoint Entities Registry) software. PEER provides a secure metadata repository, look-up service and web interface that allow end entities - service providers and identity providers - to register, store and easily retrieve each other’s metadata. PEER could also be used as an auxiliary tool for eduGAIN or for national federations to handle their metadata.

As a result of initial PEER tests towards the end of 2011, requests were made for features to be added to bring the software to a production-level release, with anticipated completion in March 2012. Further plans are to explore ways to offer a PEER pilot service for the research and education community.

The PEER work is reviewed by a committee chaired by Leif Johansson (NORDUnet) and is financed by a number of REFEDS sponsors, in particular the Internet Society. The PEER software is gaining interest outside the academic community.

Other work item results
In collaboration with eduGAIN, the REFEDS ‘Attribute Release’ working group began looking at attribute release for federations and interfederations and defining recommendations to handle attribute release in a scalable way for service providers and identity providers. The first findings were presented by the group leader Steven Carmody (Brown University) at the September meeting. An updated version of the recommendations became available towards the end of 2011, with finalisation due in February 2012.

In October, Andrew Cormack (Janet) published a document providing an overview and recommendations on how to implement federated access management systems in order to reduce the amount of personally identifiable data that is exchanged, in accordance with the European Directive 95/46/EC.

www.refeds.org

EVOLUTION OF REFEDS

REFEDS began in 2005 as an interest group within TF-EMC2, looking at policies that define procedures and guidelines for interoperability of federations. With the growing number and broadening deployment of identity federations in Europe and beyond, REFEDS became a global forum with regular participation from across five continents. It covers technical and outreach topics about privacy, assurance, relationships with partner communities and support for emerging federations. REFEDS work is partly based on voluntary contributions and partly financed by sponsors. Central support is provided by Licia Florio (TERENA Secretariat) and Nicole Harris (JISC Advance), who works as a subcontractor to TERENA.
GOALS OF TF-MNM

The development and deployment of network middleware technologies to support interoperable mobility and roaming services are becoming key activities among research networking organisations and research institutions. TF-Mobility and Network Middleware promotes the standardisation and adoption of such technologies.

Klaas Wierenga (seated) and Licia Florio take a break from middleware activities during TNC2011, chatting with Tomi Dolenc (ARNES)

TF-MNM
Task Force on Mobility and Network Middleware

Chair: Klaas Wierenga (Cisco Systems)

Meetings in 2011
16 February, hosted by Renater and CRU in Lyon, France
30 June, online
9 November, hosted by GARR in Bologna, Italy

Providing an inclusive forum

The task force continued to welcome participation from all world regions, which added value to TF-MNM as a forum for consultation. Strategies for liaising with commercial mobile providers were a key area of interest.

The work item ‘enabling ubiquitous mobility’ fed into the creation of a new task within the GN3 project during 2011. Updates during task force meetings highlighted the current situation and showcased the work of three NRENs.

The February gathering heard how some NRENs are investigating the landscape of mobile virtual network operators, which may allow them to make roaming agreements with each other. The use of the ‘eduroam’ SSID supports automatic offloading from 3G to WiFi, which is an advantage to the research and education community. Mobile operators are struggling to keep up with the growth of 3G/4G traffic from mobile devices.

Leif Johansson (SUNET) presented the report of a consultant with a background in 3G-LTE (Long Term Evolution), which focused on business approaches with mobile operators and how the research and education community can participate and benefit.

In November, the role and interest of TF-MSP in the area of mobile strategy was discussed by John Dyer (TERENA Secretariat). Mike Norris presented HEAnet’s work collaborating with mobile operators. He said off-campus WiFi was not explored because hotspot providers were pulling out of the market, which has moved from providing paid WiFi at service locations to supporting mobile offload and providing free WiFi with advertising.

Frans Panken (SURFnet) presented a trial in which SURFnet partnered with KPN to perform the first LTE user trial in the Netherlands on a campus site: the integration of LTE with eduroam (and at what level it is realised) is one of the topics that will be studied.

A wide world perspective

TF-MNM continued to enjoy the strong support and participation of non-European organisations in 2011. In the February meeting, Philippe Hanset (University of Tennessee, Knoxville) presented an overview of progress with eduroam in the United States. In November, Hideaki Goto (Tohoku University) explained the most recent iteration of the Delegate Authentication System in Japan, which supports integration with the Japanese identity federation GakuNin for end-user enrolment in a ‘cloud’ eduroam IdP. This decouples the eduroam service provider and identity provider roles, because, as it is becoming increasingly popular to outsource WiFi services in Japanese campuses, there is no local RADIUS infrastructure to support an eduroam identity provider.

The task force provided a forum for consultation about the revision of the GN3 project’s European eduroam confederation policy in 2011, and the participation of people from outside Europe provides a useful perspective in discussing details and promotes consistency with regions following the European lead.

RADIUS/TLS and eduPKI

As part of the work on supporting eduroam, the pros and cons of using certificate services for secure RADIUS (RADIUS over TLS) were examined. The November meeting concluded that collaboration with eduPKI should continue as the preferred, and only, accredited Certification Authority under the eduroam Trust Profile, because it can issue certificates for every federation-level RADIUS server, which is a broader audience than other Certification Authorities can serve at this time.

www.terena.org/tf-mobility
TF-EMC2
Task Force on European Middleware Coordination and Collaboration

Chair: Diego Lopez (RedIRIS) (until 8 November)
Roland Hedberg (Umeå University) and Victoriano Giralt (University of Malaga) (from 8 November)

Meetings in 2011
14-15 February, hosted by Renater and CRU in Lyon, France
29 June, online
7-8 November, hosted by GARR in Bologna, Italy

Exploring synergies and evolving services

As long-standing work items evolved towards normal services to the community, newer work items showed progress in their early steps. The task force provided a forum for promotion of and feedback to ongoing projects and initiatives.

The February task force meeting covered an array of efforts on Levels of Assurance, including specifications, compliance, audits and the drivers for adopting this extension to current federation practices. Participants heard regular updates throughout the year about Project Moonshot, which is an integral part of the task force portfolio. The virtual meeting in June focused on progress in the service-oriented collaboration infrastructures work item. Niels van Dijk (SURFnet) summarised progress of OpenConext, the open source version of SURFconext, and how its support for collaborative communities fed into a collaborative portal infrastructure to support the arts and humanities being developed by Project Bamboo. The project’s plans were presented by John Pybus (University of Oxford) and synergies with other initiatives were noted: Bamboo software could provide a use-case for eduGAIN in supporting humanities research, and the GEMBus registry could support Bamboo with a heterogeneous service registration, Secure Token Service and workflow and composition services.

An update on the community outreach work item concentrated on collaborative efforts to respond to the European Commission’s tender for a study on authentication, authorisation and accounting platforms and services for scientific data / information resources – which was awarded to a TERENA-coordinated consortium in December with work to be undertaken in 2012. The work item on alternative forms of expressing identity, led by Diego Lopez, looked at a range of identity services including STORK (Secure Identity Across Borders Linked), the European project to establish a cross-border e-identity platform, and how national identity card services and security and vetting processes are aligned or complement academic identity federations. Although these systems use the same protocols predominant in academic identity federations, the national level integration constraints are a barrier to interfederation.

Schema for Academia evolves

SCHAC, the well-established schema used in Europe and other world regions for inter-institutional data exchange, took an evolutionary step in 2011. Work was completed to update the registry hosted

ECAM
European Committee for Academic Middleware

ECAM continued efforts to raise the profile of TERENA’s middleware activities and provided input to plans for the project to succeed the current GN3 project.

In March, Licia Florio (TERENA Secretariat) represented ECAM at the second meeting of SSEDIC (Scoping the Single European Digital Identity Community), the initiative to provide a platform for collaboration on a strategy for a single European digital community. The University of Malaga, represented by Victoriano Giralt, is one of 33 partners in SSEDIC, and TERENA decided to join as an associate partner.

Victoriano Giralt also provided ECAM with updates on the Rome Student Systems and Standards Group (RS3G) and their November Coding Camp, which held live interoperability tests between different consortia of student information systems.

In 2011, a series of workshops on federated identity management started, organised under the auspices of the European E-infrastructures Forum, focusing on the authentication and authorisation requirements of large scientific communities and research infrastructures. ECAM ensures that the research networking community is represented, to explain the solutions that academic federations and interfederations can currently offer, and to take user group requirements back to the community. The first workshop took place at CERN in Geneva in June. Of the use cases discussed, some are easily achievable but many would be challenging for federations to accomplish. The second workshop was held in November at Rutherford Appleton Laboratory in the United Kingdom.

As part of TERENA’s requested input to the development of ideas for GN3+ - the project to succeed GN3 - ECAM consulted the middleware task forces’ work item leaders about activities that could benefit from development within the project.

www.terena.org/ecam

WHAT IS ECAM?

The European Committee for Academic Middleware (ECAM) promotes innovative and open middleware technologies and infrastructures and advises TERENA on new emerging middleware technologies. It helps TF-EMC2 and TF-MNM to coordinate their work. ECAM members are work item leaders from these task forces, plus invited community experts from related middleware fields, and meet monthly via teleconference.
GOALS OF TF-EMC2

TF-EMC2 focuses on identity infrastructure and application-oriented middleware. The goal of TF-EMC2 is to promote the development and deployment of open and interoperable middleware infrastructures among national and regional research and education networking organisations, and academic and research institutions.

by TERENA and to obtain a shorter namespace. The URN registry supports current and legacy names and allows country specific subdelegations, so country-specific data can be more easily maintained. The registry was completed in summer 2011 by Victoriano Giralt (University of Malaga) and Dick Visser (TERENA Secretariat). In August the IETF published an informational request for comments (RFC 6338) detailing a shorter SCHAC namespace and later gave its approval. This makes SCHAC less wedded to a regional service and more an independent schema. The completion work was presented by Victoriano Giralt during the November task force meeting. In December it was announced that migration to the new namespace will take place throughout 2012 ready to stand alone in 2013.

Diego Lopez, who had chaired TF-EMC2 since its inception in 2004, stepped down as chair when he ceased working for RedIRIS.

www.terena.org/tf-emc2

TF-Storage
Task Force on Storage

Chair: Jan Meijer (UNINETT) (until 3 February)
Maciej Brzeźniak (PSNC) (from 4 February)

Meetings in 2011
3-4 February, hosted by NIIF/HUNGARNET in Budapest, Hungary
19 May, Prague, Czech Republic
16-17 June, hosted by GRNET in Athens, Greece

Thinking about clouds

Besides the usual data storage and management topics, an important development for TF-Storage in 2011 was a new focus on resource clouds, which became the dominant theme for the second half of the year. Other work items made good progress. Task force participants from industry made valuable contributions.

The ‘measuring storage performance’ work item developed throughout 2011, gathering information and best practices in a storage benchmarking study, migrating information to a new wiki in February, and agreeing that NRENs and vendors would benefit if they could agree

Diego Lopez chaired TF-EMC2 for around eight years.

