

# Innovation Programme

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**Competenze e Nuove  
Idee dalla Comunità  
delle Reti della Ricerca  
e dell'Educazione**

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GARR

WORK  
SHOP  
GARR  
2022

**NET  
MAKERS**

# Innovation Programme ?

“The GÉANT Innovation Programme is a **unique opportunity to enable initial development, establish a proof of concept or testing of new ideas**, with **lightweight, administrative constraints**.

As part of the GÉANT Community Programme (GCP), the GÉANT Association has reserved EUR300k to support an Innovation Programme for specific research projects to be carried out by the GÉANT Community

I.e. **GÉANT Member NRENs, universities, research institutions/institutes or other such legal entities to which a GÉANT Association Member NREN provides services.**”



<https://community.geant.org/community-programme-portfolio/innovation-programme/>



# Casi «dal passato»

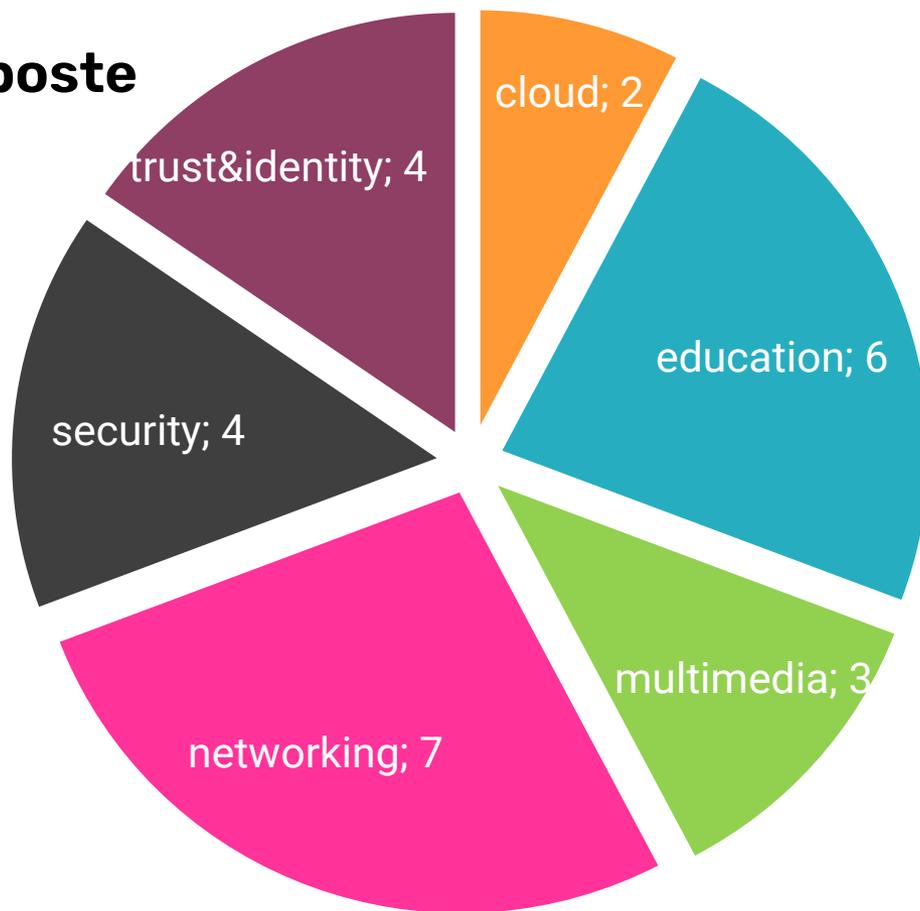


# Proposte sottomesse nel 2021

Country	cloud	education	multimedia	networking	security	trust&identity	Grand Total
Bulgaria	1						1
Croatia		1					1
Czech Republic				1			1
Denmark		1					1
Finland		1					1
Hungary						1	1
Israel					2		2
Italy	1		1	3	2		7
Moldova		1					1
Netherlands						1	1
Poland			2				2
Portugal		1					1
Slovakia				1			1
Spain						2	2
UK		1		2			3
<b>Grand Total</b>	<b>2</b>	<b>6</b>	<b>3</b>	<b>7</b>	<b>4</b>	<b>4</b>	<b>26</b>

