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Cyber Situational Awareness and Resilience in the Resilmesh Project

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About the Project

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Essential Information

- **Programme and type:** Horizon Europe (Innovation Action)
- **Duration:** 36 months (10/2023 – 09/2026)
- **Consortium:** 14 partners – 9 countries
- **Budget:** € 5.6 millions

To deliver an open and extensible security operations platform with advanced cyber situational awareness and detection / response capabilities to manage security and resilience in complex and dispersed digital services and infrastructures.

Project Overview

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Partners

Research & Technology	UMU, TUS, RHUL, MUNI, JR, KEMEA, JAMK
Industrial	GMV, MONT, F6S, SLP
End Users	INFOCERT, ALIAS, CARM

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Technical Concept and Components

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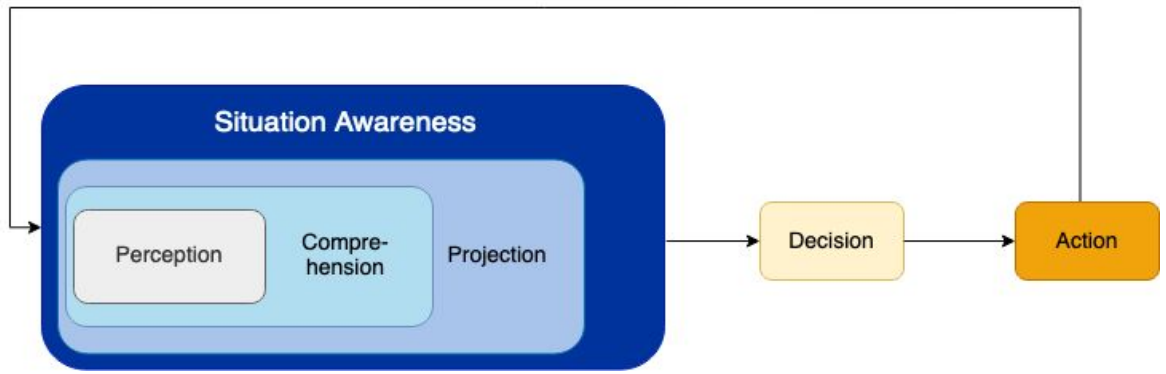
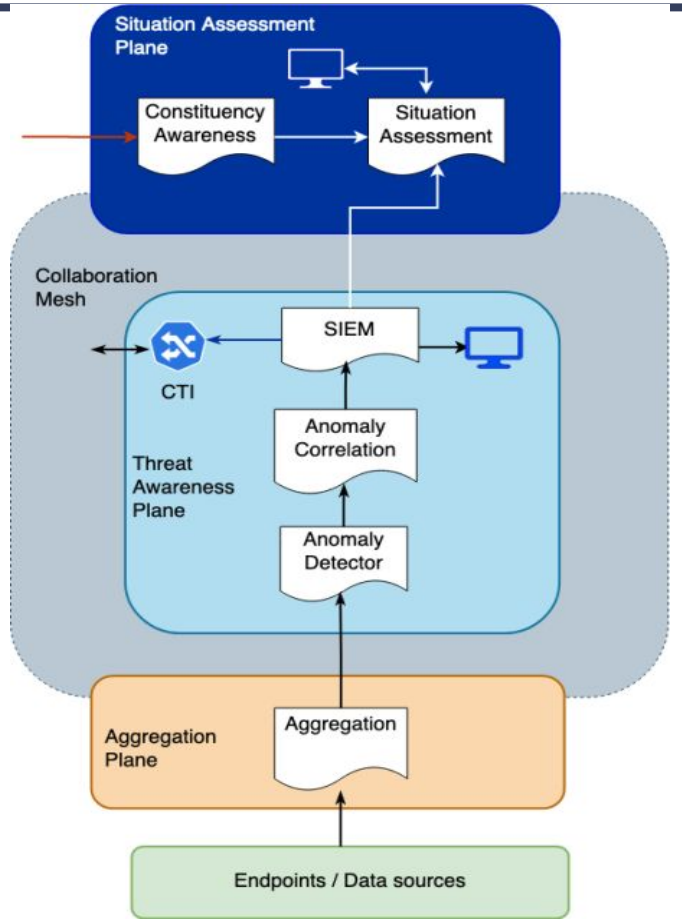
Cyber Situational Awareness