Maciej Brzeźniak at TNC2011
on best common practices and recommendations for testing complex storage systems. During the June meeting, Cisco Systems offered to review wiki content from the vendor perspective and FORTH volunteered to give a scientific perspective. Feedback will be incorporated into the wiki in 2012.

The task force invited several commercial companies to present information about their storage offerings. National updates from NRENs and other institutions provided a useful picture of the status of data storage infrastructures and services. During the June meeting, Andy Vallely (Cisco Systems) gave a technical overview of the Fibre Channel over Ethernet (FCoE) protocol.

Clouds, strategies and proposals
Early in the year work began to develop a green paper on NRENs’ strategic perspective on storage technologies and services, with a special focus on cloud storage. TF-Storage participants provided input and the document was compiled by Péter Szegedi (TERENA Secretariat), who presented it for further feedback at the March meeting of TF-MSP before publication in April. The May task force meeting featured a panel discussion which concluded that only a large-scale, pan-European cloud initiative could provide the economic benefits and technical advantages demanded by the global research and education user community. Whether large-scale cloud storage will replace traditional, mostly national, storage solutions or NRENs will play a key role in building and / or brokering cloud services for end users, remains to be seen. Some NRENs, for example, CESNET, NIIF/HUNGARNET, PSNC and GRNET, reported that they had procured and installed computational and storage hardware in several locations, put open-source cloud manager software on top and had started testing. Technical discussions about Infrastructure-as-a-Service clouds followed during the June meeting. In July the European Commission issued a project call on cloud computing, Internet of services and advanced software engineering. Maciej Brzeźniak (PSNC) and Peter Stefan (NIIF) initiated a project proposal that the task force developed towards the end of the year. The RECIPE proposal was submitted in January 2012.

www.terena.org/tf-storage

ABOUT TF-STOREAGE

TF-Storage facilitates discussions among national research and education networks and academic and research institutions about open and interoperable data storage, management infrastructures and services. It provides a forum for the exchange and promotion of ideas, experience and knowledge and for gathering storage expertise. The task force liaises with other communities such as Internet2 and APAN and those involved in Grids and high-performance computing.

For smaller universities and colleges, the reliable and secure handling of large amounts of scientific data is not economically and/or technically viable. By moving data off campus, there is an opportunity for NRENs to provide backup services, and even complete disaster recovery or cloud services. TF-Storage discussions help to further NRENs’ efforts in this field.
The FileSender project was inspired by TF-Storage discussions and uses the task force as one of its fora for building a funding, developer and user community. FileSender web-based software makes transfer of large files easy and uses SimpleSAMLphp to allow for a wide variety of federated authentication methods. The software is released under the BSD license and available for free.

Following the release of the stable 1.0 version of FileSender in January, several new production sites sprung up. By the end of 2011, production FileSender services were known to be offered by AARNet, ARNES, Belnet, FCCN, HEAnet, i2CAT, Srce, TERENA and UNINETT, and at least six more NRENs were known to be testing the software with the intent to build a service. In November, version 1.1 was released enabling uploads of any size using native HTML5 functionality available in modern browsers, a feature unique to FileSender.

A FileSender open discussion session at the TERENA conference was a success and was attended by more than 40 people.

The FileSender core team is funded by AARNet, HEAnet, SURFnet and UNINETT. Belnet and ARNES contributed significant funding in 2011.

www.filesender.org

TF-NOC
Task Force on Network Operation Centres

Chair: Stefan Liström (NORDUnet)

Meetings in 2011
15-16 February, hosted by ARNES in Ljubljana, Slovenia
15 May, Prague, Czech Republic
28-29 June, hosted by SWITCH in Zurich, Switzerland
11-12 October, hosted by Belnet in Brussels, Belgium

New task force takes rapid steps to success

Following the initial TF-NOC meeting in September 2010, the task force progressed quickly with the defined work items. It established interaction with the GN3 project’s Access Port Managers, holding meetings back-to-back in February and June.

A slide template prepared in 2010 was used by fourteen NOCs to present themselves to the task force in 2011, with effort set to continue in 2012 to collect a complete ‘Taxonomy of NOCs’, supported with audiovisual recordings. It became clear that there are great differences between NOCs regarding their size, role, procedures, organisational structure and purpose, and whether or not they are part of NRENs. Non-NREN NOCs participating in the task force are operated by CERN, SARA, CESCA (the Catalan regional network), USLHCnet and Indiana University, which provides the NOC for Internet2.

To further investigate NOC patterns, an online survey was created during the May meeting, finalised in June, and sent to task force participants in July. Around 80% of questions related to NOC tools, and the leader of the NOC tools work item, Maria Isabel Gandia Carriedo (CESCA), put significant effort into the survey preparation work and initial analysis. Preliminary results were presented in the October meeting, where a sub-group was formed that held subsequent videoconferences to analyse the data further. Towards the end of the year the task force chair was invited to present the results to the UK Network Operators Forum early in 2012.
GOALS OF TF-NOC

Network Operation Centre functions are essential, costly and critical to the main business of national, regional, metropolitan and campus network providers. There is great diversity in the organisation, structure and roles of NOCs. It is also hard to find information about common practices in their day-to-day operations. NOCs usually cope with similar issues, but use different tools, procedures and workflows.

TF-NOC brings together NOC managers, engineers, developers, operators, controllers and project managers interested in NOC functions to share experience and knowledge as well as to investigate the creation of best common practices.

Trading tools

As part of the October meeting, the task force held a workshop on open-source NOC tools, where participants showcased custom-made tools in a kind of ‘dating service’, drawing them to the attention of other NOCs. Together, the workshop and survey analysis revealed two major tools that most NOCs are using: Cacti – a complete network graphing tool – and Nagios – an IT infrastructure monitoring tool. It was agreed to arrange a follow-up workshop focusing on these two tools in 2012, to bring together key developers and use cases, and to explore possibilities for collaborating on improvements.

www.terena.org/tf-noc

GN3 Multi-domain User Application Research

TERENA leads the Joint Research Activity for multidomain user applications in the GN3 project. This activity encompasses three different tasks. The first addresses roaming developments with the objective of enhancing the current eduroam infrastructure and exploring new roaming technologies. The standardisation of RADIUS/TLS (formerly known as RadSec) progressed well and approached a final stage. The RADIUS/TLS protocol enables data transmission through an encrypted tunnel and its introduction in eduroam allows users to establish secure point-to-point connections with their home institutions no matter where they are. The eduroam Operational Team is deploying RADIUS/TLS. The Roaming task developed two tools, to improve eduroam statistics gathering in real time and to generate custom-made installers that configure eduroam on various platforms. The former went into production in 2011 and the latter should be available for testing in 2012.

The second task addresses issues that arise when different identity federations inter-operate. This task produced a website, Federation Lab, which offers best practices as well as tools to debug SAML metadata; the site is regularly enriched with new additions to the existing tools and gained popularity among SAML developers. Towards the end of 2011 the Identity Federation task started work to implement the specifications of OpenID Connect, a framework to exchange identity information via APIs. This new technology was embraced by industry (Google, Microsoft etc.) and the research and education community also has great interest in it. OpenID Connect may become the dominant standard in the identity space and the team worked to deliver the first implementation. This will become available on the Federation Lab website.

The third task, ‘GEMBus’, will provide a framework to support the composition of services using the functionality available in existing services. It will provide a service bus through which services can be made available to each other in different combinations. In 2011, the GEMBus architecture was finalised and was demonstrated at the TERENA conference. By the end of the year, some GEMBus core elements became available and further development will be done in 2012 to offer a GEMBus platform for experimentation.
GOALS OF TF-MEDIA

NRENs can play different roles, such as to survey and analyse, provide and maintain, or develop and enhance multi-media management, repository, and distribution back-end systems and services, taking into account the special requirements of the academic and research community.

TF-Media provides a forum in which NRENs and universities collect and share ideas, knowledge and experiences on how to support media applied to educational (e-learning) as well as to research/scientific purposes. Thanks to their unique relationship with the user community and with pan-European (and global) collaboration, NRENs, through TF-Media, can advise, facilitate and guide the research and education community to change from the old national, institutional, and language-centric teaching and learning model, to the new borderless, highly mobile, interactive, and disciplinary-centric education and research environment.

TF-Media
Task Force on Media Management and Distribution

Chair: Andy Zbinden (SWITCH)

Meetings in 2011
30-31 March, hosted by SURFnet in Utrecht, Netherlands
1 September via Adobe Connect
27-28 October, hosted by FCCN and ISEP-IPP in Porto, Portugal

Evolving with a change in focus

The task force encouraged local participation of representatives from universities, as well as NRENs, by combining meetings with national workshops. The increasing diversity of TF-Media participants stimulated a change of approach and focus as the task force prepared to renew its terms of reference.

The March meeting was held back-to-back with a SURFnet MediaMosa workshop and the October meeting was co-located with an FCCN workshop about media technology services. Both NRENs made significant contributions to the TF-Media community during the course of the year. SURFnet not only maintained the MediaMosa open-source code, it promoted its features and helped other organisations to build their own services based on it. FCCN gave significant support to Portuguese universities with its repository service, and actively participated in all task force meetings. The University of Vigo in Spain was also a valued contributor, regularly participating in meetings and providing technical support to record the Porto meeting in October.

Survey success

An anonymous online survey to investigate strategic, technical and service elements and plans for multimedia systems was a significant achievement for the task force in 2011. It was finalised during the March meeting and was launched in early April in an effort to understand the diversity of tools and practices in the research and education community. The survey was open to any type of organisation and collected information about the lecture recording or multi-purpose (multi)media management platforms and services available, planned, and under development. The data were analysed and made accessible in a searchable way so anyone can do their own analysis. A visual summary ‘poster’ was planned and worked on at the end of the year, which task force participants will be welcome to adapt and use for their own purposes.

Reflection and renewal

The October meeting was largely concerned with preparation for renewal of the task force’s terms of reference. Participants reflected on the purpose and goals of TF-Media and heard short talks and had lively brainstorming sessions on defining the scope of the task force and the main interest areas. Having begun as
GNU Gatekeeper

**GNU Gatekeeper becomes IPv6 compliant**

A 2011 project organised by TERENA and co-financed by seven NRENs succeeded in making the open-source GNU Gatekeeper (GnuGk) fully IPv6 compliant, with the corresponding code and documentation freely available online.

GNU Gatekeeper (GnuGk) is a full-featured H.323 gatekeeper, available freely under General Public License (GPLv2). Gatekeepers form the basis for a free IP telephony (VoIP) or video conferencing system.

In August, CESNET initiated the project idea and contacted TERENA about cost-sharing options. Earlier, eduCONF - a GN3 project task dedicated to the development, creation and coordination of support tools for European higher education and research videoconferencing services - had conducted a survey to determine the level of interest in a pan-European videoconferencing platform. The results showed that GnuGk usage was and would continue to be significant, and that there was also remarkable interest in IPv6.

Using the eduCONF contacts and its own channels, TERENA sought organisations willing to contribute to funding the development work. AARNet, ARNES, CARNET, CESNET, GARR, HEAnet and UNINETT agreed, and many other NRENs expressed support.