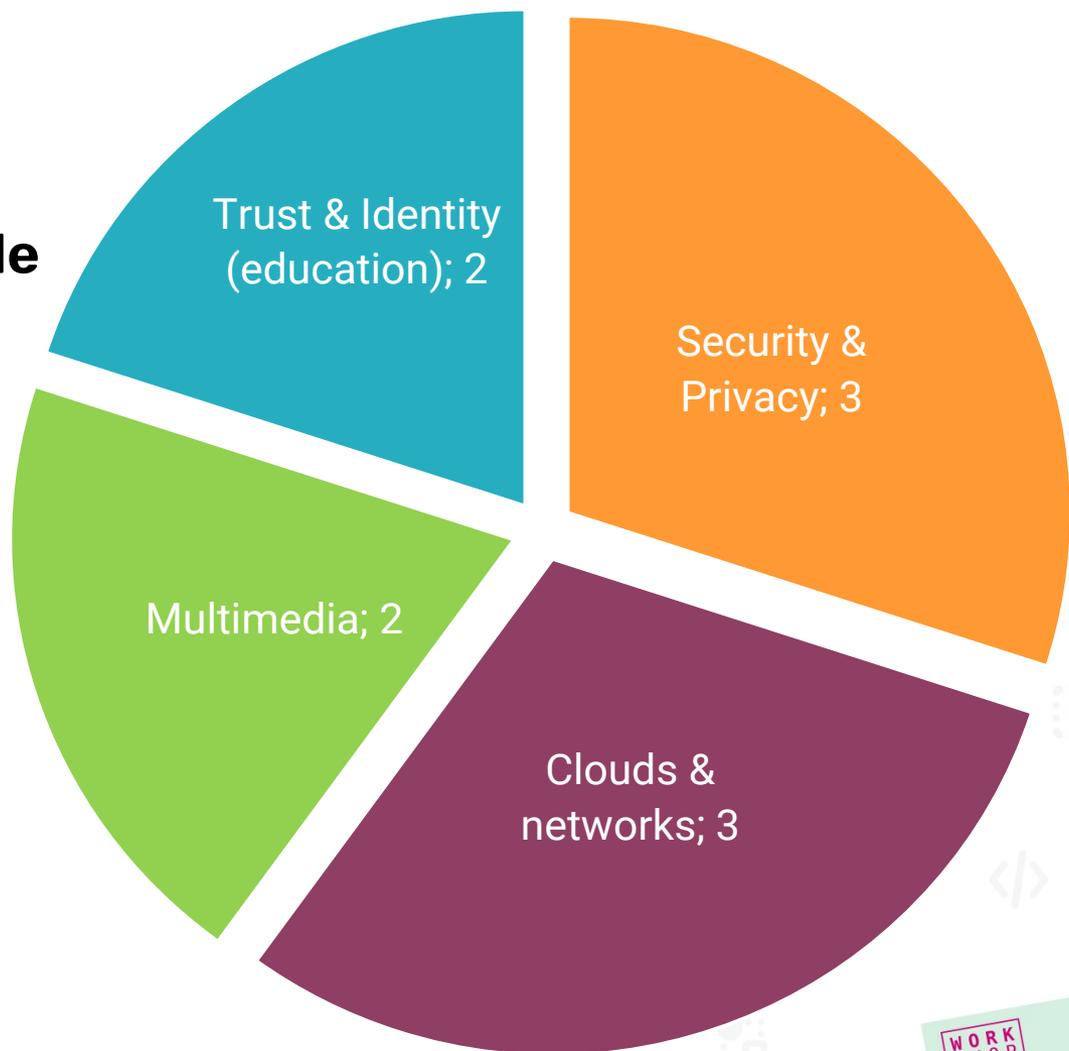
# 2021: tutte le proposte

**Totale: 26 proposte**



# 2021: i progetti approvati

- **Totale: 10 progetti**
- **300 K eur budget totale**
- **287 K eur assegnati**
- **96% del budget speso**