- Ability to understand **the current state** of network environment
- Can improve **cyber resilience** against attacks





- **End-to-end data pipeline** containing information processing steps
- **Starts** with emission of the event from the endpoint
- **Ends** with consumption for situation assessment

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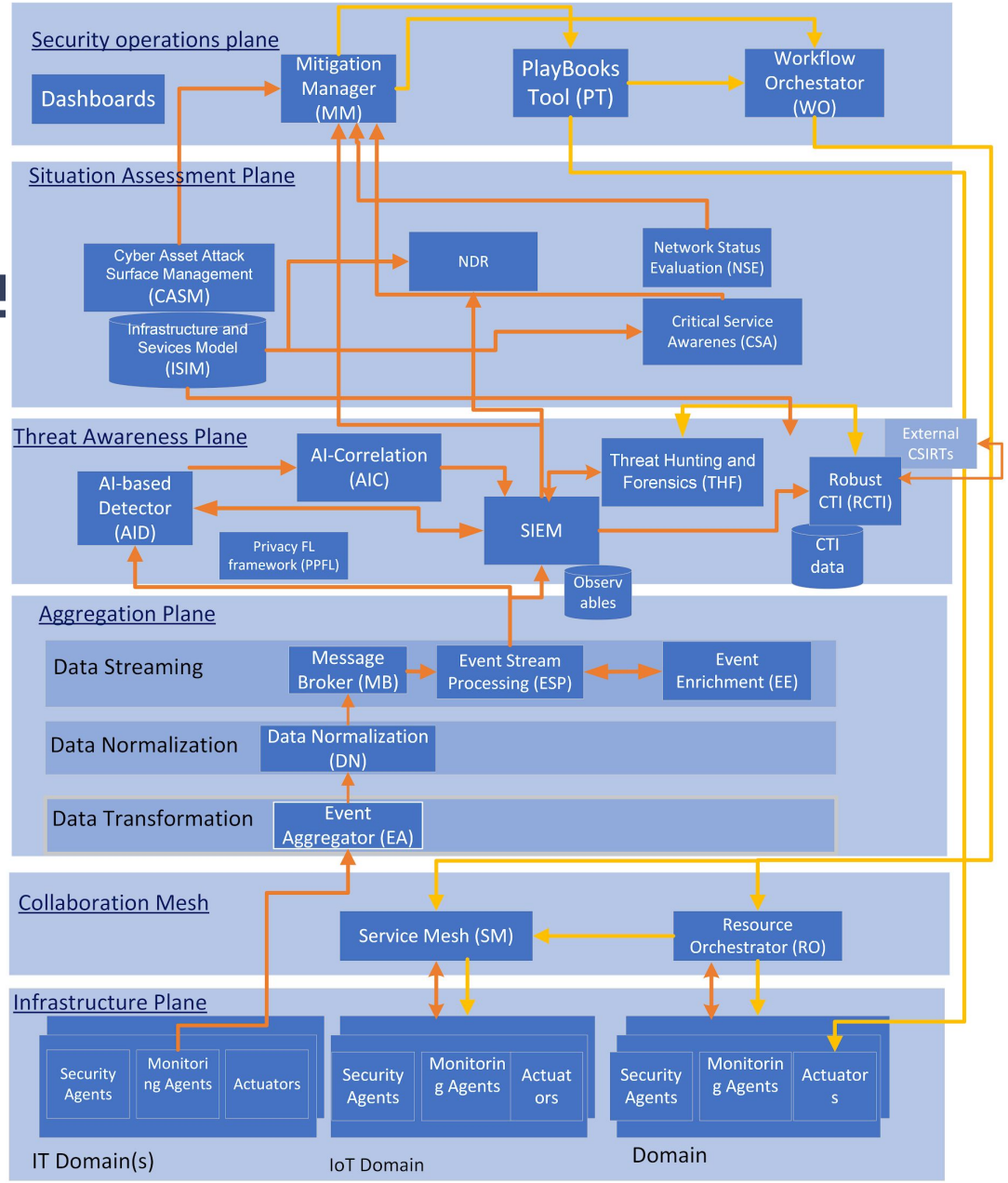
Functional Architecture