Jan Willamowius (GNU Gatekeeper Consulting), the lead developer of GnuGk, was contracted to develop the new version of the software, including coding, testing interoperability, creating beta versions for testing, and publishing the final work under GNU Public License version 2, which happened in November.

This development means that GnuGk 3.0.0 offers full traversal zone support, full IPv6 support (including IPv4-IPv6 proxying), RTP (Real-time Transport Protocol) multiplexing, improved H.235 password authentication with neighbours, and a massive performance improvement when (re-)loading large numbers of gateway rewrites. The source code and its documentation are available at the GnuGk code repository.

www.gnugk.org

TERENA projects are regulated by contractual relationships between TERENA and a subcontractor. Often they are pieces of work that originate from TERENA task-force activities but cannot be completed with volunteer effort alone. Sources of funding vary depending on the size and scope of the project. Very small projects can be funded by TERENA from its own resources, but larger projects require financial contributions from TERENA members and possibly other interested organisations. In 2011 there were three TERENA projects: REFEDS and the TCS Portal Project, which are reported on elsewhere in this document, and the GNU Gatekeeper project.

www.terena.org/tf-media

TERENA PROJECTS

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ABOUT THE TERENA CERTIFICATE SERVICE

TERENA member organisations participating in the TERENA Certificate Service have the possibility of offering their research and education constituencies five types of certificates:

- server certificates - for authenticating servers and establishing secure sessions with end clients;
- e-science server certificates (IGTF compliant) - for authenticating Grid hosts and services;
- personal certificates - for identifying individual users and securing e-mail communications;
- e-science personal certificates (IGTF compliant) - for identifying individual users accessing Grid services;
- code-signing certificates - for authenticating software distributed over the Internet.

The service started on 1 July 2009 and is based on a three-year contract between TERENA and Comodo CA Ltd. The contract also allows research and education institutions in the countries that participate in the service to purchase EV (Extended Validation) certificates from Comodo at a reduced price. EV certificates are issued after a more thorough vetting process than with other certificates, and can be used to secure online financial transactions.
TCS maintains a steady service

Twenty-six NRENs participated in the service during the year, including SANET (Slovakia), which joined in the summer. At the end of 2011 an extension to the contract between TERENA and Comodo was agreed, continuing the current arrangement until the end of June 2013.

In 2011, about 27,000 server certificates were issued, compared to about 36,000 in the previous year. This decrease was to be expected as, in many countries, the scientific community’s initial demand for server certificates was becoming saturated, while demand to replace certificates that were valid for three years had not yet started. On the other hand, the number of personal certificates issued doubled from 2010 to 2011, as did the number of code-signing certificates.

As well as the extension to the contract, agreement was reached with Comodo to remove the restriction on the use of TCS certificates to secure financial transactions from 1 July 2012. Towards the end of the year, the TERENA Executive Committee agreed a new charging scheme for the period July 2012 – June 2013. In the scheme, the fees to be paid to TERENA by participating NRENs depend on the size of their countries. This was seen as fairer, because large countries have larger research and education communities and can therefore benefit more from TCS than small countries.

www.terena.org/tcs

TCS Portal Service

A scalable, centralised solution for personal certificates

Following a year-long pilot phase, the TCS Portal Service was launched as a production service on 1 May 2011. The service is available for a fixed fee to any NREN subscribed to the TCS personal certificate service with access to an identity federation.

TERENA subcontracted Austad IT (Norway) to maintain the Confusa software used by the portal, and Tilburg University (the Netherlands) to host and operate portals for the issuance of TCS e-science personal certificates and TCS personal certificates.

The service provides NRENs with a simple, inexpensive and scalable solution for issuing these certificates for users in their communities. It uses a shared portal to automatically issue certificates after authentication has been undertaken by an identity provider (usually part of an identity federation). This method scales well to large volumes of users as the verification of users’ identities is delegated to their home institutions and only needs to be undertaken once. By sharing a centralised, web-based portal, participating NRENs take advantage of economies of scale in portal hosting and operational costs - the need and the associated cost for an individual NREN to host and maintain their own portal is eliminated.

The service succeeded the TCS Portal Project (January 2010 – April 2011), which was funded by a number of NRENs: ACONet, Belnet, CSC/Funet, Forskningsnettet, GARR, RENATER, SURFnet, SUNET and UNINETT. The national TERENA members from the same nine countries subscribed to the Portal Service, while IUCC (Israel) joined the service in December 2011.

HOW DOES TI WORK?

Many research and education networking organisations, commercial Internet service providers, telecommunications operators and governments have established CSIRTs to deal with network security incidents. TERENA's Trusted Introducer (TI) service builds a ‘web of trust’ between CSIRTs. Collaboration between trusted teams is very important because incidents often originate from outside the network that is affected.

TI fosters trust by collecting and publishing information about CSIRTs, accrediting those that meet certain criteria. The information is regularly checked to ensure that CSIRTs still fulfil the criteria. Accredited CSIRTs can participate in closed meetings that are organised back-to-back with TF-CSIRT meetings. They hear sensitive and confidential information about incidents and threats. TI also provides accredited CSIRTs with statistical information, a re-encrypting secure mail gateway and out-of-band alerting. The addition of a new ‘certification’ level of the service, in 2010, strengthened ties of trust still further.

The Trusted Introducer service is provided by PRESECURE GmbH, under contract with TERENA. TERENA pays PRESECURE for provision of the service and covers these expenses from fees paid by the accredited and certified CSIRTs. The Trusted Introducer Review Board reviews the operations of the service and addresses any issues that may arise.

Trusted Introducer

Trusted Introducer Review Board
Lionel Ferette (chair)
Przemek Jaroszewski (CERT POLSKA)
Kevin Meynell (TERENA Secretariat)
Erika Stockinger (CERT-SE)
Wilfried Wöber (ACOnet-CERT)

A new supplier and developing plans

With the contract between TERENA and S-CURE, the Trusted Introducer provider, due to expire at the end of August 2011, in February TERENA issued a call for prospective suppliers to express their interest in taking over provision of the service. After a competitive tender exercise, PRESECURE Consulting GmbH was selected as the new supplier in June.

PRESECURE was chosen because it offered the most economically advantageous proposal. PRESECURE is a long-established participant in the global and European CSIRT communities, was a subcontractor to the previous supplier S-CURE, and offered tailored consultancy to CSIRTs embarking on the certification process.

PRESECURE took over responsibility for the service from 1 September with a three-year contract. This covers both the TI accreditation and certification services and includes an improved service level agreement, online updating of team information, best-effort incident response coordination, and an improved website. PRESECURE will handle all IT service aspects of the service with the contributions of Klaus-Peter Kossakowski and Antonio Liu (PRESECURE), Don Stikvoort (S-CURE) and Miroslaw Maj (Cybersecurity Foundation).

During the year, agreements were reached on improving the website, information updating and general service. This was considered in conjunction with proposals to restructure TF-CSIRT, which originated TI and still maintains a close relationship with the service. Discussions continued through the end of the year, with plans to implement changes in 2012.

Certified and accredited teams

During 2011 the Swedish teams TS-CERT and SE-CERT were certified. Newly accredited teams included: ESISS (UK), S21secCERT (Spain), CIRCL (Luxembourg), CSIRTCV (Spain), CSIRT.CZ (Czech Republic), DanishGovCERT (Denmark), CSIRT-MU (Czech Republic), CERT-DVT (France), CERT-GE (Georgia), CORIS-STSI (Romania), AZ-CERT (Azerbaijan), CSIRT.SK (Slovakia) and DANCERT (United Kingdom). During the year, the United Kingdom teams RBSS-ISIRT and DCSIRT were de-accredited, as was the Latvian team DDIRV, which merged with CERT NIC.LV to form CERT.LV.

www.trusted-introducer.org
TACAR®
TERENA Academic Certification Authority Repository

TACAR following a steady course

Since its inception TACAR has offered great value to the IGTF (International Grid Trust Federation) communities, which rely on digital certificates to authenticate their users. Since 2010 it has also supported GN3 project services: TACAR is used to store Certification Authorities’ root certificates that comply with the specific certificate profiles issued and managed by the eduPKI service.

The continued operation of the standard TACAR service during 2011 was funded by TERENA. The eduPKI CA joined TACAR during the year, bringing the total number of root certificates stored in the repository to 63.

* TACAR is a registered trademark of TERENA

www.tacar.org

WHAT IS TACAR?

Since its launch in 2003, TACAR has become a trusted online store of trust anchor certificates, related certificate policies and certificate practice statements registered by the Certification Authorities (CAs) of organisations in the academic community.

TACAR does not evaluate the policies adopted by the CAs nor enforce compliance with any particular technical minimum requirements. This has proven to be a strength, as it allows TACAR to cooperate with different Policy Management Authorities which are better placed to assess policies. TACAR has become the official repository of the International Grid Trust Federation (IGTF), and the majority of the CA root certificates hosted by TACAR have been accredited by the IGTF. TACAR also supports the GN3 services.

eduPKI
European Public Key Infrastructure service

eduPKI goes into production

TERENA leads the eduPKI service, which is a task within the GN3 project’s Multidomain User Applications activity. Work progressed on time during 2011: in March, eduPKI became a production service and began working with various GN3 project services to define trust profiles determining what their certificates should include.

With the launch of the full service, eduPKI can provide a suite of tools that offer a consistent, robust and secure way to use digital certificates for the GN3 project.

Having delivered a trust profile for eduroam towards the end of 2010, by January 2011 eduPKI CA’s Registration Authority for eduroam was in operation, allowing eduroam identity and service providers to request tailored SSL (Secure Sockets Layer) certificates. In April the eduroam trust profile and eduPKI CA policy were updated and the eduPKI PMA accredited the eduPKI CA under the terms of the trust profile.

In July a new eduPKI trust profile was defined, for certificates covering the GÉANT Multi-Domain Network Service activity’s tools and services, including perfSONAR, cNIS, I-SHARe, AutoBAHN and Bandwidth-on-Demand. In September the CA policy was updated to support this.

With eduPKI CA able to issue certificates in compliance with both trust profiles, the eduPKI service reached its goal to support those GN3 services that use digital certificates.

www.edupki.org

WHAT IS EDUPKI?

The eduPKI service developed within the GN3 project supports other GN3 services by defining their security requirements and providing them with digital certificates. A number of GN3 services build their trust on X.509 certificates and some have very specific requirements regarding their trust procedures and the contents of certificates used. Many NRENs also operate national PKIs and provide X.509 certificates for their constituency. Whenever possible, eduPKI relies on existing national Certification Authorities, thus offering a federated service.