# I progetti approvati del 2021

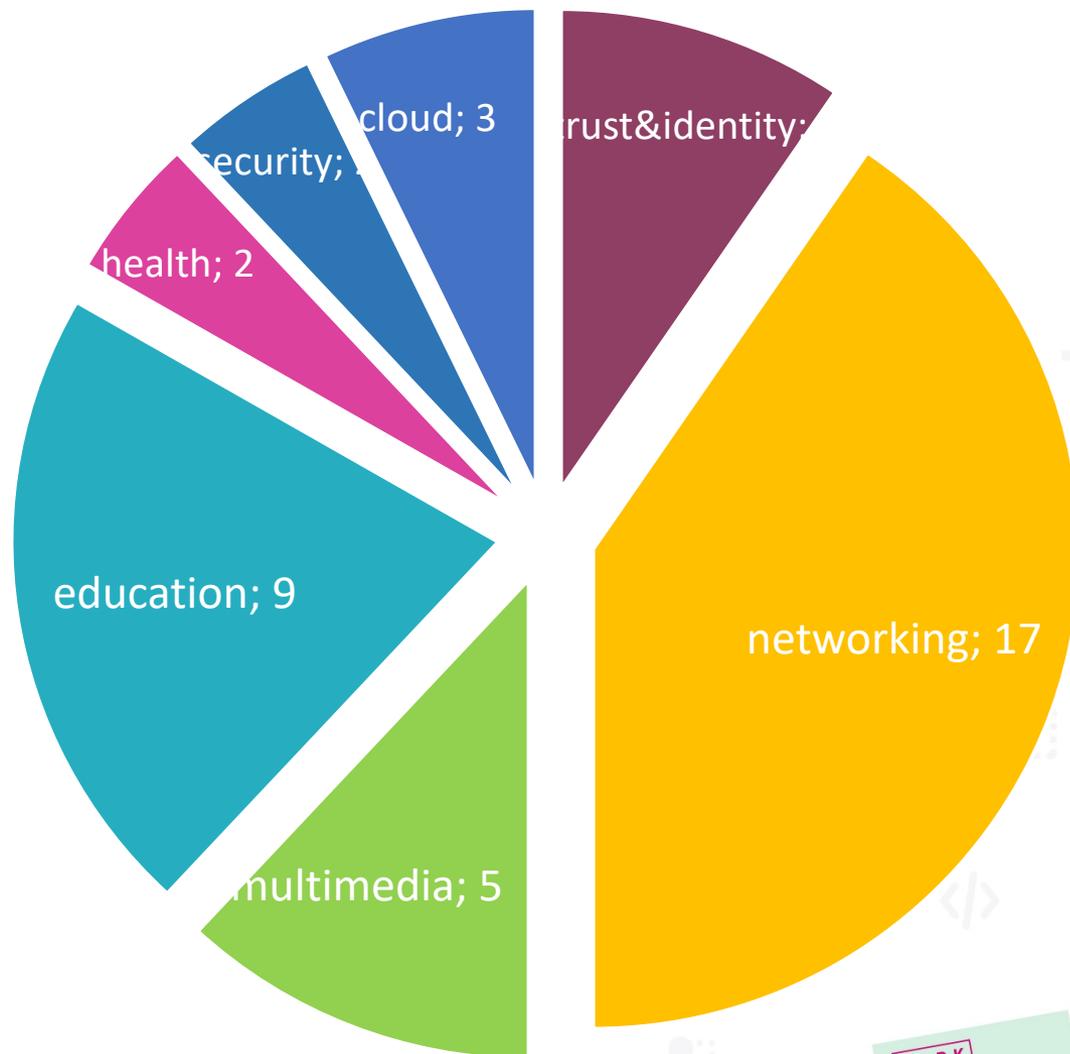
Title	Organisation / grant
mingleMeet - Interactive meeting space for eduMEET	PSNC, PL / 30.0 K eur
Adaptive DNSSEC - DNSSEC: Make or Break Vulnerabilities in DNS	TAU, IL / 30.0 K eur
VoDsync - Synchronous playback of high quality videos in eduMEET sessions	PSNC, PL / 30.0 K eur
eduCLAIMS - educational claims and recommendation letter service with eduGAIN identifiers	BME, HU / 28.0 K eur
<b>PLAS: Platformed Workflows</b>	<b>CNIT, IT / 30.0 K eur</b>
<b>User Controlled SD-WAN Services (UCSS) with Performance Monitoring over GÉANT</b>	<b>CNIT, IT / 30.0 K eur</b>
<b>ABEBox: Privacy Preserving File Sharing Service</b>	<b>URoma2, IT / 30.0 K eur</b>
<b>Design and Implementation of an 802.11 Privacy Preserving Sub-Layer</b>	<b>UniBS, IT / 28,8 K eur</b>
RaQSaC: RaptorQ-based data transport for low earth orbit Satellite Constellations	Sussex University, UK / 30.0 K eur
The impact of EU Digital Identity Wallets on NRENs	SURF, NL / 20.0 K eur

# Proposte sottomesse nel 2022

Country	cloud	education	health	multimedia	networking	security	trust&identity	Grand Total
Albania		1						1
Armenia	1							1
Belgium					1			1
Bulgaria		1						1
Czech Republic	1							1
Hungary					1			1
Ireland					1			1
Israel					1			1
<b>Italy</b>	<b>1</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>11</b>			<b>22</b>
Lithuania						1	2	3
Moldova		1						1
Netherlands							1	1
Poland				2	1			3
Portugal		1						1
Serbia					1			1
Spain						1		1
UK					1			1
<b>Grand Total</b>	<b>3</b>	<b>9</b>	<b>2</b>	<b>5</b>	<b>18</b>	<b>2</b>	<b>3</b>	<b>42</b>