- Inspired by **Security Operations and Analytics Platform Architecture (SOAPA)**
  - **Security Operations Layer** – contains elements of the collaboration function plus SOAR (Security Orchestration, Automation, and Response) functions
  - **Analytics Layer** – contains threat awareness and situation assessment
  - **Software Services Layer** – contains parts of the collaboration mesh and aggregation
  - **Distributed Data Services Layer** – contains aggregation functions
- **Functionality of layers** is provided by components
- **Proactive and reactive** communication of components



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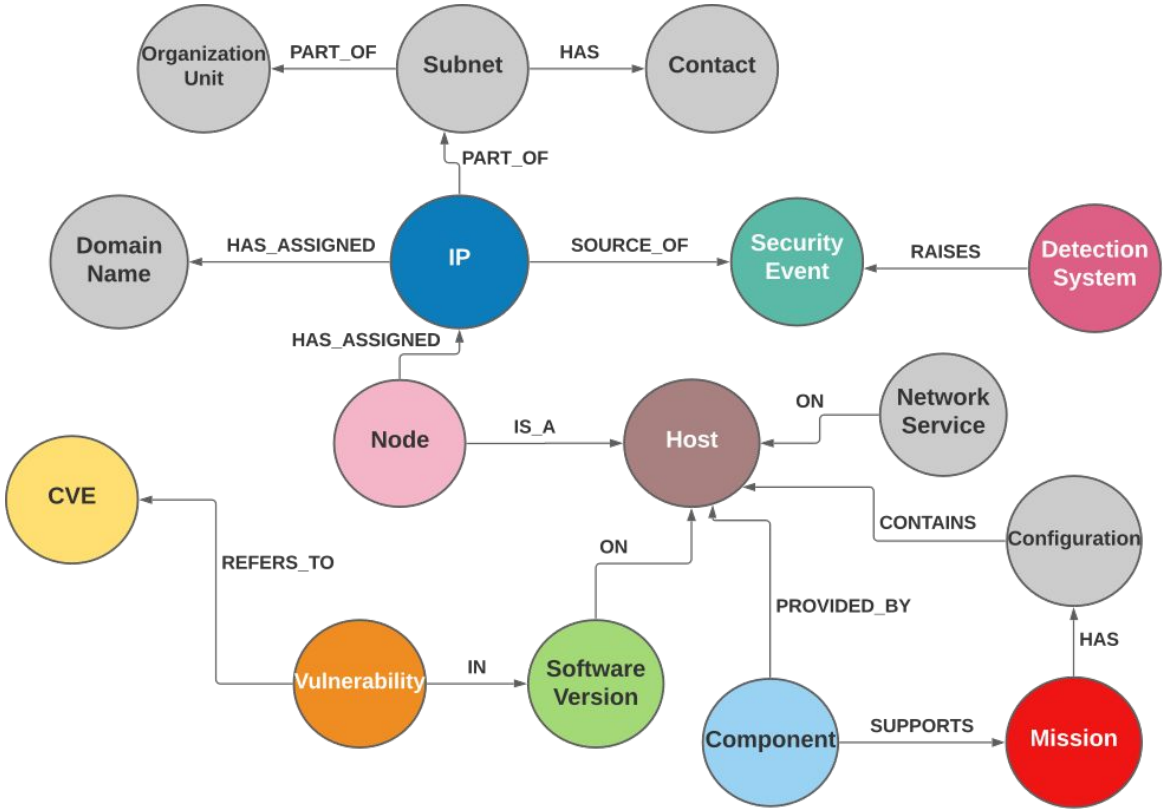
ISIM – Infrastructure and Service Information Model

- **Knowledge graph** of local network
- **Nodes** – entities (e.g., hosts, services, networks, users, vulnerabilities)
- **Edges** – relationships (e.g., vulnerability found on host and host connected to network)