The eduPKI service consists of:
- eduPKI PMA (Policy Management Authority) - the heart of the service. It defines procedures for eduPKI as a whole, and analyses and categorises services’ requirements.
- eduPKI CA (Certification Authority) - a dedicated Certification Authority that supports users of GN3 services who cannot obtain service-specific certificates from national CAs and / or for test purposes.
- TACAR is used as a trusted support tool to list CAs supporting eduPKI-proposed solutions.
ABOUT EDUROAM

Conceived in 2002, eduroam® was started as a pilot service early in 2003 under TF-Mobility, with six countries taking part initially. Now eduroam has become a global service. Participating research and education institutions in over 45 countries worldwide offer eduroam to students, teachers, researchers and other staff, allowing them to obtain network connectivity across campus and when visiting other participating institutions without the inconvenience of guest accounts or extra passwords.

Because eduroam removes the requirement for visitor accounts, it reduces the administrative and support burden for IT support staff within thousands of institutions, many of which own and operate the service’s infrastructure. National and pan-European coordination of this infrastructure is undertaken by the National Roaming Operators and the European eduroam Operational Team that is funded by the GN3 project and participated in by TERENA Secretariat staff. Outside Europe, eduroam is also available in Australia, Canada, Hong Kong, Japan, New Zealand, Papua New Guinea, Taiwan and the USA, and is under development in some African countries.

ABOUT GEGC

The Global eduroam Governance Committee was constituted in November 2010 with seven senior representatives of roaming operators (ROs) in North America, Asia-Pacific and Europe. TERENA finalised the summary charter for global eduroam governance after extensive consultation with eduroam leaders from these regions. The GeGC members are officially appointed by TERENA on the basis of nominations from their national or regional confederation or regional groups of ROs. In order to ensure interoperability between eduroam regions, all eduroam ROs are notified when new organisations sign the statement and are officially recognised as ROs by the GeGC, or if there are any changes in service. They are also consulted by the GeGC about any developments or changes in the standards. TERENA provides the committee with secretariat support.

eduroam®

Education Roaming

Global eduroam Governance Committee
Paul Dekkers (SURFnet)
Hideaki Goto (Tohoku University)
Jens Haeusser (University of British Columbia)
Philippe Hanset (University of Tennessee, Knoxville)
Miroslav Milinovic (Sreć - chair)
James Sankar (AARNet) (until 21 July)
Klaas Wierenga (non-voting expert member)
Stefan Winter (RESTENA)
Neil Witheridge (AARNet) (from 21 July)

Meetings in 2011
10 January, 9 February, 9 March, 26 May, 23 September, 5 December, via videoconference

Global governance sets the standard

New global standards for eduroam were formulated in 2011 and signed by representatives of three key world regions. While the service continued to develop and spread, work also progressed to expand eduroam in new ways.

The Global eduroam Governance Committee (GeGC) held its first meeting early in 2011 and composed a ‘Compliance Statement’, which was the first formal outline of technical and organisational standards for the eduroam service offered globally by roaming operators (ROs). Being authorised by the GeGC to operate the eduroam service is now contingent upon compliance with this statement. This development provides a framework for eduroam to expand further while maintaining a high and consistent standard of service that ensures connection for all users anywhere in the world. In December the compliance statement was signed by representatives of the national ROs in Australia, Canada, Japan and the United States as well as the confederation of national ROs in Europe. Further signatures from ROs in Asia, Africa and Latin America were being sought at the end of the year.

eduroam spreads and grows

Representatives of the Azerbaijani and Belarusian roaming operators attended training in Zagreb in March, which was organised with the collaboration of the European eduroam Operational Team (OT). Further technical support was provided throughout the year. Azerbaijan, Belarus and Moldova participated in technical interoperability tests with the European eduroam confederation in the latter part of 2011, with their membership in the GN3 eduroam federation to be approved at the GN3 project consortium early in 2012.

At the 32nd APAN meeting in New Delhi in August, OT member Brook Schofield (TERENA Secretariat) secured agreement from the hosts of the next two meetings, in 2012, for eduroam to be available at the conference, introducing it to TEIN3 and APAN participants and initiating its deployment in these countries.

Technical developments

Two work items in TF-MNM have eduroam as their focus – providing a public forum in which members of the GN3 project’s Joint research activity for eduroam technical developments can interact with experts outside the project, and coordinating best practice in eduroam deployment and operation outside Europe. In addition two other work items bore fruit, related to eduroam, in 2011.

The ‘location awareness’ task included the development of the ‘eduroam companion’ app and the expansion of eduroam into public transport services. The app was developed by Janet and the University of Southampton and uses the GN3 monitoring database; a development version was presented at the TERENA conference and it was released in December. In partnership with Greyhound Coaches, Janet started a trial of eduroam aboard coaches on four routes across the United Kingdom.

Such expansion of eduroam into public spaces is also the aim of the ‘enabling ubiquitous mobility’ work item, which looks at eduroam integration with mobile operators using commercial, in addition to academic, hotspot locations. An on-campus trial of 4G/LTE began in 2011 by SURFnet and KPN will examine how the integration of eduroam with LTE may be realised. To encourage eduroam deployment, HEAnet offers rebates for sites that implement it and HEAnet brokered a deal with O2.

eduroam is a registered trademark of TERENA

www.eduroam.org
eduGAIN

Easing the goal of interfederation for research and education

TERENA participates in the GN3 project’s eduGAIN task and is active in its policy group. In 2011 new initiatives were developed for federation and service provider participation in eduGAIN.

The eduGAIN team developed a new approach in its quest to reach a wider audience of potential participant service providers by empowering individual identity federations to liaise with service providers in their countries, becoming the single point of contact on behalf of the community of federations. Service providers would need to talk only with their home / preferred federation to offer their service to the wider federation community. From October, the eduGAIN team began coordinating with identity federations’ account managers and with REFEDS, with interest in this concept expressed initially by a small group of federations. The Dutch federation, SURFfederatie, talked with BioOne – a collaboration of scientific societies, publishers, and libraries, which provides access to peer-reviewed research in the biological, ecological, and environmental sciences – and signed a contract in December, with plans to test connectivity in 2012. The eduGAIN team planned to further develop this model in 2012, gradually involving more federations.

Internships and developments

A plan to ease federations into eduGAIN participation took shape in 2011. Brook Schofield (TERENA Secretariat) proposed that students participating in the New Zealand Summer of eResearch could work with the New Zealand identity federation, Tuakiri, with funding from GN3, to develop the necessary workflow in their federation management tool to support eduGAIN requirements and benefit other federations using the same software. The project started in July with the submission of proposals, and students started work in November, continuing until March 2012.

Training and advocacy

The eduGAIN team liaised with the Development Support activity to organise two EuroCAMP training events in 2011 (reported elsewhere in this document), where NREN and campus participants learned to set up federated identity infrastructure and pass that knowledge on to their local community. A training event immediately preceding the GN3 Symposium in October equipped participants with the knowledge needed to participate in eduGAIN, and to support the adoption of the service within their own constituencies.

During 2011 the eduGAIN web content was upgraded and migrated to a new microsite managed by the GN3 Project Office, separating the public facing content from the administrative and technical content targeted solely at federation operators.

Brook Schofield gave a presentation about eduGAIN at the New Delhi APAN conference in August.

www.edugain.org

WHAT IS EDUGAIN?

With nationally deployed Authentication and Authorisation Infrastructure (AAI) systems, controlling access to networks, services and applications it is currently necessary for organisations to join one another’s federation in order to establish the relationship necessary to exchange information across these systems. The eduGAIN service being developed in the GN3 project will allow AAIs to interact, enabling the sharing of data between federations and providing an interconnection framework to applications willing to provide their services, content or resources to multiple federations. In April 2011 the eduGAIN production-level service was launched and by year’s end had grown to support more than 10 national identity federations.
WHAT IS GLIF?

GLIF is an international virtual organisation that promotes lambda networking – using interconnected wavelengths of optical light (lambdas) over optical fibres – to support demanding scientific applications. Through participating organisations, GLIF coordinates lambdas to create an international infrastructure that supports data-intensive scientific research. It also focuses on middleware development, to improve the facilitation of this infrastructure and to better support demanding applications. GLIF participants are research and education networks, research institutes and other organisations that voluntarily contribute network resources (equipment and / or lambdas), and / or participate in activities to further the goals of optical interconnection.

GLIF’S activities are organised in working groups:

The Governance Working Group is chaired by Kees Neggers (SURFnet). Maxine Brown (UIC) and Larry Smarr (UCSD) lead the Research and Applications Working Group, which promotes the use of super-networks by new generations of scientists. In 2011 both co-chairs of the Technical Issues Working Group stood down – in February Lars Fischer (NORDUnet) took over from Erik-Jan Bos, who was ending his employment at SURFnet, and in September Gigi Karmous-Edwards (NCSU) stepped down, to be replaced in 2012.

GLIF Secretariat
Global Lambda Integrated Facility

GLIF events in 2011
24-25 February, Technical Working Group Meeting in Hong Kong, China
20 April, Open Exchange Point Discussion Meeting, in Arlington, United States
13-14 September, Annual Global LambdaGrid Workshop hosted by RNP in Rio de Janeiro, Brazil

Exciting demonstrations and task force progress

TERENA is contracted by GLIF participants to provide secretariat support as a service to GLIF, organising meetings and maintaining the website. This work is funded through voluntary contributions by a number of GLIF participants. In 2011, 24 organisations provided sponsorship amounting to almost 57,000 euro. The number of GLIF participants grew from 60 to 62.

The February GLIF meeting was held in conjunction with the APRICOT-APAN 2011 Conference. Updates were presented on the progress of the Open Grid Forum’s OGF Network Service Interface (NSI) Working Group and the GLIF Campus Networking Task Force. It was decided to close the Generic Network Interface Specifications (GNI-API) Task Force as it had completed its objectives and to move effort to the OGF NSI Working Group. The LHCOME (Large Hadron Collider Open Network Environment) project was introduced as a use case for dynamic circuits. A panel discussion produced agreement on a roadmap towards an NSI implementation and automated GOLE (GLIF Open Lightpath Exchange) pilot service by the end of 2012.

More than 50 people attended both the sessions and the main attraction, the first demonstration of the scheduled (book-ahead) provisioning of Layer 2 circuits over the Automated GOLE pilot infrastructure, which was promoted with a poster created by TERENA. Prior to the demonstration, Jerry Sobieski (NORDUnet) presented an architectural proposal for defining, engineering and verifying performance guaranteed connection services. Discussion about the potential creation of a task force within the GLIF Technical Working Group to cover these issues followed at the September meeting.

September was the first time that GLIF had held its annual workshop in South America, with around half of the 120 participants coming from that region. The plenary session highlighted the value of networks in research on space, particle physics, engineering visualisation and the Brazilian aircraft industry.

The Research and Applications Working Group session focused on how Green ICT (information and communications technologies) can reduce power and cooling requirements. The Campus Networking Task Force presented results of its campus networking survey, which showed the challenges in answering the technical and non-technical issues of the end-sites. The possibility of TERENA taking a further role in this area was discussed,
with a suggested end-to-end workshop for campuses in 2012. As this task force had reached its goals, it was closed. The GNI-API and Resource Allocation Task Forces were also concluded with plans for further work in two new task forces, on NSI Implementation and End-to-End Performance Verification. The Governance Working Group discussed the future role, strategy and funding of GLIF. Similar themes were discussed in a panel session on whether lambda networking would remain the domain of big science or become more accessible to ordinary users.

