

# elacotic

Efficient, portabLe And Secure orchesTration for reliable servICes

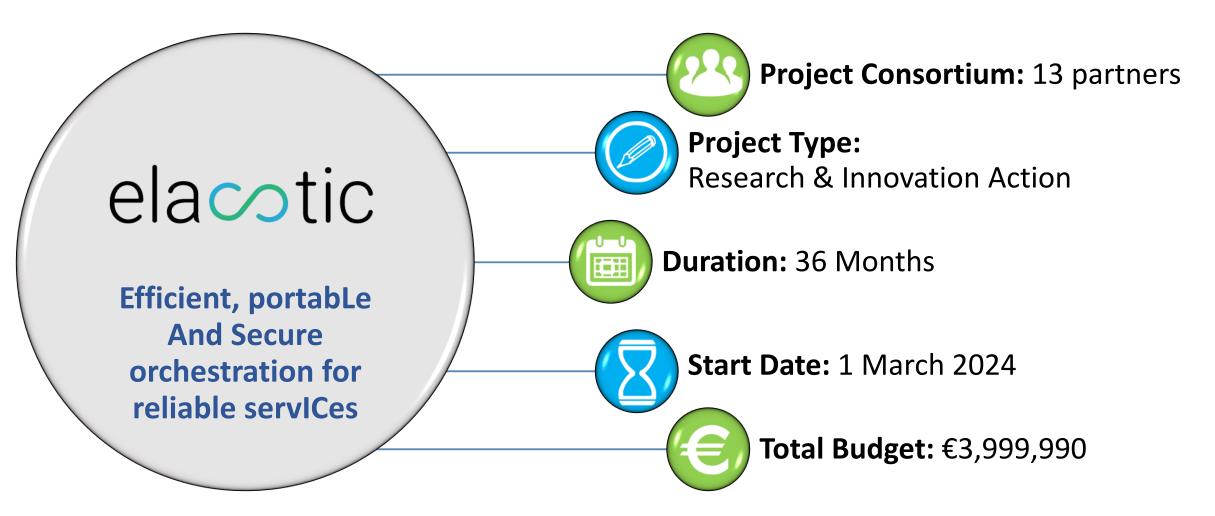
## ELASTIC and European Smart Networks and Services (SNS)

Prof. Sotiris Ioannidis (TUC)

March 7, 2024

### **Project Identity Card**

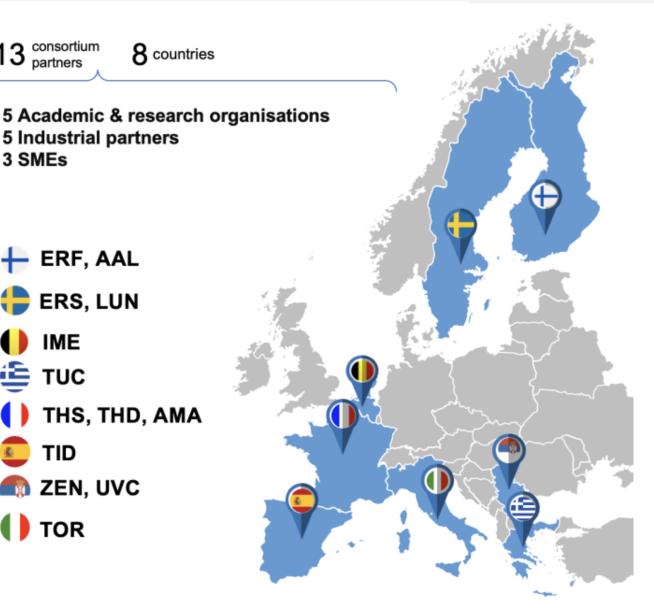




## **ELASTIC Consortium**

⊖ ela∽tic

- 1. POLYTECHNEIO KRITIS (TUC)
- 2. ERICSSON AB SE (ERS)
- 3. OY L M ERICSSON AB (ERF)
- 4. TELEFONICA INVESTIGACION Y DESARROLLO SA (TID)
- 5. THALES SIX GTS FRANCE SAS (THS)
- 6. THALES DIS FRANCE SAS (THD)
- 7. INTERUNIVERSITAIR MICRO-ELECTRONICA CENTRUM (IME)
- 8. ULTRAVIOLET CONSULT DOO (UVC)
- 9. AALTO KORKEAKOULUSAATIO SR (AAL)
- 10. LUNDS UNIVERSITET (LUN)
- 11. ABSTRACT MACHINES SAS (AMA)
- 12. PRIVREDNO DRUSTVO ZENTRIX LAB DRUSTVO SA OGRAN (**ZEN**)
- 13. POLITECNICO DI TORINO (TOR)



### Motivation



#### 6G communication networks



Important to ensure efficient and effective orchestration of its broad range of services and resources



**Edge cloud computing** 

Increasingly important as the data volumes rise with the number of the connected devices



#### Security in 6G

Critical issue in 6G services due to privacy and confidentiality of sensitive data

## Challenges



1

## Security of lightweight and portable executable isolation

- Secure portable and lightweight workloads
- Improve orchestration monitoring latencies

2

#### Efficient and secure serverless orchestration over a heterogeneous continuum

• Fast and secure orchestration services

3

## Privacy-preserving multi-party confidential computing

• HW CPU extensions for creating secure enclaves

4

#### Portable and secure workload distribution and execution over constrained far-edge IoT devices

 Efficient process orchestration and execution over 6G networks





ELASTIC aims to enhance **efficiency and security of service orchestration** within the highly distributed and heterogeneous context of **cloud-fog-edge continuum** technologies.

