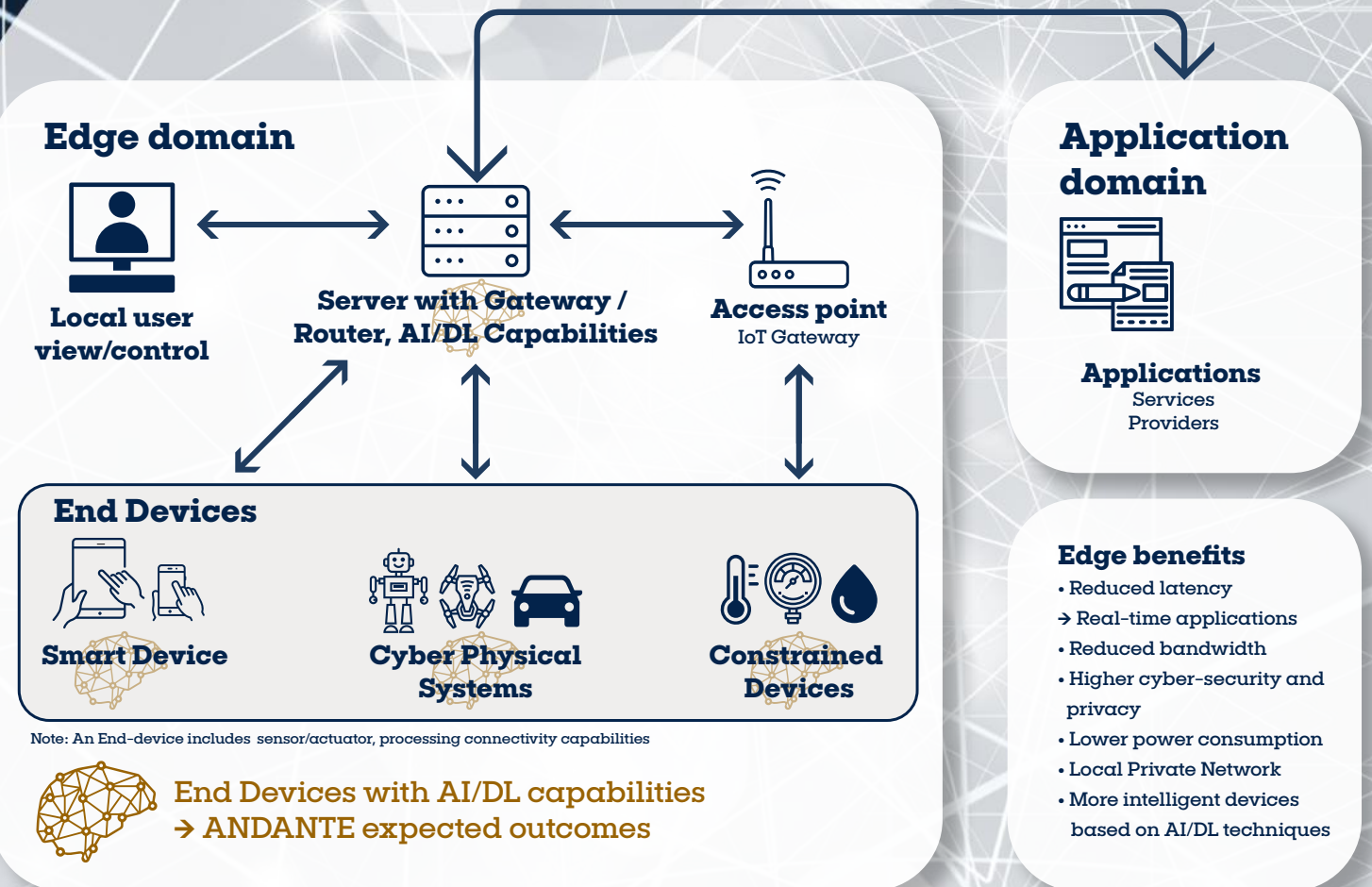# ANDANTE

Contributions to develop advanced and intelligent solutions in the Edge domain

Edge Domain System Architecture

Edge domain

Local user view/control

Server with Gateway / Router, AI/DL Capabilities

Access point
IoT Gateway

Application domain

Applications
Services
Providers

End Devices

Smart Device

Cyber Physical Systems

Constrained Devices

Note: An End-device includes sensor/actuator, processing connectivity capabilities

End Devices with AI/DL capabilities
→ ANDANTE expected outcomes

Edge benefits
- Reduced latency
- → Real-time applications
- Reduced bandwidth
- Higher cyber-security and privacy
- Lower power consumption
- Local Private Network
- More intelligent devices based on AI/DL techniques

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ECSEL Joint Undertaking
Electronic Components and Systems for European Leadership

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Contributions to develop advanced and intelligent solutions in the Edge domain

Main Goal of IoT Systems

Analyse the data gathered, from the system environment, for decision-making

Context

Current IoT System solutions

- Centric solutions based on cloud computing
  → Not adapted for real-time applications

- Data storage, data analysis performed on the Cloud
  → Huge memory and processing resources required

- Data gathered sent to the cloud
  → Bandwidth and energy spent unnecessary for many applications

- Larger end-to-end path to ensure cyber-security and privacy
  → Increasing the risk and surface for attacks and data theft.

- Infrastructure to be shared between many users to be cost effective
  → Huge storage and computing power required that implies high level of energy consumption.

- For many IoT applications, cloud computing not adequate
  → More efficient data processing vs energy consumption is required.

Moving from Cloud to Edge computing

- Many IoT applications can be locally performed at the edge
  → Reducing latency then allowing real-time applications
  → Performing data analysis in the Edge

Main Benefits

- Reduce bandwidth use
  → Less amount of data to transmit

- Reduce storage needs
  → Data is processed in line

- Increase the data security and personal data protection levels
  → Less surface for attacks

- Reduce overall power consumption
  → Significant energy savings

- Creation of Local Private Networks
  → Higher data confidentiality, recurrent cost savings, distributed intelligence

ANDANTE contributions for data analysis on the Edge

Introduction of advanced eNVM technologies allowing

- The design of powerful and cost-effective Neuromorphic solutions (Artificial, Spiking and Analog Neural Networks
- The implementation of Intelligent end-devices for different applications
- The development several demonstrators, in different Application Areas, to validate and evaluate project outcomes.

Main Challenges

- Very complex Neural Networks (several 10's Mbytes of eNVM)
- Very high performances at ultra-low power consumption (several Tops/mW)
- High integrated solutions
- Low cost

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