



An Overview of SIG-AI

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Co-funded by
the European Union

16th SIG-NGN meeting –
in collaboration with SIG AI

09 October 2025

ATI?

Introducing the SIG AI for NRENs: Collaborative AI Exploration

- **Newly Established SIG:** Started at TNC24 in Rennes, France
- **Focus:** Exploring the potential applications of AI within the context of NRENs
- **Cross-Cutting Approach:** Delving into various areas where AI can enhance NREN services
- **Areas of Exploration:** Cybersecurity, Network Management, Automation, Next Generation Networks, Ethics, Policy, and Above-the-Net Applications



Objectives of the SIG-AI

- Knowledge Exchange
- Use Case development
- Community Hub

AI in NRENs: Opportunities & Challenges

- Opportunities
 - Innovation driver
 - Service enhancement
 - Efficiency gains
 - Strategic enabler
- Challenges
 - Complexity
 - Security and ethical concerns
 - Skills Gap
 - Data availability and readiness for AI
 - Costs and energy efficiency

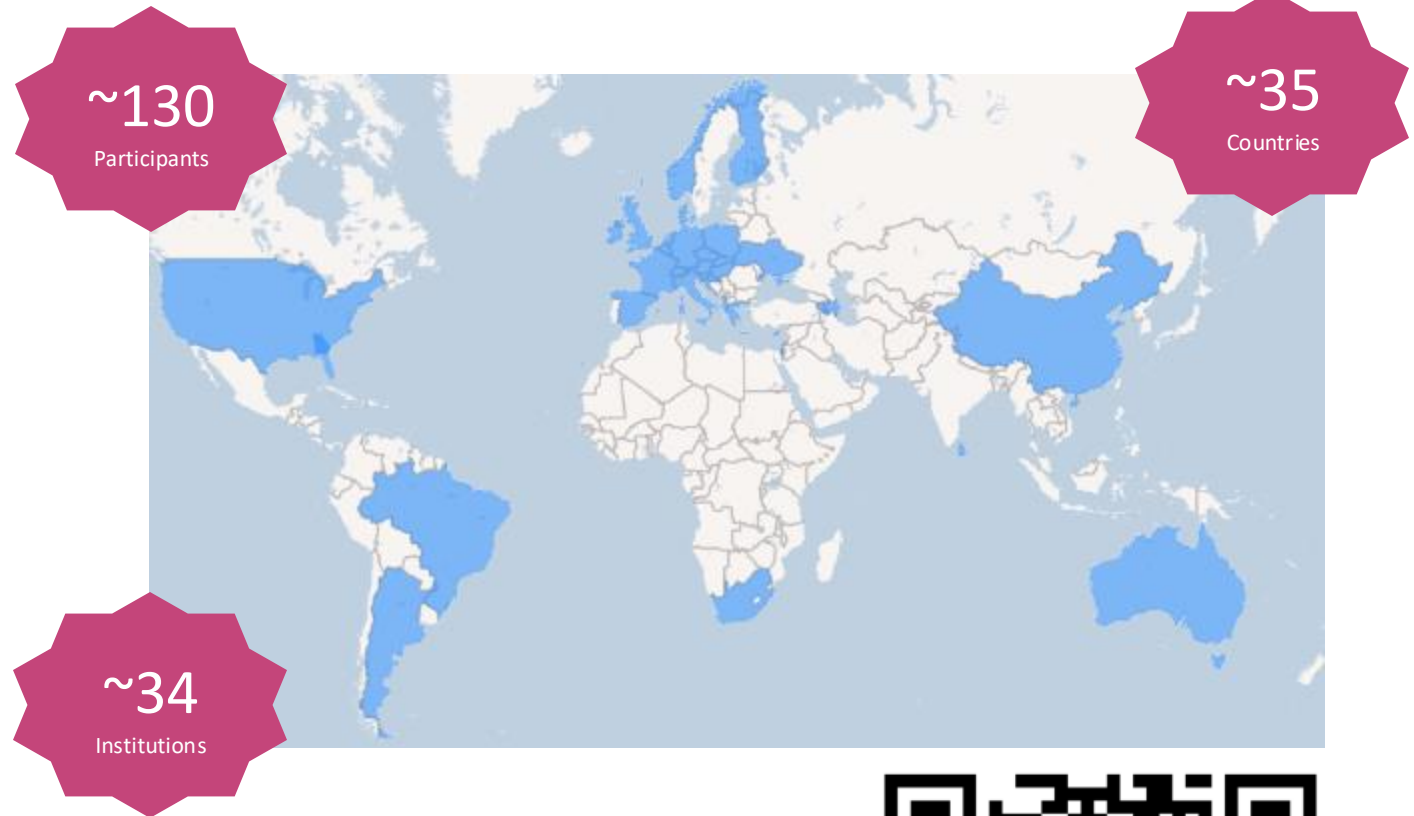
Wiki

<https://wiki.geant.org/display/SIGAI/SIG-AI+Home>



Who are we?

