



Network Technologies and Services Development in the GÉANT Project

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SC22 - Asia

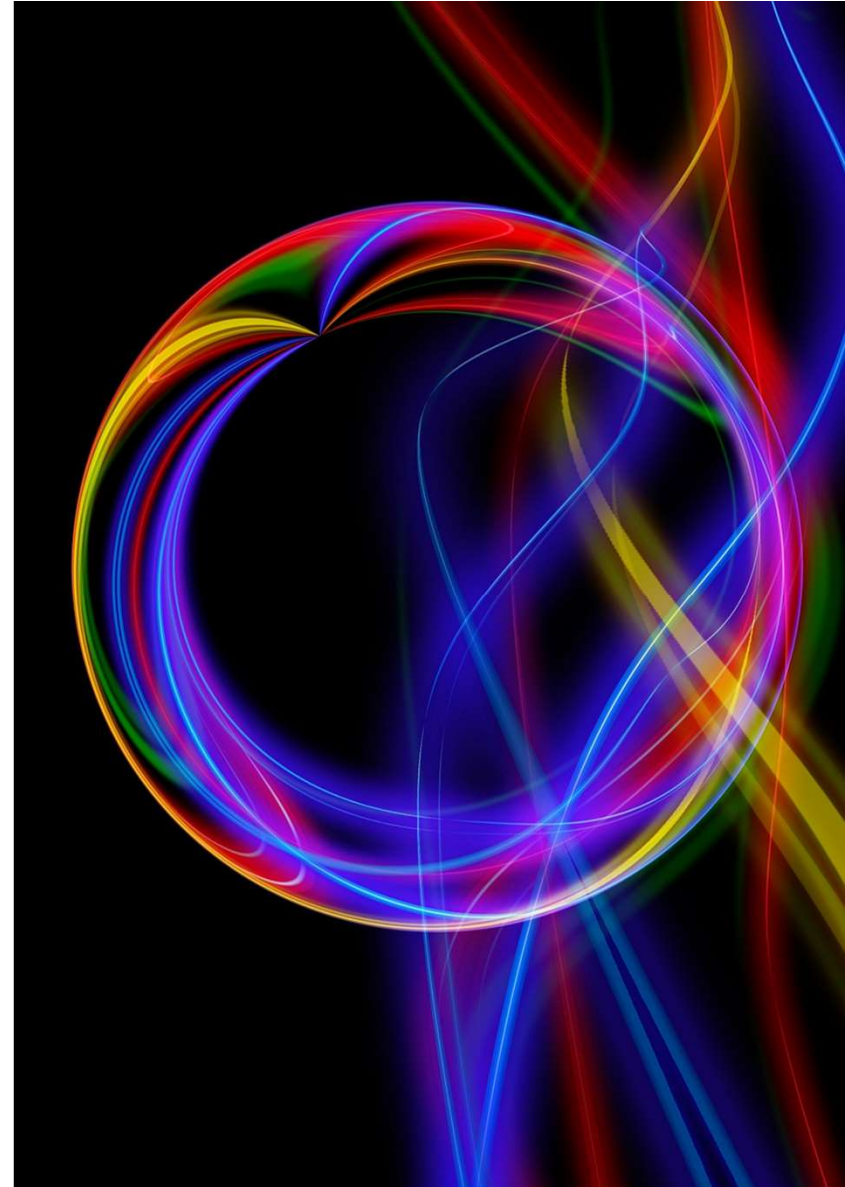
3 March 2022

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Agenda

GÉANT Project Overview

Network Technologies and Services
Development Work Package



The GÉANT Project



GÉANT's vision is to ensure **equal network access for all scientists across Europe** to the research **infrastructures** and the **e-infrastructure resources** available to them.



A part of the European Union's Horizon 2020 research and innovation programme - GÉANT 2020 Framework Partnership Agreement (FPA)