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CASM – Cyber Asset Attack Surface Management

- **Task** – enumerate cyber assets and vulnerabilities automatically
- **Implementation** – split into multiple workers of Temporal.io
    - **CVE worker –** identifies CVEs based on Common Platform Enumeration
    - **Scanning workers –** Nmap asset scanning, Nmap topology scanning, nuclei scanning, and “custom” EasyEASM scanning
    - **Enrichment worker –** indicators from cyber threat intelligence from industrial partner

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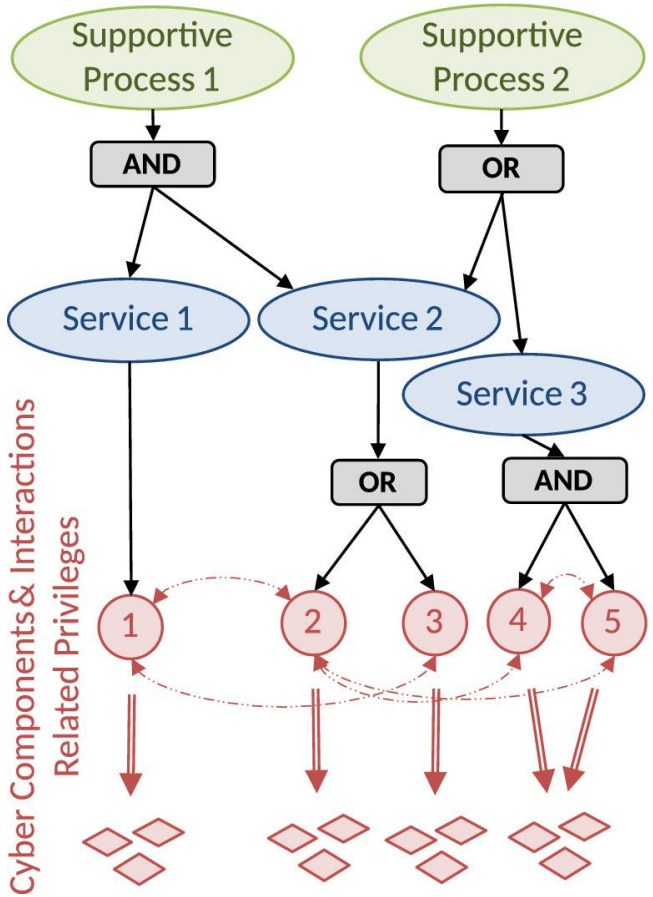
CSA – Critical Service Awareness

- **Task** – map critical assets and their dependencies
- **Data model** – 3-layer mapping with AND/OR notation
- **Example** – robotics
- Used in **computation of criticalities** from missions



