# Embedding the Future
IoT and Edge Intersections

IoT and Edge: Instruments, Priorities and Partnerships

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AIOTI Structure

AIOTI logo

WG IoT Research

WG Innovation Ecosystems

WG IoT Standardisation

WG IoT Policy

WG Smart Living Environment for Ageing Well

WG Smart Farming and Food Security

WG Distributed Ledger Technologies

WG Smart Cities

WG Smart Mobility

WG Smart Water Management

WG Manufacturing

WG Smart Energy

WG Smart Buildings and Architecture

Avoid siloed approaches: cross-domain integration

AIOTI is the **multi-stakeholder platform for stimulating IoT Innovation in Europe**, bringing together **more than 200 small and large companies, start-ups and scale-ups, academia, policy makers and end-users and representatives of society** in an end-to-end approach.

AIOTI strives to leverage, share and promote **best practices in the technology and applications IoT ecosystems**, be a one-stop point of information on all relevant aspects of IoT Innovation to its members while proactively addressing key issues and roadblocks for economic growth, acceptance and adoption of IoT Innovation in society.

•**AIOTI White Paper: https://aioti.eu/wp-content/uploads/2020/10/IoT-and-Edge-Computing-Published.pdf**
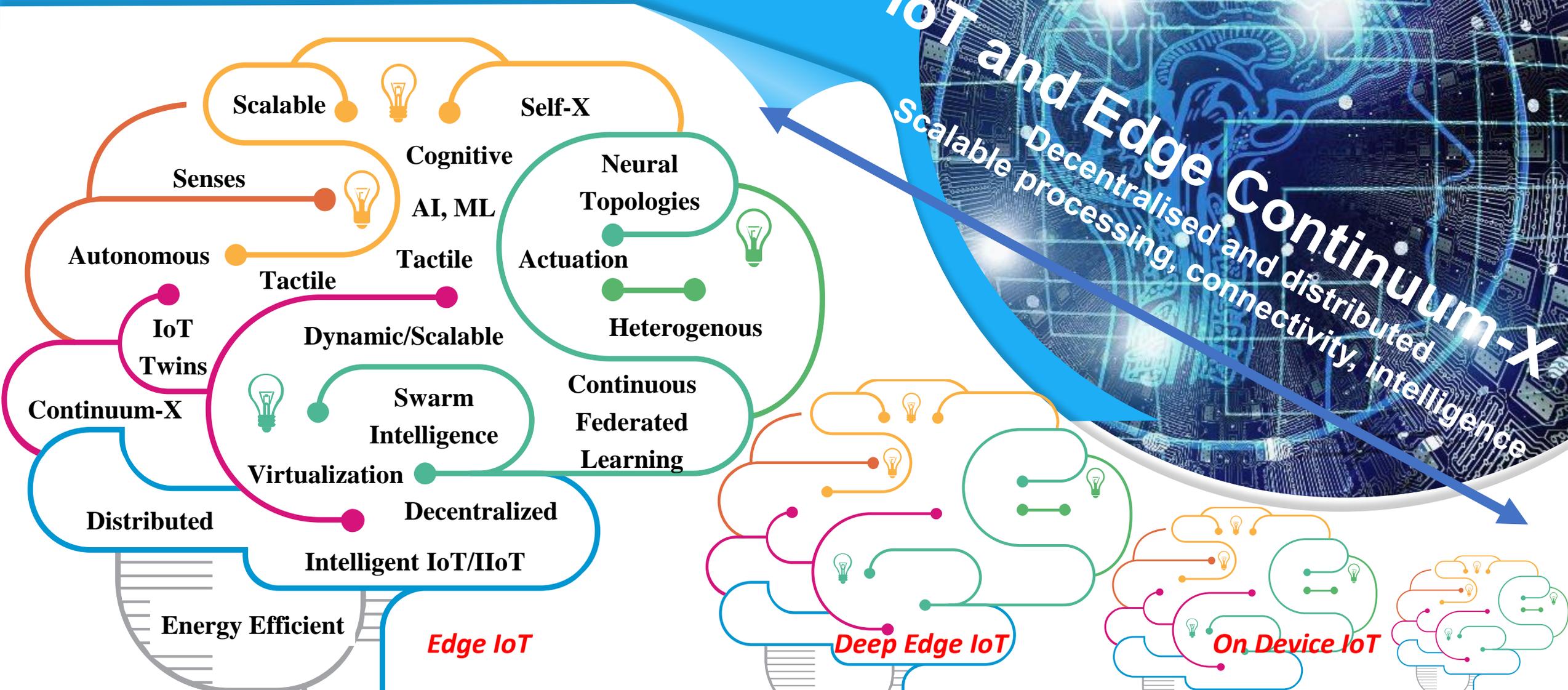
IoT moving fast
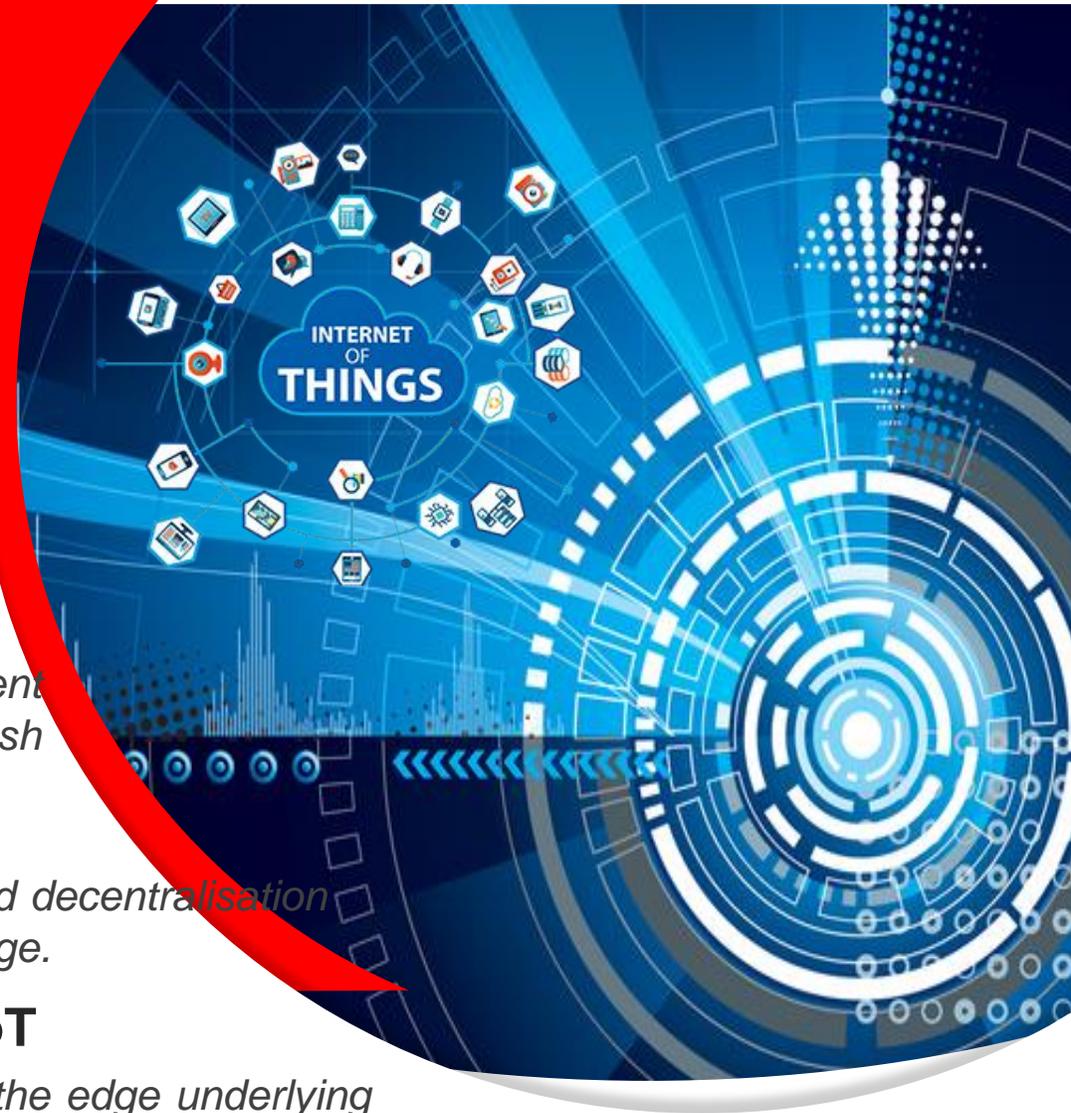
01 **Extending the value creation**