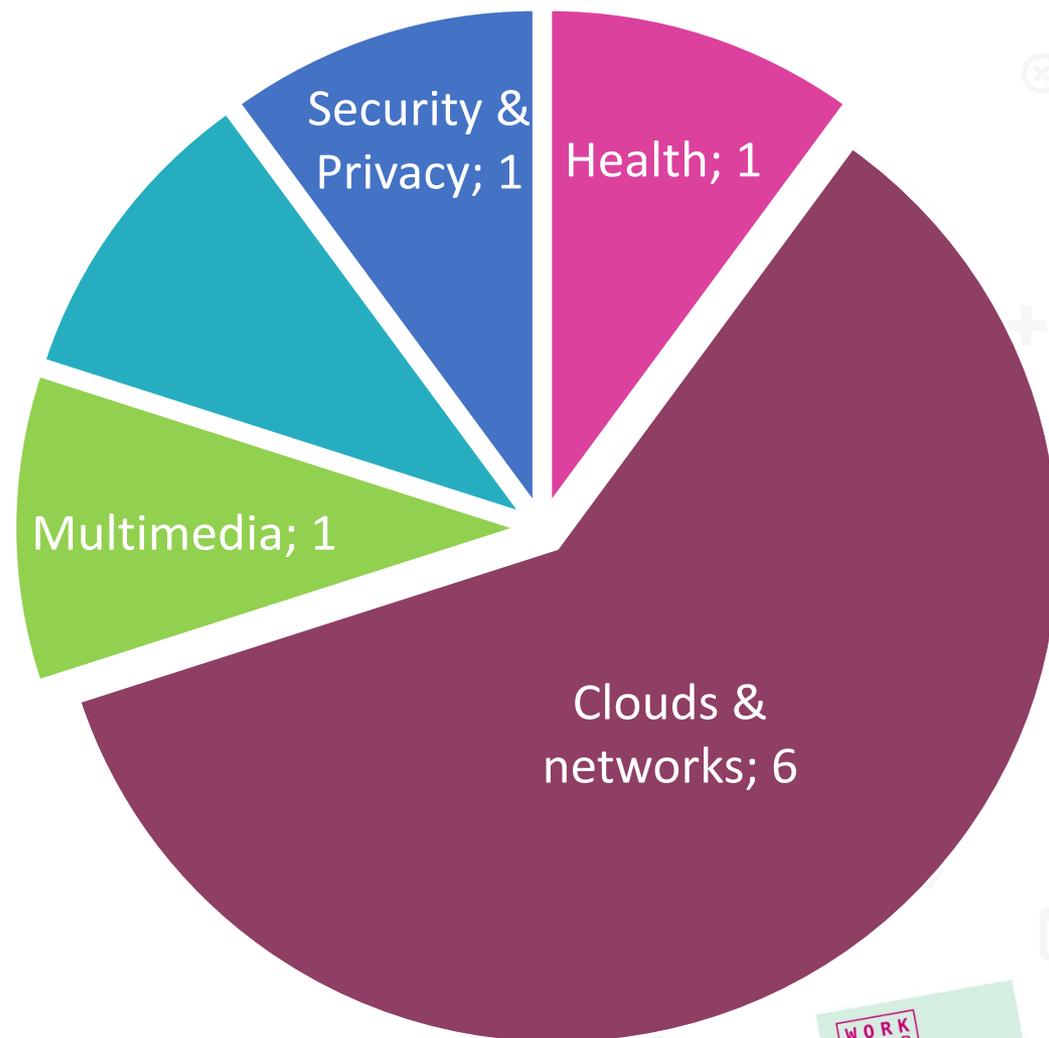
# 2022 tutte le proposte

Total: 42 proposte



# 2022 progetti approvati

- **Totale: 10 progetti**
- **300 K eur budget totale**
- **293 K eur assegnati**
- **97.6% del budget speso**



# I progetti approvati del 2022

Title	Organisation / grant
<b>Artificial Intelligence-based contactless Devices for tele-Rehabilitation and Health</b>	<b>Univaq, IT / 30.0 K eur</b>
<b>eCLAT: eBPF Chains Language And Toolset</b>	<b>Uniroma2, IT / 30.0 K eur</b>
PBSPro-Kubernetes Connector for Seamless HPC Submission	MasarykU, CZ / 26.4 K eur
drawOnMeet - Common drawing on any video in eduMEET sessions	PSNC, PL / 30.0 K eur
TCPLS Low-Lat	UCLouvain, BE / 29.1 K eur
Federated Learning-Driven Network and Service Management	BUniT, HU / 28.2 K eur
SMART Campus – Building the campus on Digital key identification	VytautasMU, LT / 30.0 K eur
Research and Education Network as a Service for Developing Nations	TCD, IE / 30,0 K eur
SIEVA: SIEM Visibility Assessment	i2CAT, ES / 29.5 K eur
<b>Borderless Data Spaces</b>	<b>Politecnico T, IT / 29.5 K eur</b>