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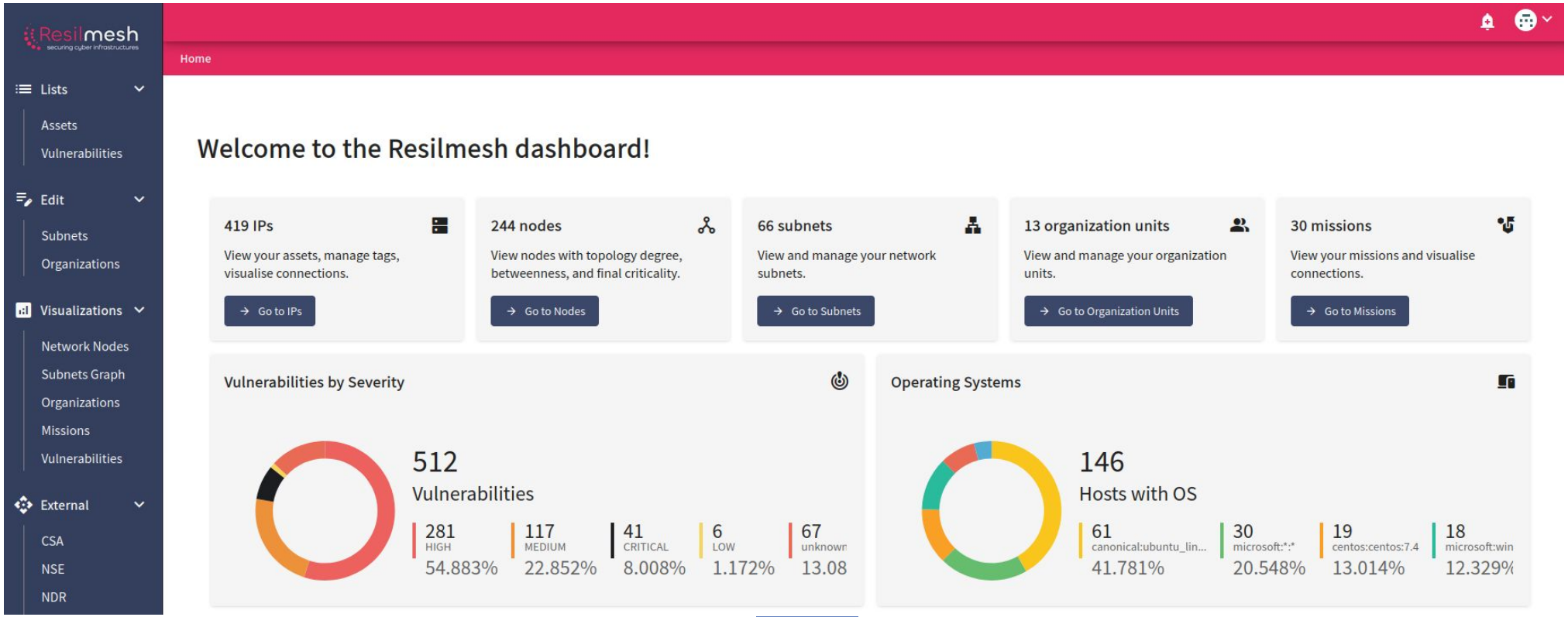
SACD – Situation Awareness Consolidated Dashboard

- **Panels** allow interaction with **ISIM data**



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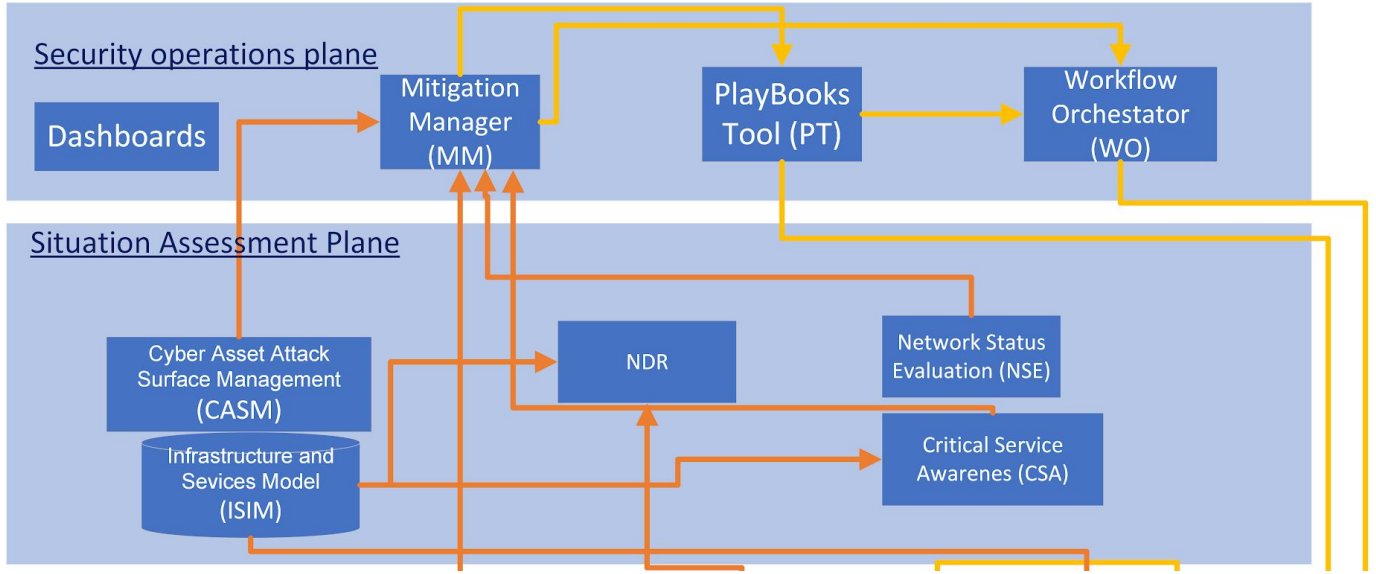
Dependent Components