A live “NSI Plugfest” including seven different domains was a demonstration of progress towards deployable software incorporating the NSI-CS (NSI - Connection Service) protocol and framework, assisted by the Distributed Topology Exchange Task Force. A University of Sao Paulo 4K visualisation tiled display wall featured both collaboration software for sharing multiple windows of information and high-performance audio-visual media transmitted from the University of Essex in the UK. The dynamic set-up and tear-down of lightpaths between user institutions of RNP in Brazil and Internet2 in the US, demonstrated the interoperation of their respective Cipó (pre-production) and ION (production) on-demand dynamic circuit services.

**WHAT IS NRENUM.NET?**

NRENum.net uses special DNS (Domain Name System) record types to translate a telephone number into a URI (Uniform Resource Identifier) or IP (Internet Protocol) address that can be used in Internet communications. It provides a solution for seamless dialling interconnection between multiple technologies in countries where the standard system, the “Golden ENUM Tree”, using ENUM (E.164 Number mapping) technology, is unavailable, and it facilitates services such as VoIP (Voice over IP) and videoconferencing.

TERENA ensures the coordination of this pre-existing service, following a proposal by the Task Force on Enhanced Communications Services (TF-ECS), which concluded its activities in 2008.

**NRENum.net**

**ENUM service for academia**

Member meeting in 2011
23 March, via videoconference

The NRENum.net service became more robust in April with a change in its operational structure: NIIF took over from SWITCH on running the primary DNS and CARNet provided an additional secondary DNS alongside the one that SWITCH operates. That same month, AMRES joined the service, followed by SigmaNet in September, bringing the number of member countries to 13.

During the year, NRENum.net members discussed the value of the service, with a focus on the interoperable VoIP services operated by universities or provided by NRENs as a hosted service for their national community. Because of its lightweight policy, NRENum.net offers a good starting point for countries wanting to introduce the Golden ENUM tree managed by RIPE NCC. For example, after extensive 3-year testing with NRENum.net, FCCN decided to migrate its service to the Golden Tree in 2011. Such testing, either before or in parallel with the ‘official’ ENUM use, is a good use case for NRENum.net. Further, some world regions cannot currently join the Golden ENUM service because of how the E.164 numbering plan is set up, or, in some countries, other administrative difficulties block its use, whereas NRENum.net’s policy does not rule out these participations. In 2011 it was discussed whether the NRENum.net service could be a good address mapping solution for services other than voice, for instance, the educonf pan-European videoconferencing service under development in the GN3 project.

RIPE NCC has an ENUM working group that is in charge of operating the Golden ENUM Tree. At the RIPE meeting in Amsterdam in May, Péter Szegedi (TERENA Secretariat) presented NRENum.net as an apolitical NREN-tailored service that can be used as a way of piloting ENUM. He reprised this talk at the Internet2 Fall Member Meeting in Raleigh, North Carolina, where Internet2 expressed interest in joining NRENum.net as a way of testing for ENUM and dialling to Europe. AARnet also expressed interest in the use of NRENum.net for its enhanced VoIP service as part of the AARNet Unified Communications Exchange (AUCX) service. Péter Szegedi was invited to present again at the November RIPE meeting in Vienna, about how TERENA coordinates the NRENum.net service.

www.glif.is

www.nrenum.net

0
10000
20000
30000
40000
50000
60000

May June July August September October November December

Total number of DNS queries (data collection started in May 2011).
Conferences and Workshops

TNC2011 – FACTS AND FIGURES

In Prague, 541 participants from 53 countries attended the conference, which was rated very highly by attendees. Participants welcomed the award for ‘best student poster’ and TERENA’s 25-year anniversary video contest. Particular praise went to the overall organisation and the high quality of the network and streaming.

Sponsorship was provided by the European Commission, Nokia Siemens Networks, Cisco Systems, Huawei Technologies, ADVA Optical Networking, Juniper Networks, RIPE NCC, Vidyo, Custom Connect, Ciena, Infibera, Comodo, Extreme Networks, Level 3 Communications, ACCESS ICT, Invea Tech, AV MEDIA, INTERCOM SYSTEMS, Czech Ministry of Education, Youth and Sports, Mashable, IDG, the Czech Technical University in Prague and CESNET.

Ten out of more than a hundred papers presented at TNC2011 were selected for online publication as the conference proceedings:

www.terena.org/publications/tnc2011-proceedings

Twenty-nine posters were shown in the poster exhibition and can be seen online along with archived streams of presentations:

http://tnc2011.terena.org/schedule

During TNC2011, 8390 users from 56 countries viewed the presentation streams, with almost 150 simultaneous users at any time, making it an online event as much as a face-to-face conference.
How can research and education networking enable communities?

TNC2011 participants heard a wide range of topics in plenary and parallel sessions addressing the conference theme, ‘Enabling Communities’.

The opening presentation brought participants into the micro and nanoworld. Jaroslav Koča (Central European Institute of Technology) showed how microbes recognise human cells and how understanding the molecular and atomic interactions involved is necessary for influencing these processes with drugs. Computer simulations and modelling help substantially, but the calculations required are intensive. The ability to use a grid of computers via high performance networks is therefore a big plus.

Two aspects related to our digital world were addressed in plenary talks by Pradeep Sindhu (Juniper Networks) and Cees de Laat (University of Amsterdam). The former addressed the outlook for networking in the face of rising demands. The latter talked about the use of state-of-the-art network technologies in support of e-science. Examples from high-energy physics, radio-astronomy, dike engineering and medical research showed how networking enables research collaboration on a new scale.

Ian Bird (CERN) talked about the successful first year of the LHC (Large Hadron Collider) project, demonstrating that the Worldwide LHC Computing Grid (WLCG) infrastructure supports huge data volumes and large-scale distributed analysis. He gave an overview of the technical implementation of the distributed computing infrastructure, and described how the collaboration and infrastructure make use of evolving technologies.

How community is created and what can go wrong was addressed by Andrew Cormack (Janet) in his plenary presentation. He considered examples from both the real and on-line world, celebrated some of the NREN community’s successes and suggested issues likely to arise as we continue to develop and expand our communities.

HI-TECH LIVE DEMONSTRATIONS

- A 3D HD video of robot-assisted surgery was transmitted to the venue via a dedicated 10 gigabit link. The MVTP4K equipment used for 3D transfer was developed in a CESNET research project.
- A demonstration of a 40-100 Gbit/s transparent alien lightpath was also an experiment to gain experience in setting up very long haul photonic connections passing through several different domains, working on transport protocols and tuning, and monitoring and measuring latency and throughput.
- CESNET gave TNC participants a chance to interact remotely with a CAVE virtual environment via a dedicated 10 gigabit link and MVTP4K, which converted two video HD channels with minimal transport delay and jitter.
- A multipoint videoconference using CERNET’s DVTSplus technology focused on a medical endoscopy, included participants from 7 countries, and was moderated by University of Kyushu. With servers in Beijing and the Czech Republic, this VC tested the capability of new software designed by CERNET.
- CESNET demonstrated real-time long-distance uncompressed 4K video and audio streaming with content including film and scientific visualisations from the CineGRID Exchange project.
- PSNC demonstrated a prototype stereoscopic 4K 3D streaming application basing on JPEG codec software. The 1 Gb/s bandwidth required was supported by a dedicated link between PSNC and CESNET.
ALSO AT TNC2011

For the first time, TERENA ran a competition at TNC, part of its 25-year anniversary celebrations. The video contest culminated at the conference and was won by Tomi Dolenc of ARNES (Slovenia). Around 30 submitted videos can be seen on www.youtube.com/terenatube.

The federated, open-source system behind the conference website and organisation – CORE - was demonstrated to the community at TNC2011 as a tool available for their own event organisation. https://tnc2011.terena.org/core

Also new was the ability to subscribe to individual sessions or to the whole TNC2011 schedule, so people could stay up-to-date whether attending in person or following video streams online. https://tnc2011.terena.org/core/schedule/list

For the second time, TERENA provided TNC participants with a webspace where they commented on the event via social media, clocking up more than 1152 tweets and 21 blog posts, 25 YouTube videos, 168 Flickr photos and attracting more than 12,320 queries to the ‘Coverage’ web page: http://tnc2011.terena.org/coverage

Benjamin Jochheim (Hochschule für Angewandte Wissenschaften Hamburg) won a prize for ‘best student poster’, sponsored by Cisco Systems. His poster is at: https://tnc2011.terena.org/core/poster/29

‘Daily impressions’ of TNC2011 and video interviews with participants and speakers were recorded by a team from the Czech Technical University in Prague. The videos are available online: https://tnc2011.terena.org/web/media/video

In the closing plenary, John Wilbanks (Creative Commons) looked at the value of open access to the transformational power of the Internet. The Sciences Commons initiative provided an example of how NRENs could support this effort.

Events around the conference

Surrounding TNC2011 were a record number of smaller events, including TERENA task force meetings, project meetings and workshops. Four sponsors held special workshops: the Juniper Networks R&E Summit 2011, the Cisco Smart and Green Infrastructures Symposium, an ADVA Optical Networking event focusing on ‘The New Agile optical Core’, and ‘Telepresence by Huawei: face-to-face communication in true-to-life dimensions’.

Birds of a Feather meetings were held on a range of topics. One sought to build an e-culture community in Europe. Another showcased visions for the future of borderless collaboration. Webconferencing was the focus of a BoF where NRENs and users’ strategic perspectives were collected. A proposal for establishing a global trust and identity system, and a range of issues related to on-demand infrastructure provisioning were discussed in others.

Other TERENA and project meetings held during the conference week are mentioned elsewhere in this report. http://tnc2011.terena.org

EuroCAMP

European Campus Architecture Middleware Planning

Workshops in 2011

21-23 June, hosted by ULAKBIM in Istanbul, Turkey (training EuroCAMP)

28 June 2011, hosted by EIFL, in Minsk, Belarus (executive EuroCAMP)

29 November - 1 December, hosted by TERENA in Amsterdam, Netherlands (training EuroCAMP)

13-14 December, hosted by SURFnet in Utrecht, Netherlands (developers’ EuroCAMP)

Successful training and developing ideas

Two successful training EuroCAMPs taught NREN and campus representatives how to implement federated identity infrastructure. This was organised in collaboration with eduGAIN and Networking Development Support and was the first time that EuroCAMP delivered content on behalf of another activity. A developers’ EuroCAMP focused on problems and solutions in group management and federated services, while the executive EuroCAMP raised awareness among managers and policy makers.

The training workshops were particularly aimed at countries in eastern Europe and the southern Caucasus, to support the Networking Development Support focus on this region. Benjamin Andersen (WAYF) and Bart Ophelders (K.U. Leuven) provided the training and materials at both events, which attracted a total of forty people from nineteen countries.

