Extended zero-trust and intelligent security for resilient and quantum-safe 6G networks and services

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CERTH-ITI

XTRUST-6G

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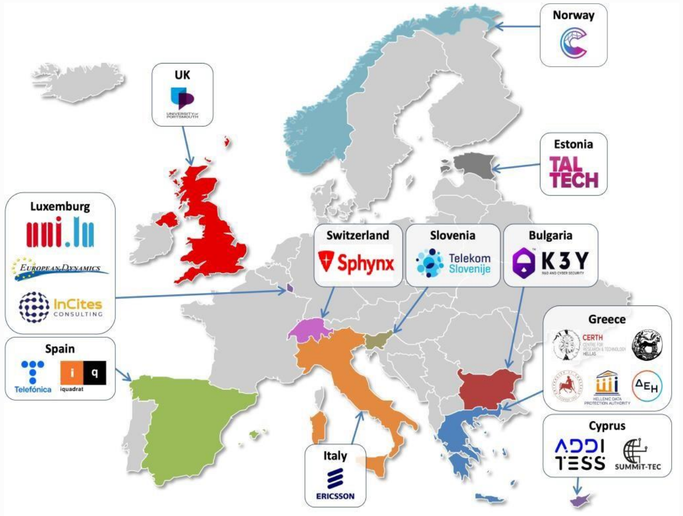
SNS JU Call 3 Projects Introduction
14 February 2025

Project Information

XTRUST-6G



19
Partners

10
Countries

36
Months

7,998,595
EU Contribution

Information Technologies Institute

Topic:
HORIZON-JU-SNS-2024-STREAM-B-01-04
“Reliable Services and Smart Security–
Standardisation and Follow-up/PoCs”

Type:
HORIZON-RIA
HORIZON Research & Innovation Actions

European Dynamics
InCites CONSULTING
Telekom Slovenije
HELLENIC DATA PROTECTION AUTHORITY
ΔΕΗ
K3Y R&D AND CYBER SECURITY
Sphynx
TAL TECH
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XTRUST-6G Motivation and Needs

XTRUST-6G

1. Difficult to analyze, secure, and maintain complex 5G+/6G ecosystems
2. Expected expanded threat surface and vulnerabilities in O-RAN functions and interfaces
3. New security threats and challenges will be introduced from the use of AI/ML
4. Major threat from software supply chain attacks
5. Lack of fully automated security Tools
6. O-RAN technical specifications not featuring security aspects
7. Increased number of complex and sophisticated attacks
8. Increased reuse of Open-source solutions without scanned for security risks
9. Hard to define the security perimeter in 6G systems

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XTRUST-6G's Aim

- **micro-segmentation** of critical O-RAN assets
- **a zero-trust-based security framework**
- **advanced AI-driven tools for intrusion detection**
- **quantum-safe technologies and privacy-preserving AI/ML schemes**
- **enhanced supply chain security measures**

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XTRUST-6G Objectives

1. Develop advanced zero-trust security architecture enforcing the least privilege policy to increase 5G+/6G infrastructures' resilience and prevent sophisticated cyber-attacks
2. Develop advanced proactive 5G+/6G security tools, relying on threat intelligence and foresight, to provide risk-based situational awareness and increased preparedness
3. Provide AI-based zero-touch E2E protection for massively connected 5G+/6G ecosystems by employing a cooperative and federated approach for optimal threat detection and mitigation
4. Deliver intelligent solutions for increasing visibility and control over a 5G+/6G infrastructure's (O-RAN, core network, etc.) assets, real-time monitoring, and orchestration of security controls

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XTRUST-6G Objectives

5 Ensure trustworthy operation of 5G+/6G services by leveraging the blockchain to enforce identity verification, secure lifecycle management, auditing, and evidence-based security policy compliance

6 Protect the 5G+/6G supply chain by building a framework for OSS security assurance and deliver intelligent risk-based tools automatically remediating injected weaknesses and vulnerabilities

7 Increase the security of future 6G mobile networks by utilizing software programmable quantum-safe security solutions and intelligent physical layer security approaches

8 Provide advanced techniques for enhancing 6G privacy and sensitive information sharing, as well as, methods for multi-stage AI/ML training and inference in a trusted, explainable, fair, and sustainable manner