# 2021: cosa ne è venuto fuori?

- **2 nuove “opzioni” in eduMEET (dynamic gatherings, and VoD playing)**
- **Una implementazione di secure DNS veloce e facile da gestire**
- **Un secure signature/certification system facile da usare anche per chi non è un “techie”**
- **Una extension in GEANT cloud workflows per la bioinformatica e il community cloud service**
- **Un users’ controlled monitored overlay VPN service, CON LA SCOPERTA che ci sono vari problemi per il support di IPv6 (ancora!!) nei Datacenter e nelle LAN delle NREN**

# 2021: cosa ne è venuto fuori?

- **Un privacy preserving service for file sharing, che si può usare in modo universale (dropbox, ownCloud...)**
- **Un firmware open source per prodotti WiFi product che impedisce efficientemente in tracciamento spaziale non autorizzato delle persone**
- **Uno studio su pro e contro dei sistemi di rete da Low Orbit Satellites con modelli su come le NREN possono intergrarli**
- **Uno studio dettagliato sugli scenari di identità digitale in arrivo(Digital Wallets e dintorni), con un “heads up” su cosa la nostra comunità deve fare per indirizzare e correggere le attuali bozze legislative.**

# PLAS – Platformed Workflows

- **Chi: CNIT**
- **Risultati:**
  - **Estande la GEANT Cloud Flow platform oltre I task containerizzati, in “platformed tasks” (open source code)**
  - **Aggiunge capacità di lavoro parallellizzato (necessario per la bioinformatica ed il community clouds)**
- **Che stanno facendo ora:**
  - **Collaborazione con SIG-CISS**
  - **Lavorano all’integrazione con altri sistemi utilizzati dai Fisici**
  - **Proseguono l’integrazione nel GEANT cloud workflow.**

# User controlled SD-WAN services

- **Chi: CNIT**
- **Risultati:**
  - **Fornisce servizi SRv6 trasparenti**
  - **Ha scoperto molti seri problem nel supporto di IPv6 sia nei Datacenter delle NREN che nei sistemi di firewall (bottlenecks operative nella periferia) che necessitano di risoluzione urgente**
- **Cosa stanno facendo adesso:**
  - **Fanno il follow up con la comunità per sistemare IPv6**
  - **Preparano un progetto o lavoro (da discutere anche con GPPC) per controllare e rendere davvero IPv6 compliant I sistemi cloud della comunità**

# ABEBox Privacy Preserving in file sharing

- **Chi: Università di Tor Vergata**
- **Risultati:**
  - **Creato un add-on che preserva la privacy e che si può usare con i servizi esistenti (COTS come dropbox, ma anche ownCloud...)**
  - **L'utente finale prende il controllo corretto della privacy dei suoi dati (nessun operatore di servizio attualmente lo fa)**
  - **Gli operatori e venditori si sono interessati alla soluzione**
- **Cosa stanno facendo ora:**
  - **Stanno disseminando l'idea anche dentro il framework EOSC**
  - **Il Progetto continua a lavorare allo sviluppo**
  - **Lavorano con la comunità medica perchè la soluzione create può risolvere vari problemi**

# 802.11 privacy preserving sublayer

- **Chi: Università di Brescia**
- **Risultati:**
  - **Dimostrato sperimentalmente che un efficace Sistema anti tcciammento è in grado di funzionare (anche efficientemente!) sui sistemi WiFi standard**
  - **Creato una implementazione open source di un firmware che si può installare su ogni access point che supporta openWiFi, senza alcun bisogno di agire sui client**
- **Cosa stanno facendo adesso:**
  - **Stanno standardizzando la soluzione con IEEE 802.11 WGs per l'inclusion nei profili standard**
  - **Ricerca di una startup o altro vendor che include di default la soluzione sui suoi access point**
  - **Lavorano con I servizi Security ed eduroam di GEANT per diffondere la soluzione**
  - **Continuano lo sviluppo e iniziato collaborazione con alcuni partner commerciali**

# 2022: cosa stanno facendo?



# Artificial Intelligence-based contactless Devices for tele-Rehabilitation and Health

- **Chi: Università de L'Aquila**
- **The project aims at proposing a new generation of contactless assistive devices and new open-source paradigms for data analysis, interpretation, and sharing. As an indirect outcome, the project will contribute to defining new operative procedures for specialists. Further, the role of specialists can be greatly simplified because they don't have to teach patients how to wear these devices: they have just to be sure the patients are using the systems well. Finalized at reaching the aims of the project, the objectives of the last part have been the following: 1) Characterization of Virtual Glove (VG) and Virtual Stabilometric Platform (VSP); 2) Definition of the Actors involved in the use of the proposed systems and of the use cases; 3) Implementation of a non-relational database (DB) for containing data, results, and processing methods; 4) Implementation of an interactive interface for DB interrogation, data presentation, and data sharing.**