In the first event, participants learned about the tools and skills necessary to deploy identity infrastructure and to pass that knowledge on effectively. As this training was well received, and as other potential participants had expressed interest but been unable to take part, it

Tomi Dolenc (centre) receives the video competition prize from Janne Kanner (left) and Miroslav Milinović at the TNC2011 closing plenary session.

RIGHT: Laura Durnford (TERENA Secretariat) interviews keynote speaker Jaroslav Koča.
was decided to re-run the event a second time in the same year. Based on feedback, the training format was improved by focusing on key components required to build a federated identity infrastructure and giving specific attention to the management of identity provider and service provider information for both mesh-and-hub and spoke federation models using the JANUS Metadata Registry.

The success of both workshops highlighted the benefit of meeting community needs with a combination of training, development support activities and advocacy. In 2011 it was further recognised that non-technical support in areas such as policy, operations and developing business cases, and a focus on helping countries without national identity federations to build one would be beneficial. Possibilities for EuroCAMP training to support this will be explored in 2012.

Developer’s EuroCAMP
The Utrecht event built on results of the developers’ EuroCAMP that had been held in Vienna in 2010. Technology specialists, campus administrators and middleware and application developers from thirteen countries around the world first collaboratively agreed the programme for the event, based on their specific areas of knowledge or problems needing the most attention. Of keen interest were topics such as inhibitors to federating a service, application federation readiness, identity assurance, and attribute aggregation and account linking.

Nat Sakimura (OpenID Foundation) presented an overview of OpenID Connect and led a discussion about the need for the research and education community to be involved in this developing standard.

A main theme was the gap between the needs of research infrastructures and the middleware solutions currently available. By bringing together the research infrastructure groups with problems and the people developing solutions, it was agreed that EuroCAMP should work on key problems that delay federating services.

Executive EuroCAMP
Brook Schofield gave a presentation at the General Assembly meeting of the Electronic Information For Libraries organisation, EIFL, in June. He focused on federated access and how to start data handling policy discussions, thereby raising awareness of these matters among policy makers and managers in the library world. This executive EuroCAMP was also used to promote the training EuroCAMPs.

www.terena.org/eurocamp

WHAT IS EUROCAMP?
Since 2005, TERENA’s EuroCAMP (European Campus Architecture and Middleware Planning) workshops have been reaching out to the European campus community and promoting state-of-the-art middleware technologies. Their aim is to develop the knowledge and skills needed by staff involved in the set-up of identity management systems for authentication and authorisation. TERENA receives advice from experts in the community about its EuroCAMP programmes.

From 2010, three types of EuroCAMP are offered:
- ‘executive EuroCAMPs’ raise awareness among campus IT managers and policy makers of campus middleware solutions;
- ‘developer EuroCAMPs’ bring together developers of campus middleware and applications to work on the latest developments;
- ‘training EuroCAMPs’ train campus networkers in the rollout and operation of readily available middleware technologies and services.

Participants of the Istanbul EuroCAMP at work and leisure.
TRANSITS
CSIRT Training Workshops

Workshops in 2011
25-26 January, sponsored by ENISA, hosted by European Central Bank in Frankfurt, Germany
6-8 April, hosted by SWITCH in Zurich, Switzerland
(TRANSITS-II)
8-9 September, co-organised by IRISS and sponsored by ENISA, hosted by Institute of Technology Blanchardstown, Dublin, Ireland

Advanced training takes off

The new TRANSITS-II advanced training was run for the first time in 2011. The TRANSITS-I course continued to attract enthusiastic participants.

Two ‘standard’, TRANSITS-I training events took place during the year. Twenty-eight trainees from 18 organisations in 12 different countries joined the workshop in Germany. The September event trained 32 participants from 25 organisations in 15 countries. Don Stikvoort (S-CURE) and Jaap van Ginkel (University of Amsterdam) were trainers at both events. In March they were joined by Wilfried Wöber (University of Vienna), Serge Droz (SWITCH) and Wayne Routly (DANTE), while in September Wim Biemolt (SURFNet CERT) and David Pybus (DIAGEO) gave training.
The first TRANSITS-II
Following on from the pilot run in October 2010, fifteen experienced CSIRT members from 13 non-profit and commercial organisations in 9 countries participated in the first TRANSITS-II advanced training course in April. This focused on four main areas: forensics, NetFlow analysis, CSIRT exercises and communication. Peter Haag and Adrian Leuenberger (SWITCH-CERT) presented materials on forensics and on network flow analysis, developed by SWITCH. Participants learned how to retrieve and handle data needed in a legal investigation, and practical techniques for forensically reviewing an incident. They learned how to deal with NetFlow logs in a practical way, including an introduction to the NfSen and NFDUMP tools which help extract and view the data. For the first time, Don Stikvoort presented a new ‘soft skills’ module on communication techniques to assist relationships between technical staff and their management colleagues. Miroslaw Maj (Cybersecurity Foundation) presented exercises such as ‘fire drills’ that were created by CERT POLSKA for ENISA (European Network and Information Security Agency).

Licensed workshops
TERENA regularly gives permission to experienced members of the CSIRT community to use the TRANSITS-I course materials for training events. SURFnet organised TRANSITS-I training workshops for its constituency on 12-13 April and on 12-13 October in Utrecht. In collaboration with FIRST (the global association of CSIRTs), the International Telecommunications Union and the University of Technology of Jamaica organised a TRANSITS-I training workshop in Kingston on 21-24 November. SABRIC, a not-for-profit organisation set up by seven banks in South Africa, brought European trainers to a combined TRANSITS-I and TRANSITS-II workshop at the Olwazini Training Centre near Joahannesburg on 24-28 October.

www.terena.org/csirt-training

COURSE MATERIALS

Since 2002, TERENA has been organising training workshops for members of Computer Security Incident Response Teams (CSIRTs). Course materials were originally developed as part of the TRANSITS (Training of Network Security Incident Teams Staff) project, which ended in 2005. Materials are maintained by volunteers from TF-CSIRT. In addition, larger overhauls of the materials are necessary periodically. In 2011, TERENA contracted Miroslaw Maj (Cybersecurity Foundation) to overhaul the operational and technical modules of TRANSITS-I.

As part of a commitment to ongoing improvement, the more in-depth TRANSITS-II course was introduced in 2010, at which point the original course became known as ‘TRANSITS-I’. TRANSITS-I training is aimed at new or potential CSIRT operatives who wish to gain basic grounding in the main aspects of working in an incident response team. It covers the legal, technical, operational and organisational aspects of running a CSIRT.

The three-day TRANSITS-II training goes into more depth on key areas and is aimed at more developed CSIRTs and experienced operatives who already have, or foresee, a need for forensic data recovery, and advanced network data flow monitoring and analysis.
The decision to organise end-to-end service provisioning BoF meetings at major events in 2011 was a result of a series of annual workshops organised by TERENA in the years 2008-2010. The first workshop had focused on establishing lightpaths and discussed the technical feasibility of end-to-end connection services, especially the last mile challenge. The second considered the provisioning of end-to-end services, taking into account all network domains from campuses to the core and discussing all the service provisioning and potential business aspects. The last explored key applications for emerging user communities and discussed the future of the community that had built up around this workshop series.

This community includes more than 160 campus network administrators, regional networkers, NREN operators, network architects, service managers and application designers from 86 organisations. Their key interests were investigated in 2009 via an online survey and an End-to-End Expert Group of eight people was set up in 2010 to advise TERENA on its activities in this area.

TERENA’s specific role is now to foster and maintain cooperation between NRENs and metropolitan, campus and local networks (the ‘last-mile’), as well as between application developers and designers, and networking communities.

During the 2011 meetings it became clear that TERENA’s activities to promote end-to-end service provisioning need to give more attention to communications and community support. Work on technical developments and standardisation should continue to be organised in their natural environments, such as NRENs, the OGF (Open Grid Forum) and IETF (Internet Engineering Task Force). TERENA’s activities must harvest information in order to facilitate knowledge sharing and transfer to user communities. Those activities must be coordinated with the network-service provider groups worldwide, such as GÉANT, Internet2 and APAN and must actively involve NREN staff members who look after the needs of connected institutions and design services.

TERENA’s work in this area should also take advantage of synergies with related activities, such as the GN3 project’s bandwidth-on-demand service pilot and Partner Services Promotion task, GLIF’s NSI (Network Services Interface) Implementation Task Force, and the promotion of Internet2’s ION (Interoperable On-demand Network) service. Trends in industry, such as 100 Gb/s and larger transmission and NGOA (Next Generation Optical Access) solutions, must be taken into account.

It was decided that, in collaboration with GN3, Internet2 and GLIF, TERENA will organise a workshop for campus networkers on lightpath services, to be held in 2012.

www.terena.org/e2e/
Interest grows for research networks to support performing arts

Interest is growing in the area of network performing arts. Twice as many people attended the third workshop in this series as compared to the 2010 event, with participation from several NRENs. An air of enthusiasm and excitement prevailed and animated discussions filled the three days.

More than 50 participants from diverse backgrounds were given hands-on experience with codecs and network testing tools and discussed topics including variable bandwidth issues, technical and organisational requirements to implement production, and the use of audiovisual and network transmissions to support teaching music and performing arts.

A number of live performances helped demonstrate the technologies available. Showing the potential of LOLA - the low latency videostreaming system that minimises latency between remote points – violinists in Barcelona and Trieste performed Béla Bartók suites while connected with an end-to-end link that used the Conservatorio Tartini LAN, the Trieste Lightnet Metropolitan Optical Network, the networks of GARR, GÉANT and RedIRIS, the Centre de Supercomputació de Catalunya (CESCA) managed network, and the Gran Teatre del Liceu link to the CESCA network. A dance performance with artists in Brazil and Barcelona was held across the RedIRIS network and GÉANT, with a transatlantic link to RedCLARA. Artists from Northern Illinois University in the United States and a teacher at the Liceu held a masterclass and the Barcelona Laptop Orchestra performed from the Liceu and another venue in Barcelona.

While the workshop was intended to maximise the benefit to users with a non-technical background, the following were also covered:
- Digital Video Transport System (DVTS and HDVTS) and other video transport tools such as Conference XP and LOLA
- full audio and echo control computerised management
- real-time monitoring of network performance and problem solving.

The success of this event shows that communities with very specific user requirements can be served by TERENA and the NREN community. During 2011 work began on planning the next workshop in this series, in 2013.

http://www.terena.org/activities/network-arts/barcelona/
Jim Buddin (TERENA Secretariat) provides logistical support for a wide range of GN3 and community events.

GN3 Events

TERENA and DANTE maintained a close cooperative effort to develop and organise training workshops and other events as part of the GN3 project in 2011. Overall workshop coordination was done by DANTE. Course tutors came from various TERENA member organisations. The TERENA Secretariat handled logistical functions such as registration and production of materials.

For some events, TERENA provided only online registration and supporting information: Leading High Performance Virtual Teams training for project activity and task leaders (11-13, 18-20, 25-27 July, 22-24 August, 31 October to 2 November) in Broadway, United Kingdom; and the second Project Moonshot meeting (24-25 March) in Prague, Czech Republic.