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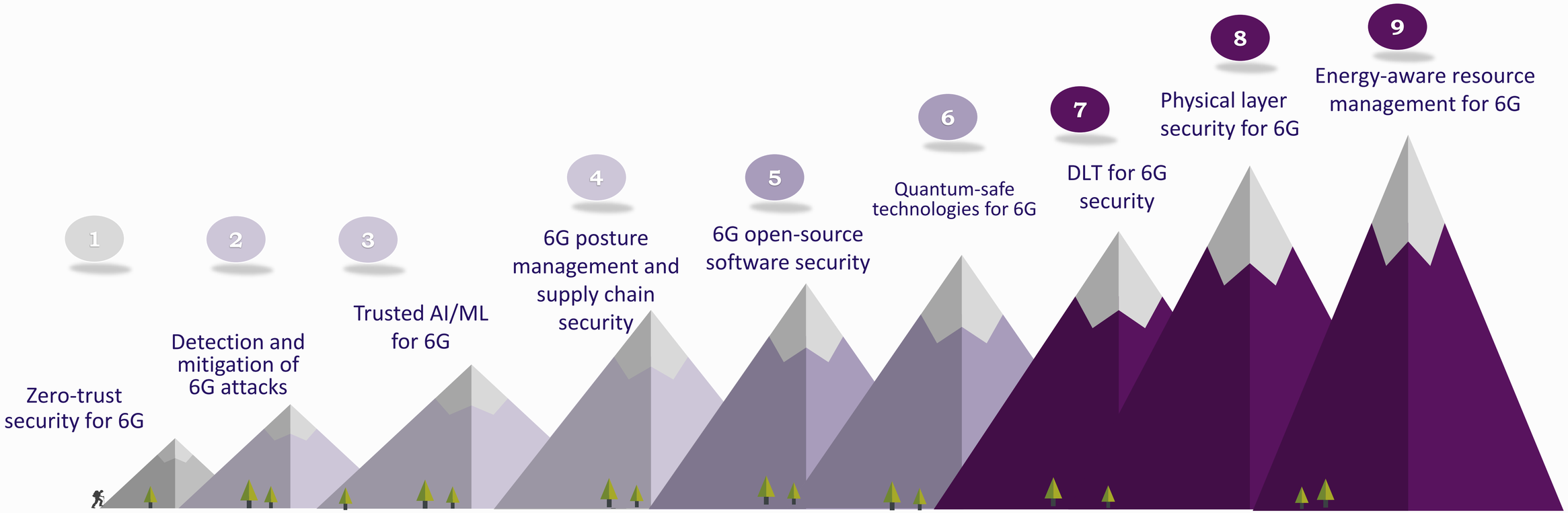
Ambitions