# eCLAT: eBPF Chains Language And Toolset

- **Chi: Università di Tor Vergata**
- **We improved the software of eCLAT, totally refactoring the command line according to best practice of argparse and supporting new commands (e.g., fetch-pkg)**
- **We are refactoring the project website (<http://eclat.netgroup.uniroma2.it/>). This includes not just the webpage but also the package repository (see below)**
- **We are building the system to store the package (mongo + node) and defining the specification of the versioning system for the packages. We are integrating the system with github via oauth.**
- **We improved the documentation for a better onboarding on new users (<https://hike-eclat.readthedocs.io/en/latest>)**
- **What still needs to be done?**
- **We need to create the final specification of the eCLAT package versioning system**
- **We need to complete and publish the website**
- **We need to finish and publish the repository of eCLAT packages**
- **We need to build the performance monitoring system**

# Borderless Data Spaces

- **Chi: Politecnico di Torino**
- **So far, we have been working on the design and PoC implementation of a solution that supports different options in terms of control and management of third party workloads that are offloaded to a hosting cluster. The baseline is to have Liqo installed and running in both clusters, to make the collaboration between such two entities easy and effective.**
- **For what concerns the data space that has to be built between them, the solution includes a set of network policies applied to the hosted workload (pod) to ensure a controlled and authorized access to the (foreign) cluster resources.**
- **In addition, a mechanism based on Kubernetes mutating webhooks enriches the incoming offloading request so as to inject a sidecar proxy and some iptables configurations to make traffic go through the proxy for traffic inspection and metrics gathering.**
- **We have so far used Envoy as a proxy, but other solutions are also possible. While for a production environment some additional corner cases should be considered, the current solution does probably more than what we usually consider in a PoC.**

# Borderless Data Spaces

- **Chi: Politecnico di Torino**
- **The above step is still work-in-progress, but not far from reaching our objective. As soon as this completes, we will be able to characterize the performance of the solution.**
- **With respect to the state of the project, our estimation is being at about 40% of the project completion, which includes design and PoC implementation of a security sidecar proxy and network policy deployment, as well as some automatic configurations for an easier deployment of the solution. The remaining part could be seen as the general hardening and anti-data exfiltration technology analysis, and the testing and performance assessment.**
- **For instance, during the development of this project we discovered some unforeseen problems in terms of the complexity required to build an anti-data exfiltration technique that proves actually effective in preventing data exfiltration.**
- **We are available for any clarifications and further developments and/or suggestions.**

# In generale...

- **Introdotta nuove persone nel mondo delle NREN**
- **Più collegamenti con gli utenti finali**
- **Collegamento con la ricerca avanzata**
- **Nuove idee nei gruppi (TaskForces e SpecialInterestGroup)**
- **Possibilità di “provare” con poche complicazioni**
  
- **L’Innovation Programme si avvia ad essere attività permanente.**
- **Quest’anno probabilmente nuova call dal 1 dicembre.**  
**GARR vi darà informazione (fate girare!) e deve confermare che il proponente è parte della comunità GARR (e discutiamo con voi la proposta inizialmente)**

# Grazie...

- **Domande?**



- **Claudio.Allocchio@garr.it**



# 2021 gli altri progetti

# mingleMeet

- Results:
  - Innovative and unique dynamic handling of VC rooms enabling emulation of what happens during meetings breaks
- Recommendations were made:
  - Integrate into eduMEET main stream development and support in GN5-1
  - Provide resources for implementing further enhancements suggested by the community
  - Liaise with TF-EDU and SIG-Multimedia for further developments

# Adaptive DNSSEC

- Results:
  - A much improved and attack resistant DNS which is also efficient in term of speed and maintenance and scalability
- Recommendations were made:
  - Follow up with Alf Moens and Nicole Harris for diffusion and inclusion into GEANT Security scenario
  - Involve the team who developed into GEANT, SIG-ISM and TF-CSIRT activities

# VoDsync

- Results:
  - Innovative and unique solution to provide high quality recorded video playback and handling inside eduMEET
- Recommendations were made:
  - Integrate into eduMEET main stream development and support in GN5-1
  - Provide resources for implementing further enhancements suggested by the community
  - Liaise with TF-EDU and SIG-Multimedia for further developments

# eduCLAIMS

- Results:
  - Provides an easy and scalable solution for digital education “claims”, documents signature,...
  - Reuses efficiently our T&I ecosystem instead in a different area
- Recommendations were made:
  - Integrate the solution inside eduGAIN and GN5-1 T&I team
  - Liaise with TF-DLT and TF-EDU communities for adoption

# RaQSaC

- Results:

- Detailed simulations of next-gen transport protocol for LEO satellites
- Study on current situation in LEO providers and protocol maturity
- Collaboration started with JISC

- Recommendations were made:

- Continue investigation for use as alternate solution for some specific use cases and liaise with NRENs
- Liaise with the network research groups of GEANT and NRENs
- Liaise with SIG-NGN to follow maturity state of the system

- Status update:

- The project now continues as a fully-funded PhD studentship here at Sussex University. Aiden Valentine who worked in the GEANT project is now a PhD candidate.
- They plan to have research published in an international conference in the coming year.
- At the same time, I am in the process of building a research proposal (to be submitted in our national funder – EPSRC) with the aim to submit in the next 6 months.
- There are several research strands that we will pursue so this is definitely a long term journey.
- They would be very interested to hear of opportunities for future collaboration with GEANT, and, simultaneously, we are strengthening our ties with JISC.