- **Network Status Evaluation (NSE)**
  - Risk assessment
- **Network Detection and Response (NDR)**
  - Raw network traffic
- **Mitigation Manager (MM)**
  - Selects mitigation
- **Playbooks Tool (PT)**
  - Playbooks with mitigations



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Evaluation and Results

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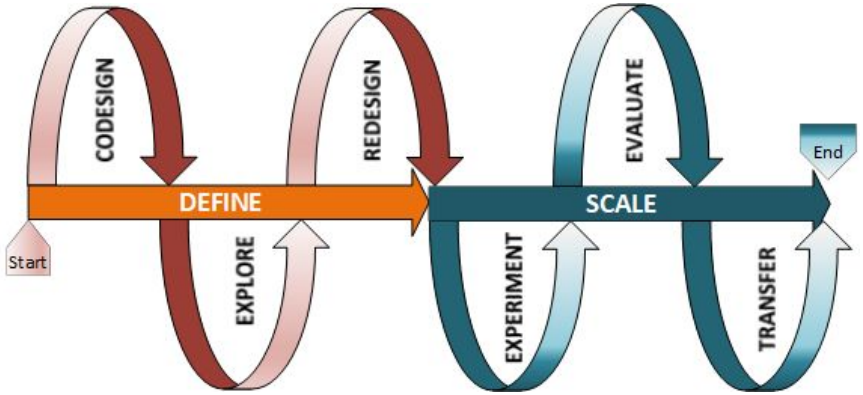
Development Methodology

- **Two phases**
  - **Define** – scope, design, and the first implementation
  - **Scale** – the second version, evaluation, and transfer of results
- **Two pilots**
  - **Pilot 1** – end users explore prototype, including functionality from open call
  - **Pilot 2** – usability and performance of the Resilmesh system



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Cascade Funding

- **Mechanism** of European Commision to distribute public **funding**
- **Beneficiaries** – start-ups, small and medium-sized enterprises (SME), and other
- **Purpose** – uptake or development of digital innovation
- **Technology Centre Prague** (tc.cz) – support for open calls
- **National portal** on the European Research Area (eraportal.sk)
- **Open Calls** in Resilmesh
- **Expert evaluators** evaluate meaningfulness of proposals

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Open Calls

- Open Call 1 – **Extend**
  - **Develop technologies** that can extend the capabilities of Resilmesh
  - Call opened in August 2024
  - **4 projects, € 90 K** per project, **9 months** duration
  - **Results:** cloud-based cybersecurity platform, smart buildings managed by SCADA, photovoltaic installations, EV charging infrastructure
- Open Call 2 – **Experiment**
  - **Demonstrate and validate** use of Resilmesh in new use-case domains
  - Call opened in September 2025
  - **5 projects, € 70 K** per project, **7 months** duration
- **Evaluators** – eight evaluations (€ 900 compensation)

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Results

- **Short-term outputs**
  - **Tools, algorithms,** and **processes** to improve cyber resilience of critical infrastructure
  - Cyber situational awareness becomes a **practically applicable** concept
- **Technology Readiness Level**
  - Improvement **from 3 – 5 to 5 – 7** depending on individual components
- **Long-term outcomes**
  - **Increased resilience** and **awareness** of security sector and service providers
- **Open calls** represent opportunities to participate
- **Horizon Booster** supports dissemination and commercialisation

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Thank you
for your attention!

Questions?

Project's website: resilmesh.eu
Contact: sadlek@ics.muni.cz

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