XTRUST-6G



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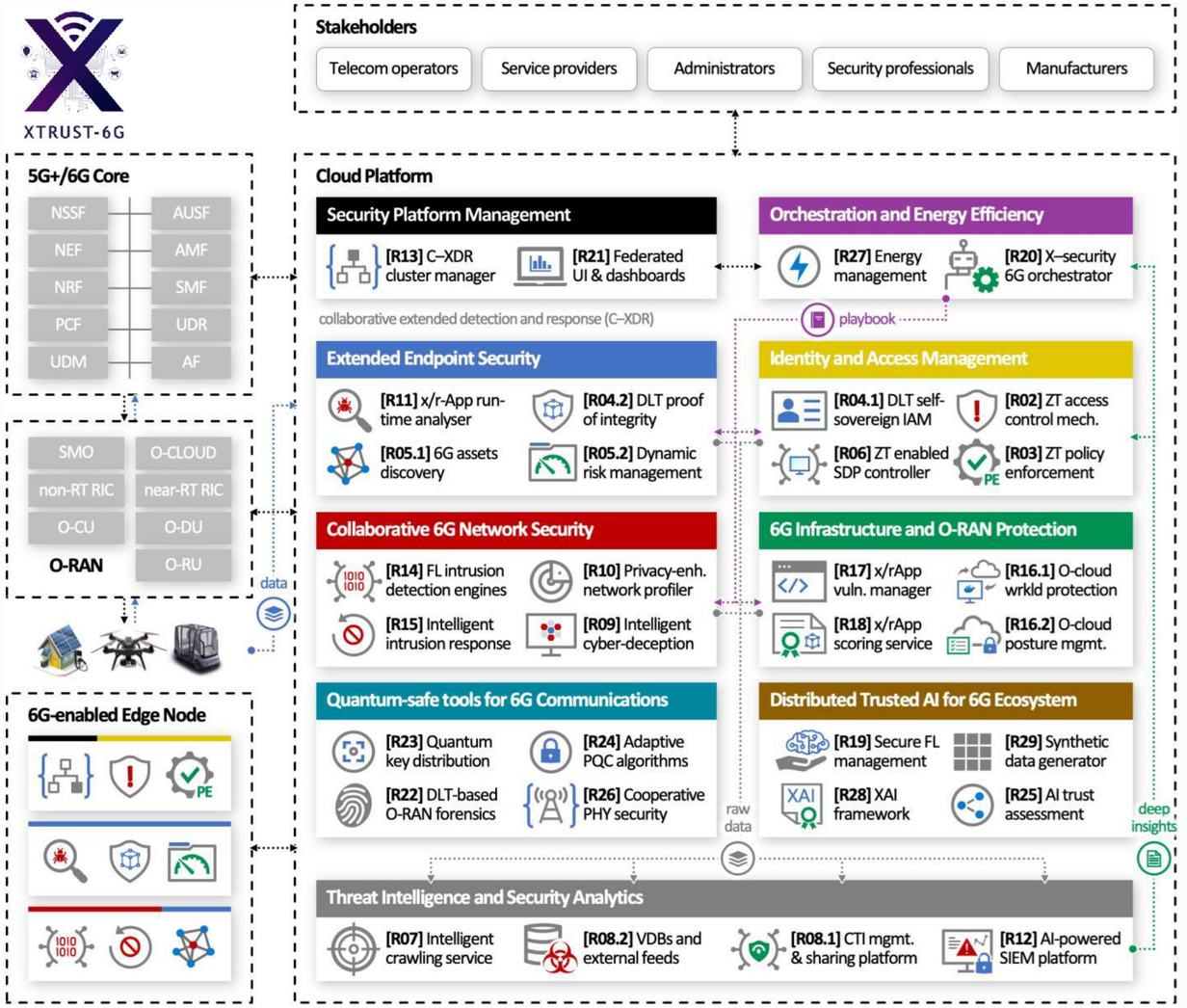
XTRUST-6G Key Technologies



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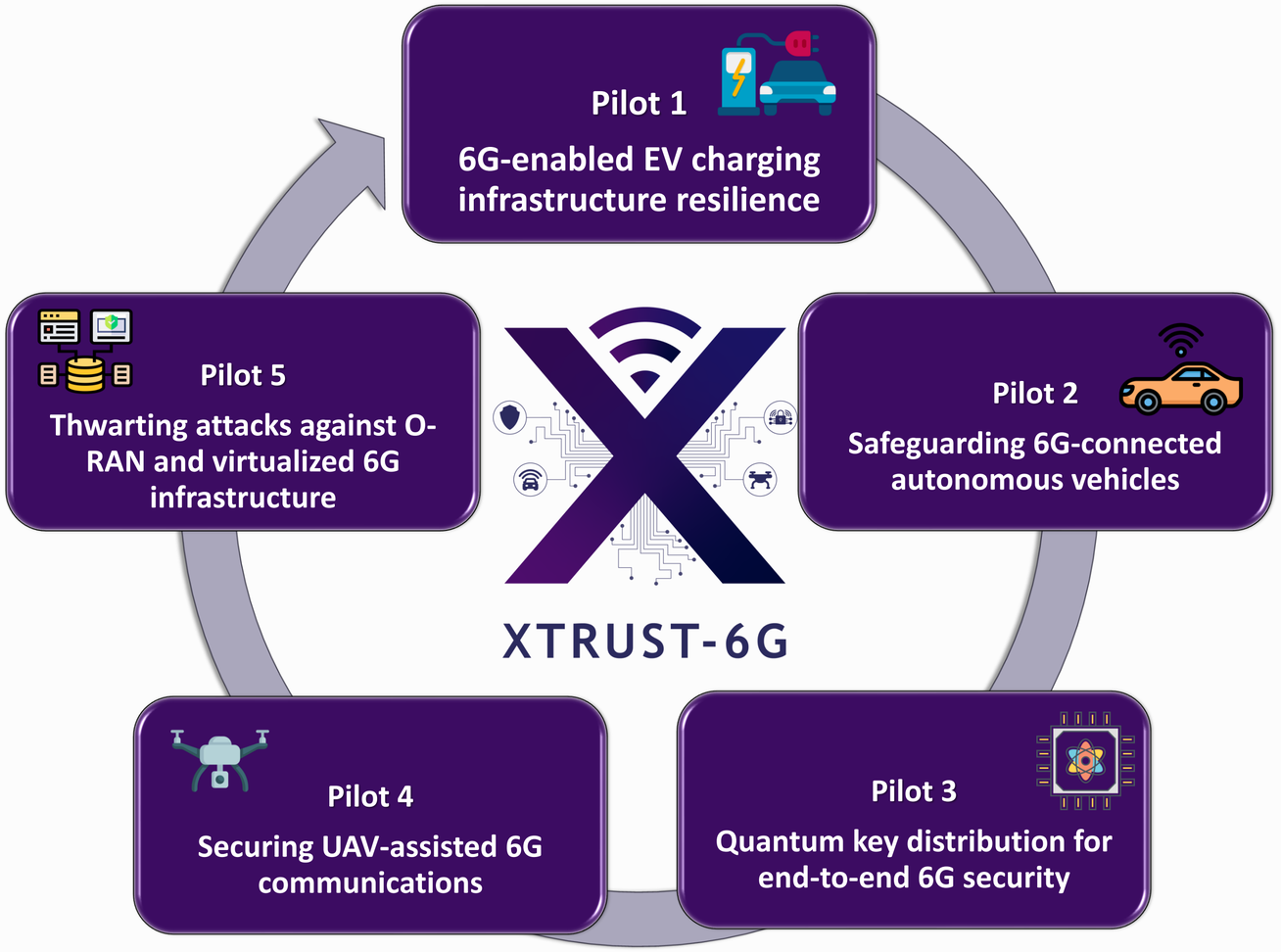
XTRUST-6G Pilot Use Cases