How To Set Up eduroam Training

15-16 March, hosted by Scce in Zagreb, Croatia

TERENA provided online and on-site support for participants of this eduroam training workshop, which was organised as part of a joint effort between several tasks within the GN3 project: Training, Partner Services Promotion, Networking Development Support and the eduroam Operational Team.

Eleven participants from Eastern Europe and Belgium learned technical information and how to give eduroam training themselves, and received samples of materials that they could use to promote the service in their own countries.

Secure Code Training

14-15 June, Berlin, Germany

TERENA provided online registration and local logistical support for a two-day workshop supporting the adoption of GN3 multi-domain services and tools by ensuring security concerns are addressed as an integral part of the service lifecycle.

Fifteen attendees heard presentations from Branko Marovic (AMRES) and Pawel Berus, Gerard Frankowski and Tomasz Nowak (PSNC). Topics covered insecure code errors, information disclosure, resource discovery, using dangerous functions and the handling of sensitive data. An introduction to secure Java programming was the primary theme for the training, which included practical hands-on exercises.
eduGAIN Federation Operator Training
17-18 October, Vienna, Austria

TERENA provided online registration, training coordination and local logistical support for two half days of eduGAIN training preceding the GN3 Symposium.

The course was designed to support the deployment of eduGAIN by federation operators by equipping participants with the knowledge needed to participate within eduGAIN, and to support the adoption of the service within their own constituencies. Fifteen people took part.

GN3 Project Symposium
18-21 October, Vienna, Austria

Online and on-site registration and logistical support for the third symposium of the GN3 project were provided by TERENA. The event drew more than 270 invited participants for a plenary session and parallel sessions that included task meetings, a services workshop and the chance to talk with the project heads.

For the TERENA Secretariat staff who participated as project task or activity leaders, the symposium provided the opportunity to meet colleagues and collaborators from other parts of the project and from participating organisations.

www.terena.org/training
Memberships and Liaisons

e-IRG and European Commission

Closer and more frequent interaction

Contact between TERENA and the European Commission (EC) intensified during 2011, with a number of visits and the opportunity to provide input to developing initiatives.

In March, TERENA’s president, Janne Kanner, and secretary general, Karel Vietsch, provided input to hearings organised by the GÉANT Expert Group. The group’s report, ‘Knowledge Without Borders’, was presented to Commissioner Neelie Kroes in October. On this occasion, the new TERENA president, Pierre Bruyère, gave a presentation highlighting TERENA successes.

In September, Karel Vietsch and Pierre Bruyère visited the European Commission, and met with Mário Campolargo, director for Emerging Technologies and Infrastructures, Kostas Glinos, head of unit for GÉANT and e-Infrastructures, and Jean-Luc Dorel of the same unit. They discussed the Commission’s proposal for its multi-annual financial framework ‘A budget for Europe 2020’, the initial plans for the 8th Framework Programme for Research and Technological Development, known as ‘Horizon 2020’, and the opportunities that these would offer for European research networking. The Commission representatives also explained the plan to create a backbone network interconnecting the various networks in the member states that connect public-sector institutions, and how the GÉANT backbone network could facilitate this new backbone. Kostas Glinos presented a summary of all these developments at the TERENA General Assembly meeting in October.

In December, Karel Vietsch participated in a session to brainstorm about the future of the e-IRG (e-Infrastructures Reflection Group) at an e-IRG meeting in Warsaw. e-IRG defines and recommends best practices for the European e-infrastructure efforts and consists of delegates appointed by the governments of various European countries.

www.europa.eu
www.e-irg.eu
DANTE

Strengthening collaborative ties

TERENA and DANTE are sister organisations that intensively collaborate, in particular through the GN3 project, where each of the organisations is responsible for a number of activities and tasks.

Summer training sessions gave GN3 team leaders from TERENA and DANTE the chance to become better acquainted, as did attendance at the annual project symposium in September. DANTE’s new general manager, Niels Hersoug, visited the TERENA Secretariat in June and, in November, the TERENA Secretariat’s management team met DANTE managers in Cambridge to better understand the full range of the two organisations’ activities and to explore opportunities for further collaboration.

TERENA’s president and secretary general are members of the Executive Committee of the GN3 project. The latter is also an observer in the DANTE Board of Directors. Two TERENA Secretariat staff members are activity leaders and met frequently in the GN3 Project Management Team, in which many DANTE staff members also participated. Other TERENA and DANTE staff worked together in a number of project tasks, most notably to promote services and to organise events.

What is DANTE?

DANTE (Delivery of Advanced Network Technology to Europe Ltd.) is a limited-liability company and a not-for-profit organisation, based in Cambridge, United Kingdom. Its mission is to plan, build and operate pan-European networks for research and education. The company was established in 1993 and has played a pivotal role in six consecutive generations of the backbone network that interconnects national research networks in Europe. The current network is called GÉANT and is co-funded by the European Union through the GN3 project. Many national research and education networking organisations in Europe are shareholders of DANTE.

www.dante.net
Intercontinental Collaboration

CCIRN meeting in 2011
10 June, Reykjavik, Iceland

Increasing openness supporting collaboration

TERENA took over the CCIRN website in May and provided effort to simplify and improve it. A new modus operandi for CCIRN was agreed at its 2011 meeting. Interactions with other intercontinental bodies continued to thrive.

With ever more rapid deployments of technologies and services, and with increasing intercontinental collaboration and dependencies, it is necessary to identify issues and start collaborative actions on specific problems in a timely fashion. In order to facilitate this better, CCIRN agreed to cease its pattern of closed annual meetings and instead arrange more frequent, open forums at major international research networking conferences. The core CCIRN participants formed a small permanent group to organise these sessions. Organisation of the first open forum was led by Stephen Wolff (Internet2). It took place at the Internet2 Fall Member Meeting in Raleigh, North Carolina in October.

In 2011, TERENA Secretariat staff attended the Internet2 member meetings and one of the semi-annual APAN meetings, for which TERENA provides a member of the programme committee. Conversely, there was increasing participation from other continents in TERENA’s own conference and other activities including REFEDS and TF-CPR. Internet2’s director of communications, Lauren Rotman, presented an overview to TF-CPR in Utrecht, its president Dave Lambert participated in a panel discussion at TNC, and its vice-president for member relations and marketing, Ana Hunsinger, co-chaired this panel with Karel Vietsch.

www.ccirn.net
http://www.internet2.edu/
http://www.apan.net/
Middleware collaboration continues

Collaboration between TERENA and the Internet Society continued to grow in the middleware area during 2011.

The Internet Society continued to sponsor REFEDS activities and also arranged a middleware event in Amsterdam to develop its ideas and strategies for involvement in the identity space: TERENA staff were invited to contribute ideas and information.

www.isoc.org

WHAT IS THE INTERNET SOCIETY?

The Internet Society was founded in 1992 as a non-profit organisation to provide leadership in Internet-related standards, education and policy. It ensures the open development, evolution and use of the Internet for the benefit of people around the world. TERENA was a founding member. The society has more than 100 organisational members and more than 60,000 individual members in over 90 chapters around the world. It is the organisational home for groups responsible for Internet standards, including the Internet Engineering Task Force and the Internet Architecture Board.
The balance sheet, statement of income and expenditure, and summary cash flow statement for TERENA for the year 2011 that are presented below are extracted from the draft accounts of the association. A full understanding of the association's financial position and results can be obtained only from the final version of the annual accounts as adopted by the General Assembly in its meeting of 24-25 May 2012 and the accompanying auditor’s report. These documents are available from the TERENA Secretariat upon request. All figures are in euro.

Balance sheet as at 31 December 2011

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### Liabilities

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<td>51,752</td>
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<tr>
<td>Taxes and social premiums</td>
<td>55,534</td>
<td>53,614</td>
</tr>
<tr>
<td>Deferred income TERENA projects</td>
<td>601,597</td>
<td>1,106,912</td>
</tr>
<tr>
<td>Pre-issued invoices</td>
<td>1,058,686</td>
<td>1,055,167</td>
</tr>
<tr>
<td>Other payables and deferred income</td>
<td>148,571</td>
<td>133,083</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,902,966</td>
<td>2,400,528</td>
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<tr>
<td></td>
<td>3,411,922</td>
<td>3,839,262</td>
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## Statement of Income and Expenditure 2011

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>Budget 2011</th>
<th>2010</th>
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<tbody>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Membership fees</td>
<td>1,060,194</td>
<td>1,055,000</td>
<td>1,055,167</td>
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<tr>
<td>Earmarked contributions</td>
<td>1,858,046</td>
<td>1,590,000</td>
<td>1,503,891</td>
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<tr>
<td>Interest</td>
<td>58,114</td>
<td>60,000</td>
<td>57,631</td>
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<tr>
<td>Late payment charges</td>
<td>2,194</td>
<td>0</td>
<td>1,579</td>
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<tr>
<td>Other income</td>
<td>1,316</td>
<td>1,000</td>
<td>14,967</td>
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<tr>
<td><strong>Total Income</strong></td>
<td>2,979,864</td>
<td>2,706,000</td>
<td>2,633,235</td>
</tr>
</tbody>
</table>

|                      |       |             |       |
| **Expenditure**      |       |             |       |
| Personnel costs      | 1,577,477 | 1,557,000 | 1,469,789 |
| Other administrative costs | 354,183  | 381,000    | 384,656 |
| Travel/meetings      | 315,549 | 215,000    | 242,017 |
| Minor projects funding | 0     | 5,000      | 0     |
| Membership subscriptions | 3,656  | 4,000      | 3,384 |
| Contracted services  | 637,986 | 598,000    | 445,652 |
| Financial expenses   | 20,896  | 21,000     | 14,634 |
| Bad debts written off | 2,884  | 3,000      | 1,603 |
| Project results from earlier years | -2,991 | 3,000   | -9,304 |
| **Total Expenditure**| 2,909,640 | 2,787,000 | 2,552,431 |

|                      |       |             |       |
| **Result**           | 70,224 | -81,000     | 80,804 |

|                      |       |             |       |
| **Destination of the result** |       |             |       |
| General reserves     | 70,224 | -81,000     | 80,804 |
### Cash Flow Statement

<table>
<thead>
<tr>
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<th>2011</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NET RESULT</strong></td>
<td></td>
<td></td>
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<tr>
<td>Depreciation charges</td>
<td>70,224</td>
<td>80,804</td>
</tr>
<tr>
<td>Investments in tangible assets</td>
<td>12,074</td>
<td>15,972</td>
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<tr>
<td>(Increase)/Decrease in accounts receivable</td>
<td>-17,575</td>
<td>-23,725</td>
</tr>
<tr>
<td>Increase/(Decrease) in current liabilities</td>
<td>-55,837</td>
<td>92,718</td>
</tr>
<tr>
<td><strong>NET CASHFLOW</strong></td>
<td>-377,003</td>
<td>37,862</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash in bank and on hand, 1 January</td>
<td>3,294,009</td>
<td>3,256,147</td>
</tr>
<tr>
<td>Cash in bank and on hand, 31 December</td>
<td>2,917,006</td>
<td>3,294,009</td>
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</table>

### Membership Fees

The annual membership fees for National Members are in eight categories, depending on the gross national income of the countries that they represent. A National Member pays the unit fee multiplied by the number of units linked to its category. The membership fees for National Members in categories 1 and 2 are further differentiated according to the gross national income per capita of their countries. National Members in categories 1 and 2 from countries that are classified by the World Bank as an ‘upper-middle-income economy’ receive a reduction in the fee and in the number of votes of 20%. That reduction is 40% if their country is classified as a ‘lower-middle-income economy’ and 60% if their country is classified as a ‘low-income economy’.