- Coordinator: Leonie Schäfer (DFN)
- Chair: Daniela Brauner (GÉANT)
- Steering Committee Members:
 - Hrachya Astsatryan (ASNET-AM)
 - Jan Kohlrausch (DFN-CERT)
 - Albert Hankel (SURF)
 - Marcin Wolski (PCSS)
 - Panos Louridas (GRNET)

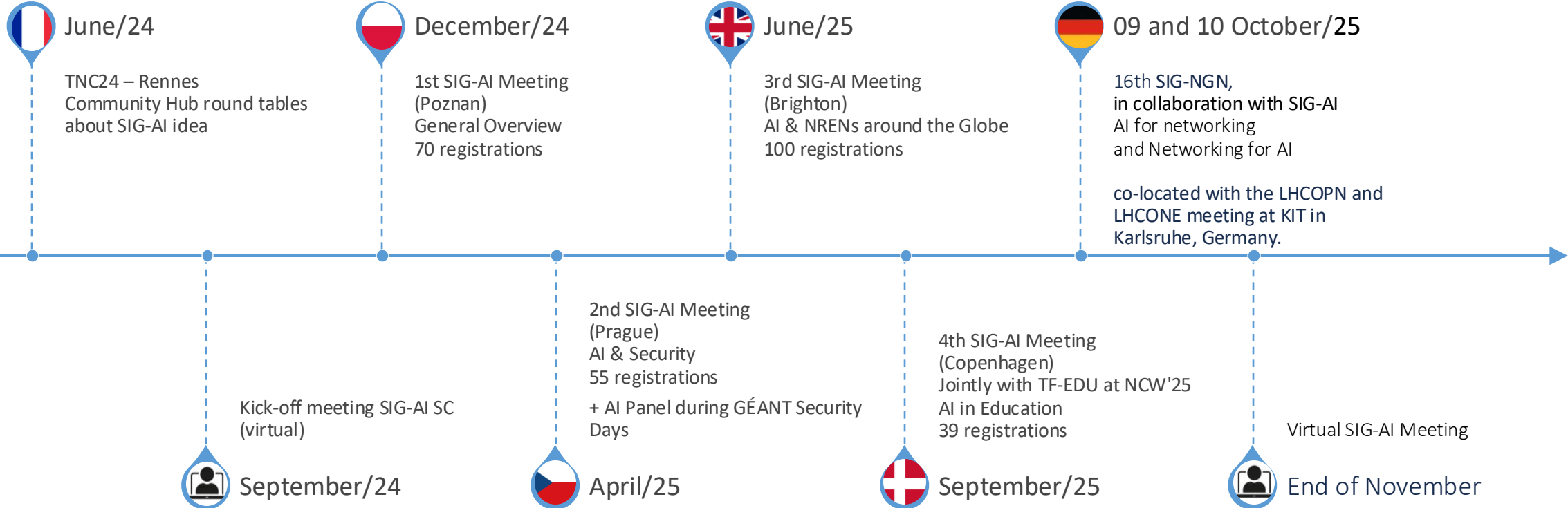


Join the SIG-AI community:

<https://lists.geant.org/sympa/subscribe/sig-ai>



SIG-AI Roadmap



On the topic of this meeting

- Uses of AI for Networking
 - Network traffic prediction and analysis
 - Automated network management and orchestration
 - AI-driven Network security and threat detection
 - Fault detection and root cause analysis
 - Network slicing
 - Traffic profiling
- and Networking for AI
 - High-Performance networking for AI workloads
 - Federated Learning Infrastructures

Some challenges (AI for Networking and Networking for AI)

- **Technical challenges**
 - Data quality, availability and readiness
 - Model generalisation (No one 'trained model' fits all)
 - Scaling ML pipelines
- **Organizational and Governance Challenges**
 - Skills
 - Cross-domain coordination (data, models and policy)
 - AI infrastructure for NRENs (GPUs, data lakes, analytics platforms)
- **Ethical and Legal Risks**
 - Data privacy, compliance and security
 - Transparency, explainability and reliability
 - Bias
- **Other challenges**
 - Skepticism among network engineers who trust deterministic/rule-based systems
 - Loss of human supervision
 - Infrastructure investment, cost and sustainability
 - Standardisations (?) and interoperability
 - Energy efficiency and sustainability

Some examples of AI Applications in Europeans NRENs:

Cybersecurity/Network security:

- Unsupervised ML for PerfSONAR data analysis – CARNET-GÉANT
- IP Blacklist creation using Neural Networks – CESNET
- Risk assessment using classification models – i2Cat
- DDoS Mitigation – CESNET, PCSS and RedIRIS
- Anomaly detection with Machine Learning – DDoS and DNS attacks – PCSS
- Detection of brute-force SSH attacks using Classification methods - CESNET
- Retrieval-Augmented Generation agent for Workflow Orchestration - SURF
- Domain classification (DGA) using Multi-Layer Perceptron (MLP) - ICCS-NTUA/GÉANT
- Vulnerabilities exploitation using a LLM judge (Giskard detectors) - PCSS

Network management/Monitoring & Systems Orchestration:

- Graph Neural Networks (GNNs) for Science Traffic Classification - University of Twente/GÉANT
- LLM for domain categorization – CESNET
- LogsLLM – Automated Log Analysis and Management based on LLMs – NTUA/GRNET/PCSS/CYNET
- AI ChatBot – PCSS and GÉANT

AI in Education:

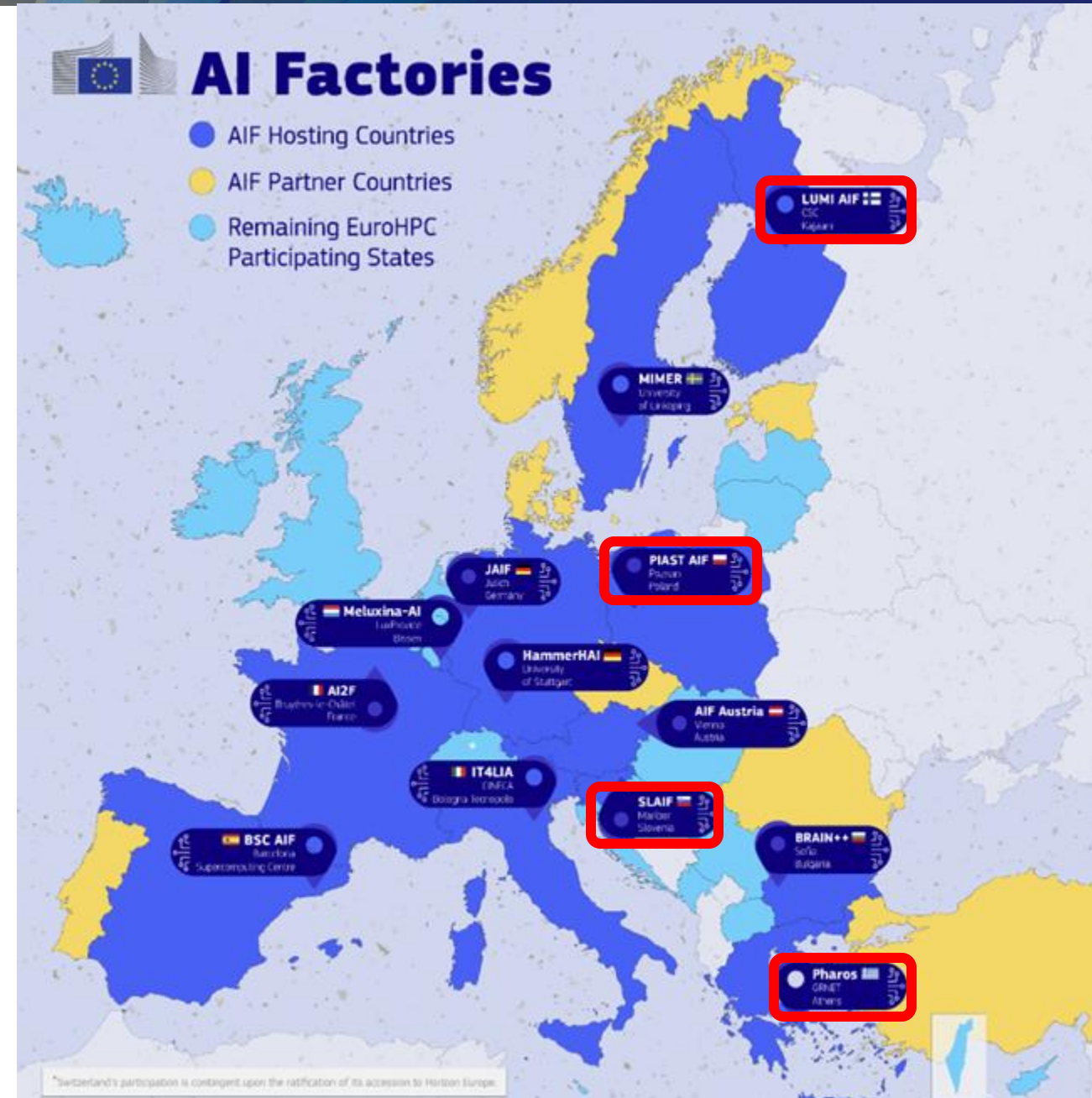
- LISA – Language learning Intelligence for Students and Academic organisations | ACOmarket (via ACOnet)
- eduGenAI from SURF (NL) + Npuls: supporting the use of genAI in education;
- Sikt KI – platform to create AI assistants based on LLMs developed by SIKT (NO);

AI Improvements:

- Active Learning Framework to re-train models (data drifts) - CESNET
- Federated learning for DNS Security and AI Explainability – ICCS-NTUA/GÉANT
- AI Security – auditing LLM, detecting malicious executable code in ML – PCSS

Some examples of AI Infrastructure in European NRENs:

- Some NRENs are hosting AI Factories: PSNC(PL), GRNET(GR), CSC(FI) and ARNES (SI); and working on competence centres for AI;
- The AI Factory Antennas are also coming soon;
- Creation of an GÉANT Members NRENs coordination group to share knowledge about AI Factories;





Great meeting for all! Any questions?

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