500 contributors from 40 partners - European R&E Institutions

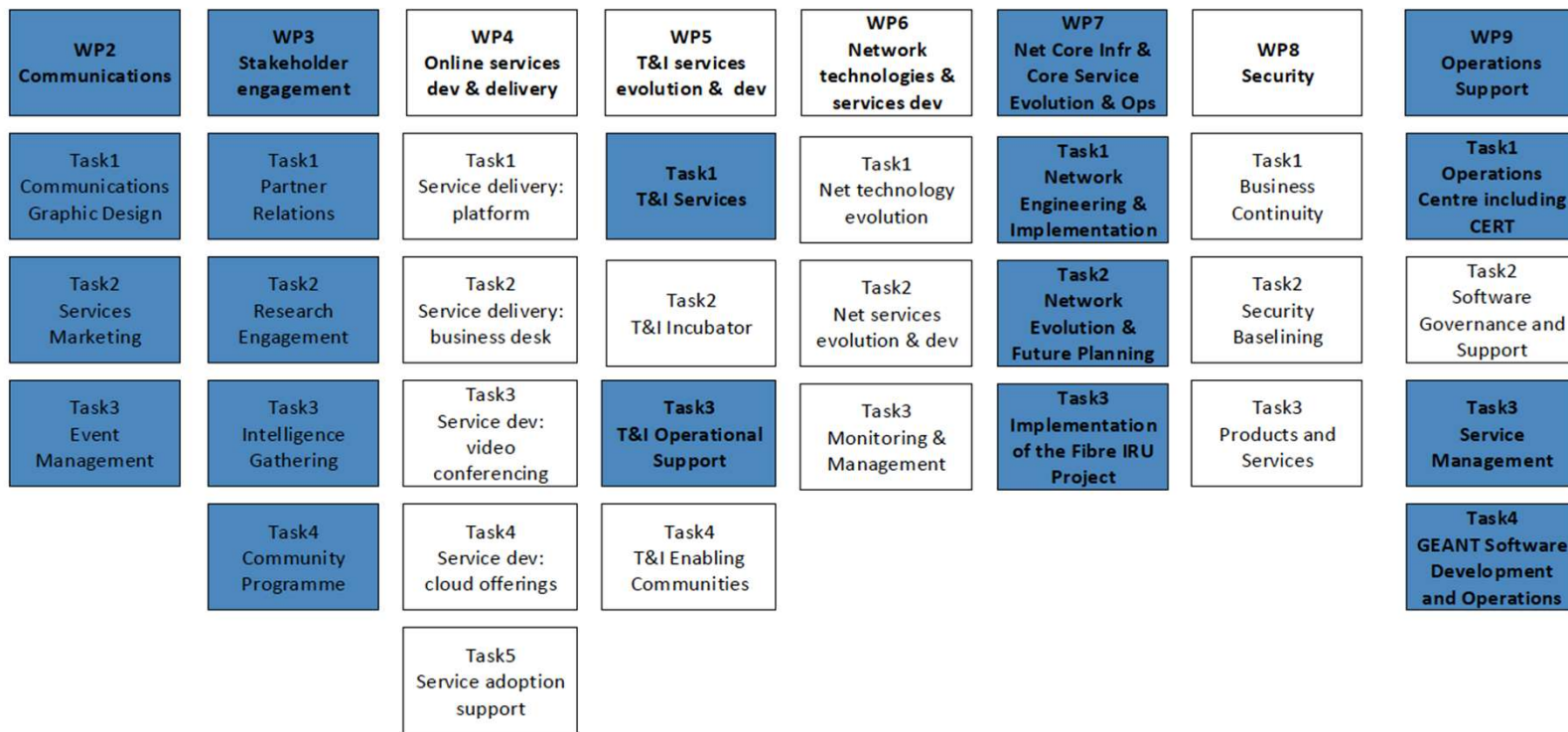


50 M users

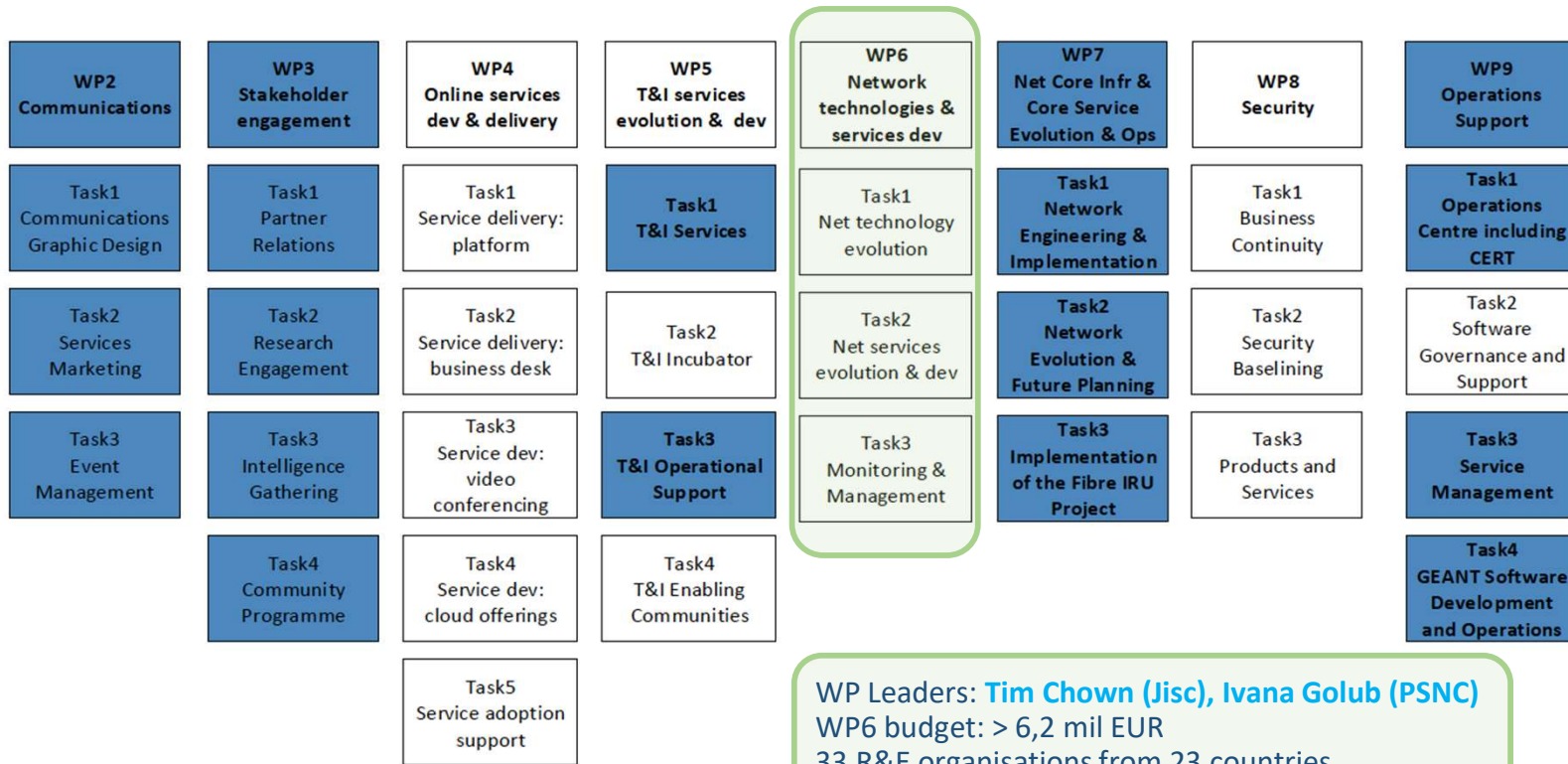


GN4-3 duration: 1 Jan 2019 – 31 December 2022

The GÉANT Project Structure



The GÉANT Project Structure



WP Leaders: **Tim Chown (Jisc), Ivana Golub (PSNC)**
 WP6 budget: > 6,2 mil EUR
 33 R&E organisations from 23 countries
 88 team members



WP6 – structure and work items

Task1: Network Technology Evolution

- Low Latency networking support
 - TimeMap latency/jitter monitoring tool
- Optical Time and Frequency Networking (OTFN)
- Router for Academia, Research and Education (RARE)
 - GÉANT P4 Lab
 - White box performance testing
- Data Plane Programming (DPP)
 - In-band Network Telemetry (INT)
- Quantum Key Distribution (QKD)
- White box networking for R&E use cases (completed)

Task2: Network Services Evolution and Development

- Service Provider Architecture Platform (SPA)
- Orchestration, Automation and Virtualisation (OAV)
 - Architecture and TMForum ODA mapping
 - Network Automation eAcademy learning material
 - NETDEV Wiki with the Community Portal
 - Campus Network Management as a Service - CNaas
 - OAV maturity mode
 - OAV terminology FG

Task3: Monitoring and Management

- perfSONAR including perfSONAR consultancy
- Performance Measurement Platform (PMP)
- Network Management as a Service (NMaaS)
- WiFiMon
- Argus for alarm aggregation
- Network Telemetry
 - 100G monitoring/measurement
 - P4-based flow monitoring

WP6 umbrella page:

<https://wiki.geant.org/display/NETDEV>

Task 1 – Network Technology Evolution

Low Latency Networking TimeMap

Implemented GÉANT backbone per-segment latency and jitter monitoring

- Using TWAMP measurements
- Available at <https://timemap.geant.org/>
- Being adopted by the GÉANT Operations team

Deploy

Optical Time and Frequency Networking OTFN

Supporting NRENs in implementing T&F services

- Testing in progress in GÉANT and around NREN T&F interconnectivity
- Published [SWITCH's L-band deployment](#) white paper