XTRUST-6G



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XTRUST-6G Outcomes

XTRUST-6G

1) AI technology applied to security and service deployment in different aspects:

- **secure and verifiable application of AI** to enhanced service deployment in 6G;
- consideration of potential **security threats using AI; AI for securing 6G** control and mgmt. planes; to efficiently improve the security of distributed architectures and complex use environments.

2) Beyond perimetric security strategies and disruptive security and reliability scenarios, including energy efficiency aspects. Holistic distribution of security in all its phases (protection, detection, response), with a particular focus on differentiated security architectures and cooperative security across domains, layers and stakeholders.

3) **Availability, accessibility, and affordability** of technologies supporting **trustworthiness, resilience, openness, transparency, and dependability** under the EU regulations (such as GDPR and Cyber Security Act) across a complete service continuum, supporting complex human centric multimodal communications, including entangled devices.

4) **Availability, accessibility, and affordability** of technologies ensuring **secure, privacy preserving and trustworthy services** in the context of a programmable platform for the complete life cycle of services, for increasingly dynamic scenarios considering interdependencies between components and cascade effects that may be produced separately.

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XTRUST-6G Outcomes

5) **Zero-touch security** deployment solutions for **virtualized and distributed environments**, taking into account the varying computational capabilities and security requirements of their building blocks and their interactions with third-party entities.

6) Quantum key distribution and post-quantum cryptography support **ensuring long term security for 6G networks.**

7) **Efficient run-time service development methodologies** able to operate across multiple stakeholders in an **efficient way**, to **provide complex, multi-technology, dynamic services**.

8) Service technologies for time-sensitive and computationally intensive applications, able to optimize deployment considering aspects as energy consumption, reliability and security levels.

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XTRUST-6G Outcomes

XTRUST-6G

9) **Algorithms**, **software** and **hardware implementations**, which can be used for PoC and later trials systems.

10) **Dissemination** of solutions for international consensus building, which can be **exploited in standardization activities**. Contributions to international standardization.

11) **Strengthened EU cybersecurity** capacities and European Union sovereignty in digital technologies.

12) More **resilient digital infrastructures**, **systems and processes**.

13) **Increased** software, hardware and supply chain security.

14) **Secured** disruptive technologies.

15) **Smart** and **quantifiable** security assurance across the EU.

16) **Reinforced awareness** and a **common** cyber security management and culture

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XTRUST-6G

Thank you!

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