International Members have 10 votes and pay the unit fee. Associate Members pay half the unit fee.

The unit fee for 2011 was set at 5,027 euro

<table>
<thead>
<tr>
<th>Category</th>
<th>Units</th>
<th>Votes</th>
<th>Country</th>
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<tbody>
<tr>
<td>1</td>
<td>0.2</td>
<td>2</td>
<td>Moldova</td>
</tr>
<tr>
<td>1</td>
<td>0.3</td>
<td>3</td>
<td>FYRoMacedonia, Montenegro</td>
</tr>
<tr>
<td>1</td>
<td>0.4</td>
<td>4</td>
<td>Malta</td>
</tr>
<tr>
<td>2</td>
<td>0.4</td>
<td>4</td>
<td>Azerbaijan</td>
</tr>
<tr>
<td>2</td>
<td>0.6</td>
<td>6</td>
<td>Bulgaria, Latvia, Lithuania, Serbia</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>10</td>
<td>Cyprus, Estonia, Iceland, Luxembourg</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>20</td>
<td>Belarus, Croatia, Slovakia, Slovenia</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>30</td>
<td>Czech Republic, Hungary, Israel, Romania</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>40</td>
<td>Denmark, Finland, Greece, Ireland, Portugal</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>50</td>
<td>Austria, Belgium, Netherlands, Norway, Poland, Sweden, Switzerland, Turkey</td>
</tr>
<tr>
<td>7</td>
<td>12</td>
<td>60</td>
<td>Spain</td>
</tr>
<tr>
<td>8</td>
<td>16</td>
<td>70</td>
<td>France, Germany, Italy, United Kingdom</td>
</tr>
</tbody>
</table>
The TERENA management team: Valentino Cavalli (Chief Technical Officer), John Dyer (Business and Technology Strategist), Bert van Pinxteren (Chief Administrative Officer) and Karel Vietsch (Secretary General).
Christian Gijtenbeek (Senior Software Engineer)

Dick Visser (Senior Systems Engineer)

Marc van der Holst (Data Analyst from 24 May to 14 November)

Jim Buddin (Workshop Organiser), Laura Durnford (Senior Communications Officer), Hanna Cherigui (Secretary) and Gyöngyi Horváth (Conference and Workshop Organiser)

Mirko Ampt (Assistant Bookkeeper)

Carrie Solomon (Communications Officer until 30 September)

Anthony Hodge (Communications Officer from 1 October)
## Acronyms and Abbreviations

<table>
<thead>
<tr>
<th>A</th>
<th>AAI</th>
<th>Authentication and Authorisation Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>APAN</td>
<td>Asia-Pacific Advanced Network</td>
<td></td>
</tr>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
<td></td>
</tr>
<tr>
<td>ASPIRE</td>
<td>A Study on the Prospects of the Internet for Research and Education</td>
<td></td>
</tr>
<tr>
<td>AutoBAHN</td>
<td>Automated Bandwidth Allocation across Heterogeneous Networks</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>BoF</td>
<td>Birds-of-a-Feather</td>
</tr>
<tr>
<td>C</td>
<td>CA</td>
<td>Certification Authority</td>
</tr>
<tr>
<td>CAMP</td>
<td>Campus Architecture and Middleware Planning</td>
<td></td>
</tr>
<tr>
<td>CAVE</td>
<td>CAVE Automatic Virtual Environment</td>
<td></td>
</tr>
<tr>
<td>CCIRN</td>
<td>Co-ordinating Committee for Intercontinental Research Networking</td>
<td></td>
</tr>
<tr>
<td>CEENGINE</td>
<td>Central and Eastern European Networking Engine</td>
<td></td>
</tr>
<tr>
<td>CERN</td>
<td>European Laboratory for Particle Physics</td>
<td></td>
</tr>
<tr>
<td>CESCA</td>
<td>Centre de Supercomputació de Catalunya</td>
<td></td>
</tr>
<tr>
<td>CLARA</td>
<td>Cooperación Latino Americana de Redes Avanzadas</td>
<td></td>
</tr>
<tr>
<td>cNIS</td>
<td>Common Network Information Service</td>
<td></td>
</tr>
<tr>
<td>COSINE</td>
<td>Cooperation for Open Systems Interconnection Networking in Europe</td>
<td></td>
</tr>
<tr>
<td>CSIRT</td>
<td>Computer Security Incident Response Team</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>DANTE</td>
<td>Delivery of Advanced Network Technology to Europe</td>
</tr>
<tr>
<td>DNS</td>
<td>Domain Name System</td>
<td></td>
</tr>
<tr>
<td>DNSSEC</td>
<td>DNS Security Extensions</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>EARNEST</td>
<td>Education And Research Networking Evolution Study</td>
</tr>
<tr>
<td>e-IRG</td>
<td>e-Infrastructure Reflection Group</td>
<td></td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
<td></td>
</tr>
<tr>
<td>ECAM</td>
<td>European Committee for Academic Middleware</td>
<td></td>
</tr>
<tr>
<td>eduPKI</td>
<td>European Public Key Infrastructure</td>
<td></td>
</tr>
<tr>
<td>eduroam</td>
<td>Education Roaming</td>
<td></td>
</tr>
<tr>
<td>EGL.eu</td>
<td>European Grid Infrastructure</td>
<td></td>
</tr>
<tr>
<td>ENISA</td>
<td>European Network and Information Security Agency</td>
<td></td>
</tr>
<tr>
<td>ENUM</td>
<td>Telephone Number Mapping</td>
<td></td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>EUNIS</td>
<td>European University Information Systems</td>
<td></td>
</tr>
<tr>
<td>Acronym</td>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>EuroCAMP</td>
<td>European CAMP</td>
<td></td>
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<tr>
<td>F</td>
<td>FIRST</td>
<td>Forum for Incident Response and Security Teams</td>
</tr>
<tr>
<td></td>
<td>FORTH</td>
<td>Foundation for Research &amp; Technology - Hellas</td>
</tr>
<tr>
<td>G</td>
<td>Gb/s</td>
<td>Gigabits per second</td>
</tr>
<tr>
<td></td>
<td>GÉANT</td>
<td>Gigabit European Academic Network Technology</td>
</tr>
<tr>
<td></td>
<td>GeGC</td>
<td>Global eduroam Governance Committee</td>
</tr>
<tr>
<td></td>
<td>GEMBUS</td>
<td>GÉANT Multi-domain Bus</td>
</tr>
<tr>
<td></td>
<td>GLIF</td>
<td>Global Lambda Integrated Facility</td>
</tr>
<tr>
<td></td>
<td>GN3</td>
<td>Multi-Gigabit European Research and Education Network and Associated Services</td>
</tr>
<tr>
<td></td>
<td>GNU</td>
<td>GNU's Not Unix</td>
</tr>
<tr>
<td></td>
<td>GOLE</td>
<td>GLIF Open Lightpath Exchange</td>
</tr>
<tr>
<td>H</td>
<td>HP-SEE</td>
<td>High-Performance Computing Infrastructure for South East Europe's Research Communities</td>
</tr>
<tr>
<td>I</td>
<td>I-SHARe</td>
<td>Information Sharing Across Heterogeneous Administrative Regions</td>
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<td></td>
<td>IETF</td>
<td>Internet Engineering Task Force</td>
</tr>
<tr>
<td></td>
<td>IGTF</td>
<td>International Grid Trust Federation</td>
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<tr>
<td></td>
<td>ION</td>
<td>Interoperable On-demand Network</td>
</tr>
<tr>
<td></td>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td></td>
<td>IRISS</td>
<td>Irish Reporting and Information Security Service</td>
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<tr>
<td></td>
<td>IT</td>
<td>Information Technology</td>
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<tr>
<td>J</td>
<td>JISC</td>
<td>Joint Information Systems Committee</td>
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<tr>
<td>L</td>
<td>LHC</td>
<td>Large Hadron Collider</td>
</tr>
<tr>
<td></td>
<td>LTE</td>
<td>Long-Term Evolution</td>
</tr>
<tr>
<td>N</td>
<td>NOC</td>
<td>Network Operation Centre</td>
</tr>
<tr>
<td></td>
<td>NREN</td>
<td>National Research and Education Networking organisation</td>
</tr>
<tr>
<td></td>
<td>NSI</td>
<td>Network Service Interface</td>
</tr>
<tr>
<td>P</td>
<td>perfSONAR</td>
<td>Performance focused Service Oriented Network monitoring Architecture</td>
</tr>
<tr>
<td></td>
<td>PMA</td>
<td>Policy Management Authority</td>
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<tr>
<td></td>
<td>PR</td>
<td>Public Relations</td>
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<tr>
<td></td>
<td>PSP</td>
<td>Partner Services Promotion</td>
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<tr>
<td>R</td>
<td>RADIUS</td>
<td>Remote Authentication Dial-in User Service</td>
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<tr>
<td></td>
<td>RARE</td>
<td>Réseaux Associés pour la Recherche Européenne</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<td>REFEDS</td>
<td>Research and Education Federations</td>
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<td>S</td>
<td></td>
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<tr>
<td>SAML</td>
<td>Security Assertion Markup Language</td>
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<td>SEERA-EI</td>
<td>South East European Research Area for eInfrastructures</td>
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</tr>
<tr>
<td>SERENATE</td>
<td>Study into European Research and Education Networking as Targeted by eEurope</td>
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<tr>
<td>SSEDIC</td>
<td>Scoping the Single European Digital Identity Community</td>
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<tr>
<td>SSID</td>
<td>Service Set Identifier</td>
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<td>T</td>
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<td>TACAR</td>
<td>TERENA Academic CA Repository</td>
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<tr>
<td>TCS</td>
<td>TERENA Certificate Service</td>
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<tr>
<td>TEIN3</td>
<td>Trans-Eurasia Information Network (3rd generation)</td>
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<td>TERENA</td>
<td>Trans-European Research and Education Networking Association</td>
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<td>TF-CPR</td>
<td>Task Force on Communications and Public Relations</td>
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<td>TF-CSIRT</td>
<td>Task Force on Collaboration of Security Incident Response Teams</td>
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<td>TF-EMC2</td>
<td>Task Force on European Middleware Coordination and Collaboration</td>
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<td>Transport Layer Security</td>
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<td>TERENA Networking Conference</td>
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<tr>
<td>URN</td>
<td>Uniform Resource Name</td>
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