Collaborate

White Box for R&E networks

Exploring NREN's white box use cases

- Planned work completed; several white papers published
- Concluding infoshare held – “[White Boxes in NREN Context](#)”
- White box performance work in progress

Collaborate

Task 1 – Network Technology Evolution (continued)

Data Plane Programming DPP

Implementing In-band Network Telemetry (INT) using Data Plane Programming

- Deployed testbed running between 3 organisations, fourth in progress (NTUA)
- White paper published [INT testbed experience](#) including lessons learned
- White paper on clock synchronisation – due very soon

Deploy

Collaborate

Quantum Key Distribution QKD

Supporting NRENs in implementing Quantum technologies

- Currently evaluating QKD simulators and testbeds options
- PoC with Toshiba between GÉANT PoPs planned for 2022
- Running monthly open discussion forum available to all – join the [mail list](#)

Collaborate

Router for Academia Research and Education RARE

Providing full-featured open source platform – see the [RARE wiki](#)

- Runs FreeRtr control plane with P4 / DPDK data plane
- Distributed P4 lab setup at 4 GÉANT PoPs with many NRENs/unis joining
- Growing use cases: RENATER private peering, PolKA, DMC21, bier/AMT, ...

Deploy

Collaborate

Task 2 – Network Services Evolution and Development



Providing Service Provider Architecture Platform for connectivity services

- Development and support to the production GCS service
- Provides TMForum ODA-compliant software tools
- Exploring possibilities to extend to other GÉANT services
- Work in progress to containerise components and provide via NMaaS

Deploy



Raising the bar for OAV in the NREN community

- New [training modules](#) being released regularly through [GÉANT e-Academy](#)
- NREN architectures mapping to the TMForum ODA reference architecture (examples: [PIONEER](#), [NMaaS](#) and [GRNET](#)) – **more wanted!**
- [Wiki](#) including OAV [community portal](#) – **please contribute!**
- OAV Maturity Model focus group started
- Upcoming workshop on [CNaaS](#) on May 4th

Learn

Contribute

Collaborate

Share

Task 3 – Monitoring and Management



Well established [toolkit](#) for active network performance monitoring

- International collaboration with ESnet, GÉANT, IU, I2, RNP, UoM
- Latest version v4.4.3, with v5.0 underway
- Provides consultancy advice and guidance to the GÉANT community
- Planning 3rd European perfSONAR User Workshop for May 2022

Deploy

Contribute



Runs [perfSONAR mesh](#) from participating NRENs to GÉANT backbone

- Providing maintenance and support; node replacements
- New [intercontinental mesh](#) – includes SA, ESnet, TEIN3, BELLA, SINET

Deploy

Collaborate



Crowdsourced and/or RPi-based [WiFi performance monitoring solution](#)

- A production GÉANT service since July 2020
- Supports eduroam monitoring
- [EaP NREN workshop](#) held in November 2021

Deploy

Collaborate

Contribute

Task 3 – Monitoring and Management (continued)

Network Management
as a Service



Provides a [portfolio of applications](#) run via a secure, virtual platform

- Dockerised images implemented through a Kubernetes cluster
- User base is growing, both within GN4-3 and R&E networks worldwide

Deploy

Collaborate

Contribute

Argus

[Alarm aggregation tool](#) developed by SIKT

- Integrates alarms from NAV, Nagios, ZABIX, ArubaCloud, Zino,...
- Moving towards production, looking for users