ELASTIC will focus on **combining** impactful **key technologies** from modern **cloud-native ecosystems** to enhance **service orchestration** and **security** over **6G networks**.

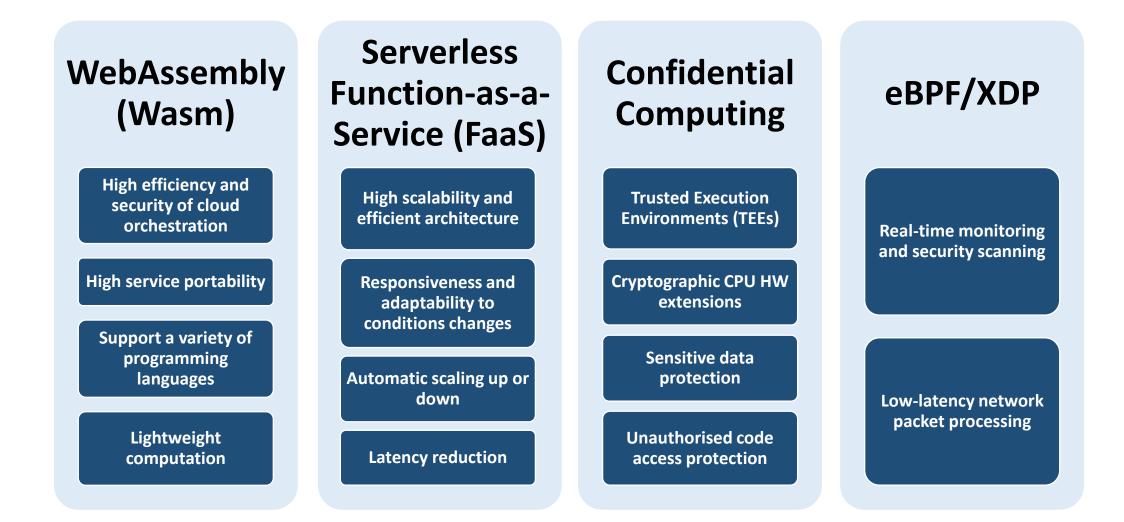
## Objectives



1	Analyse <b>executable isolation techniques</b> , and <b>improve efficiency</b> , <b>portability</b> , and <b>security</b> for secure <b>in-</b> <b>network cloud and edge</b> computing across the entire lifecycle
2	Research and design <b>secure, architecture-agnostic serverless FaaS orchestration</b> for diverse artifacts and workloads. Ensure <b>data authenticity</b> and <b>trusted digital interactions</b> in dynamic service environments
3	Implement a <b>secure, privacy-preserving, architecture-agnostic execution environment</b> utilising confidential computing and privacy-enhancing technologies to ensure secure services on a programmable platform for multi-stakeholders
4	Design and implement <b>efficient, secure edge and far-edge (IoT) workload orchestration</b> for critical <b>6G</b> <b>infrastructure</b> , ensuring <b>reliability, trust, and resilience</b> in a globally connected continuum of heterogeneous environments facilitated by network and IT system convergence for future digital services
5	Facilitate <b>6G standardization</b> , <b>exploitation</b> , and <b>dissemination</b> of developed technologies, aligning with <b>EU supply capabilities</b> for efficient, secure, and privacy-preserving service deployment

## ELASTIC key tools and functionalities





Framework that combines all the above tools across cluster-based environments

#### Pilot 1 Smart Connected Factory of the Future



IoT data fabric solution for hyper-scale data processing in a 6G timeframe

#### Tools:

- eBPF for security vulnerabilities
- WebAssembly and FaaS security frameworks
- Hardware-based, embedded low-power modules for security issues detection

#### **ELASTIC** goals & scenarios:

- In-transit IoT data processing using FaaS
- Use lightweight virtualisation to minimise processing latency and resource utilisation
- Deploy ELASTIC stateless and minimal-state processing on resource-constrained device clusters
- Deploy **privacy-aware mechanisms** for sharing threat information among distinct ELASTIC instances



IT/OT - Privacy-preserving confidential computing platform to migrate on-premise sensitive IT services to the cloud

**Confidential computing for secure migration of sensitive services to the cloud** 

#### Tools:

Pilot 2

- VM-based Trusted Execution Environments
- HW platform abstractions
- Wasm containers
- eBPF monitoring

#### **ELASTIC goals & scenarios:**

- Automated handling (i.e., creation and initialisation of confidential VM)
- TEE abstractions to use any CSP infrastructure (e.g., Gardeners to start irrigation)
- Handle remote attestations
- Software Management Agents (SMAs) for confidential VMs







## elacotic

#### Efficient, portabLe And Secure orchesTration for reliable servICes

## Thank you!



This project has received funding from the European Union's Horizon Research and Innovation program under grant agreement No 101139067.