# EU digital identity wallets impacts

- Results:
  - SWOT analysis and hi-level architecture (NRENs vs EU Digital Wallets)
  - Understanding on how to liaise NRENs and EU digital wallets services
  - Awareness of possible areas which needs intervention now during the legislation preparation
- Recommendation were made:
  - Disseminate/promote results inside the community!
  - Check T&I activities in GN5-1 against EU digital Wallets regulations
  - Influence regulations to make the ok for NRENs and the community, where needed
  - Continue to follow up the matter in the community
- Status update:
  - The report about the EUWallet and its impact on NRENs is finished as a project. It continues on a couple of different fronts:
    - They are in the process (together with GEANT, some other NRENs and others) of preparing a bid to an EC-call for 'large scale pilots' using the EU Wallet
    - They have created an SSI-lab where we want to innovate together with our institutions and gain experience
    - In The Netherlands we try 'get close to the fire' of where in government decisions on this subject are made

# 2022 gli altri progetti

# TCPLS Low-Lat

- During the first month of the project, we implemented an address exchange mechanism allowing endhosts to communicate their other addresses to their peers. We extended our test-suite to test this scenario. Our mechanism works for both IPv4 and IPv6 addresses.

This second month, we started implementing the different criteria exposed to the application to guide the path scheduling of a TCPLS session. So far, we started investigating around `tcp_info` to abstract and provide network metrics to the application.

- The work of the second, third and fifth months as described in our project proposal is not done.
- 20% of the project is currently achieved.  
Our institution just received the contract countersigned by GÉANT.

Apart from this, we did not experienced delays or unforeseen problems so far.

# PBSPro-Kubernetes Connector for Seamless HPC Submission

- The GEANT project commenced on the 1st July and we are providing the report for last three months which mark more than half of the project. Because we want to promote student involvement in research projects, we included one student in the proposal. We must admit we had problems finding a suitable student during summer months because majority of them were enjoying holidays. We managed to employ a Computer Science student in the middle of August. The rest of the team (LH, VS) devoted the first month and half to researching currently existing solutions, novel approaches that have just emerged and technologies we might utilize in our solution. We dedicated the last two weeks of August to introducing the student to our environment (PBS, Kubernetes) which was necessary in order to understand the goal of the project. At the beginning of September, we all together developed a working plan which we will follow in order to reach our objectives.
- We have fulfilled the first two points of the plan and we are in the process of implementing the third one. We were planning on being a bit further in the plan but we have been facing multiple unforeseen obstacles for the past three weeks. This month has been very rough for two out of three people in the project team (VS, student) because of the beginning of the in-person semester at the university. Furthermore, both mentioned experienced a seasonal flu with covid-like symptoms that made it impossible to work fully for nearly two weeks.
- Nevertheless, the team has met on 26th September where we discussed the work and progress we will do in the following weeks. We need to fully work on points 4, 5, 6 from the plan and partly on 1 the point 3. We are sure we will implement all required work by the end of the November but we are in delay now because of the lost September. However, we have created a detailed plan with specific implementation points and technologies. We assume that approximately 40% of the project is done because we do not have to think extensively about methodology and possible implementations (we will work with our outlined plan) but there is a chance some of our assumptions will not work (e.g. admission controller not able to perform the desired action) and we will have to think quickly about a workaround.

# SIEVA: SIEM Visibility Assessment

- What has been done so far?  
The architecture and data model of the solution is ready, an early version of the GUI is ready, the AI engine has the classification model and API endpoints are developed, 19 data sources have been integrated/tested
- What still needs to be done?
- The AI model used to calculate log completeness still needs to be completed, the GUI needs to be tested with real data on a live environment and improved upon further feedback, more data sources need to be integrated/tested, finally the solution will need to be packetized.

Please assess what % of the project has been completed.

60%

- Are there any delays?  
No
- Are there any unforeseen problems?  
No, we were having issues acquiring distinct data sources, but we found a private partner that will lend us their data to enhance our testbed.

# drawOnMeet - Common drawing on any video in eduMEET sessions

- I can confirm, that design process has been completed, as well as the implementation of the core functionality.

A dedicated branch on GitHub has been created. Now we are working on the integration with the GUI of eduMEET, improving our implementation, testing and bug fixing. I would say that about 60% of the work has been done and at this stage the project results seem to be safe with the deadline on Dec 2022.