Deploy

Network Telemetry

Moving existing network monitoring boundaries

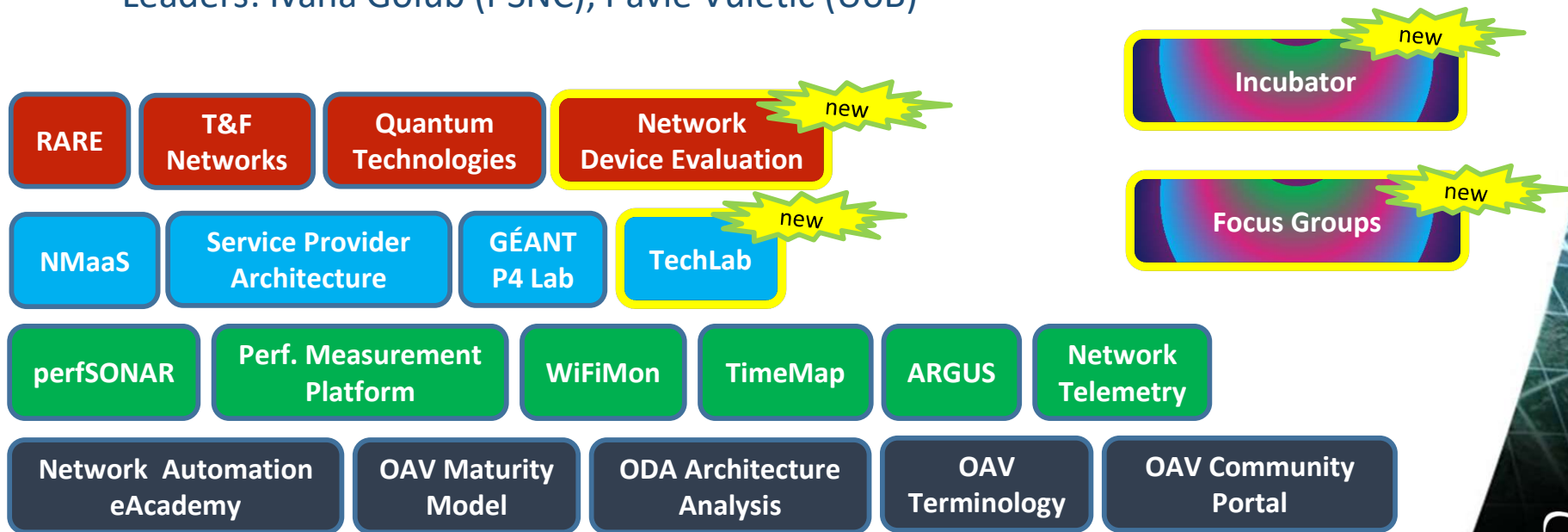
- Defining / running tests for 100G network monitoring and performance measurement (software transfer tools, RARE, and perfSONAR)
- P4-based flow monitoring
- Two upcoming workshops:
 - [2nd Performance Management Workshop](#) (March 8th)
 - [2nd Telemetry and Data Workshop](#) (April 6th)

Collaborate

Contribute

Continuation of the GÉANT project – GN5-1

- Planning is underway – smooth transition expected in January 2023
- Continuing existing + new work
- Leaders: Ivana Golub (PSNC), Pavle Vuletić (UoB)



Upcoming events (co)organised by WP6

- **8 March** [2nd Performance Management Workshop](#)
- **6 April** [2nd Telemetry and Data Workshop](#)
- **4 May** [Campus Network Management as a Service](#)
- **10-11 May** [SIG-NOC](#)
- **24-25 May** [3rd European perfSONAR User Workshop](#)

For more events see: <https://events.geant.org/>

Find out more about the WP6 work

<https://wiki.geant.org/display/NETDEV>

White Papers

OAV Training

OAV Community Portal

Code repositories

Production services

Development

Presentations

Deliverables and Milestones

Recordings

Digital Architecture Mapping

NETDEV Home
Created by Linda Ness, last modified by Susanne Naegele-Jackson on May 28, 2021

GN4-3-WP6: Network Technologies and Services Development

This work package is mainly oriented towards prototyping and piloting new network services. It undertakes evaluation of new and promising network technology in the areas of network infrastructures and network services innovation. In addition, it is responsible for Network Management and Monitoring services and their evolution (provision of operational services).

Objectives

- Enhancements to the existing and/or creation of new services/products/tools through the assessment, validation and implementation of relevant network technologies and services.
- Building and maintaining consensus in the GÉANT community on a future direction for architectures for orchestrating and automating deployment of network services, and on the necessary monitoring and management platforms to support both the services and their underlying network infrastructure(s).
- Promoting wider adoption of general service orchestration and automation principles within the NREN community through consensus building discussions, workshops and dissemination activities.
- Enhancing GÉANT and NREN knowledge transfer through a variety of dissemination activities related to network technologies and services, and network monitoring and management and to build communities of interest around those services and technologies.



WP6 Production Services

- WiFiMon
- NMaaS
- perSONAR
- Performance Measurement Platform (PMP)

WP6 Production Software

- SPA Service Provider Architecture

Digital Architecture & Automation

- OAV Architectures
- Orchestration, Automation and Virtualisation (OAV)
- OAV Training Portal

Applied Automation

- Campus Network Management-as-a-Service
- OAV Community Portal

Research & Development

- Optical Time and Frequency Networks (OTFN)
- Quantum Key Distribution (QKD)
- RARE - Router for Academia Research and Education
- In-Band Network Telemetry (INT)
- DTN - Data Transfer Nodes
- White Boxing

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Thank you

Any questions?

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