The only complication / complexity with implementation is related to eduMEET changes.

eduMEET is currently being rewritten (TypeScript).

Current status of changes is currently at level, which does not allow to implement drawOnMeet on the new version.

That's why the implementation is basing on current version of eduMEET.

As the result - adoption process will be needed later in order to integrate drawOnMeet with new version of eduMEET.

This process might start only in January, but can be done within eduMEET team in GN5-1.

# Federated Learning-Driven Network and Service Management

- What has been done so far?
  - The implementation of the core proof-of-concept components is accomplished.
  - We also finished the development of a strategy for aggregating the model weights (gradients) at the server side to yield federated learning-driven model generation.
  - We also developed a manuscript that was submitted to IEEE Communications Magazine.
    - We already received the reviewers' feedback -> We must elaborate more on some specific aspects of our architecture.
    - Manuscript revision is in progress.
- What still needs to be done?
  - We plan to develop a communication channel between the server and the clients so that the clients (besides being training participants) can also load certain models for actual classification.
  - We also plan to streamline the configuration of the server- and client-side parameters.
  - Lastly, we plan to extend our evaluation to assess classification performance.
    - To date, we evaluated only the general performance of our solution expressed in training loss and training accuracy.
    - We want to extend this preliminary examination to determine the classification accuracy of certain network traffic flow types.
- Please assess what % of the project has been completed.
  - We estimate the completion expressed in percentages to be approximately 90%.
- Are there any delays?
  - We do not expect any unforeseen delays.
- Are there any unforeseen problems?
  - We did not come across any problems. Since we have started examining the solution's efficacy now, some bugs that require attention may arise. However, its impact on project completion is unlikely.

# Research and Education Network as a Service for Developing Nations

- As per the project plan, you can see from an administrative perspective, we have leveraged learnings from other initiatives, in similar locales for the setting up of NREN's, such as Barnados NREN. This has informed us about technical and administrative detail. We have reached out to the EU delegation in Praia (Cape Verde) and European DG CNECT and DG RTD. We are using Digital Economy Ministry and in Cape Verde to reach technology stakeholders in the CV Telecom and NOSI data centre providers, as platforms for broadband access and hosting.
- To properly define the expectations and how to test, we are using the principles of Use cases. We have define use cases for the main demonstration strands which would include Basic App Technical (Eduroam), the SDN VPN that spans 3 main data centres (Cape Verde, TCD and UFES/RNP) as well as a final capstone demonstration that draws together the keys facets of project into one focus.
- For the technical work packages, we have adopted the approach of proofing the concepts in a sandbox environments first, then deploying in a live/production configuration. This has worked well for SDN VPN backbone configuration and Wireless connection with Rare FreeRtr, and seen very good liaison with the FreeRtr team esp. Csabe, Frederic and UFES esp. Edgar, Gabriel, Junior.

# SMART Campus – Building the campus on Digital key identification

- What has been done so far?
- The SMART Campus project has moved past the planning phase, where way of working general scope of responsibilities for each partner has been agreed, and already is in the testing and procurement phase. Architectural model of campus with SMART elements has been agreed for both project partners and technical solutions are being tested and implemented according to the plan.
- Pilot testing of eLocks has been implemented in both partner locations allowing to finalize procurement options. Campus buildings were selected for eLock installation as part of SMART Campus dormitory access service. Public procurement processes have been launched for acquiring eLock software and required equipment to run the full portfolio SMART eLock environment.
- As part of planning activities, Klaipeda university ran a student engagement survey to understand student expectations through digitalisation of university services, defining SMART Campus, especially in dormitory buildings and campus (entrance, exit, room security). Survey results showed, that students prefer to use digital keys, and a variety of other digital tools for better user experience, including the use of digital wallets. Equally important finding of the survey is the fact that students have expressed doubt and concerns about their personal data and privacy. These concerns are being taken into account for further development of the project, where compliance to GDPR is of high importance.
- Vytautas Magnus university is finalising Lithuanian student card LSP integration into the IT systems. This will ensure the use of student ID cards as part of university service access tools.
- What still needs to be done?
- International student card ISIC integration into university user information system has presented some legal challenges, and therefore is facing a delay.
- Face control module is being developed as part of dormitory access process.
- Full scale eLock installation and software development will commence as soon as they are delivered.
- GDPR compliance is also an important phase in the coming months.
- Please assess what % of the project has been completed.
- 50% is progress level of the project activities.
- Are there any delays?
- ISIC integration is delayed due to legal processes.  
eLock delivery is delayed by suppliers. (Klaipeda university).
- Are there any unforeseen problems?
- The eLock solution has presented some challenges to share information between institution, as separate tenants for institutions do share data across. This was not foreseen in the beginning of the project and might need additional time to solve, and investigation if possible to solve at all.