IoT edge ecosystem for the real-time IoT systems integration and federation of multiple edge, fog and multiple clouds.

02 **IoT – Everything intelligent everywhere**

Orchestration across intelligent edge IoT nodes, mobile intelligent connectivity (IoT, AI, wireless, cellular - 5G/6G and beyond), and mesh networks.

03 **Green IoT evolution**

New green IoT technologies to support decarbonisation, digitisation, and decentralisation using energy efficient and low-carbon IoT technologies for distributed edge.

04 **Operating system at the edge for decentralised IoT/IIoT**

New open architectural concepts and underlying operating systems at the edge underlying complexity and intelligence of heterogeneous IoT and system environments.

05 **Orchestrating resources to form a computing X**

Ensuring the real-time link between the edge control and automation IoT systems, and the other computing infrastructure.

Embedding the future

01 **Extensionn of Senses**

IoT and edge computing are centered around Intelligence Sensing (perception systems for IoT devices) and embedded AI technologies .

02 **New IoT concepts emerging**

Internet of Things Senses (IoTS), Tactile Internet of Things (TIoT), Internet of Robotic Things (IoRT) and Artificial Intelligence of Things (AIoT) .

03 **Continuum-X integration**

*End-to-end capabilities and tools across the architectural layers.*

04 **New open architectures for decentralised distributed functions**

New open federated architectures to enhance data security and protection, improve inference reliability, and increase autonomy and capabilities to include self-x functions.

05 **Cognitive capabilities and distributed collaborative functions**

Intelligent collaborative exchange of information for IoT edge devices across the architectural layers combined with discovery of services and features integration.

Continuum-X

Sensing · Processing · Connectivity · Computing · Intelligence · Security · Privacy · Tools

IoT and Edge Continuum
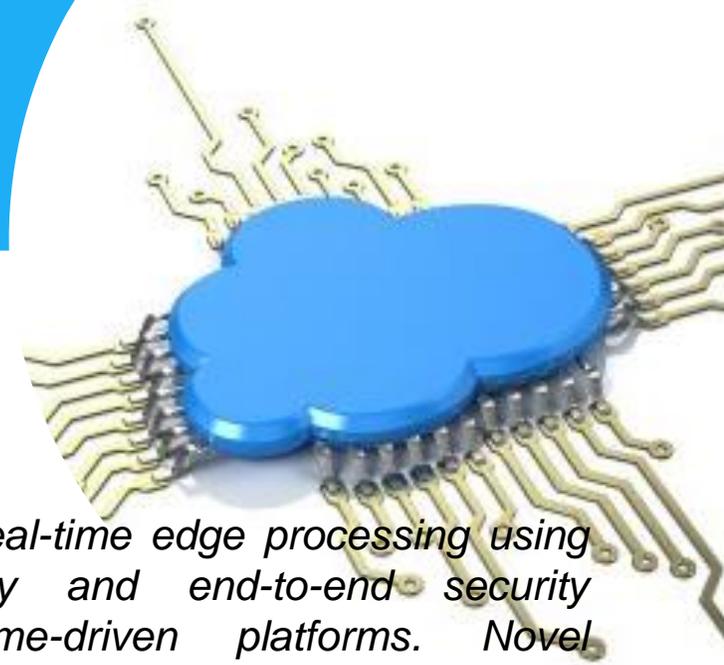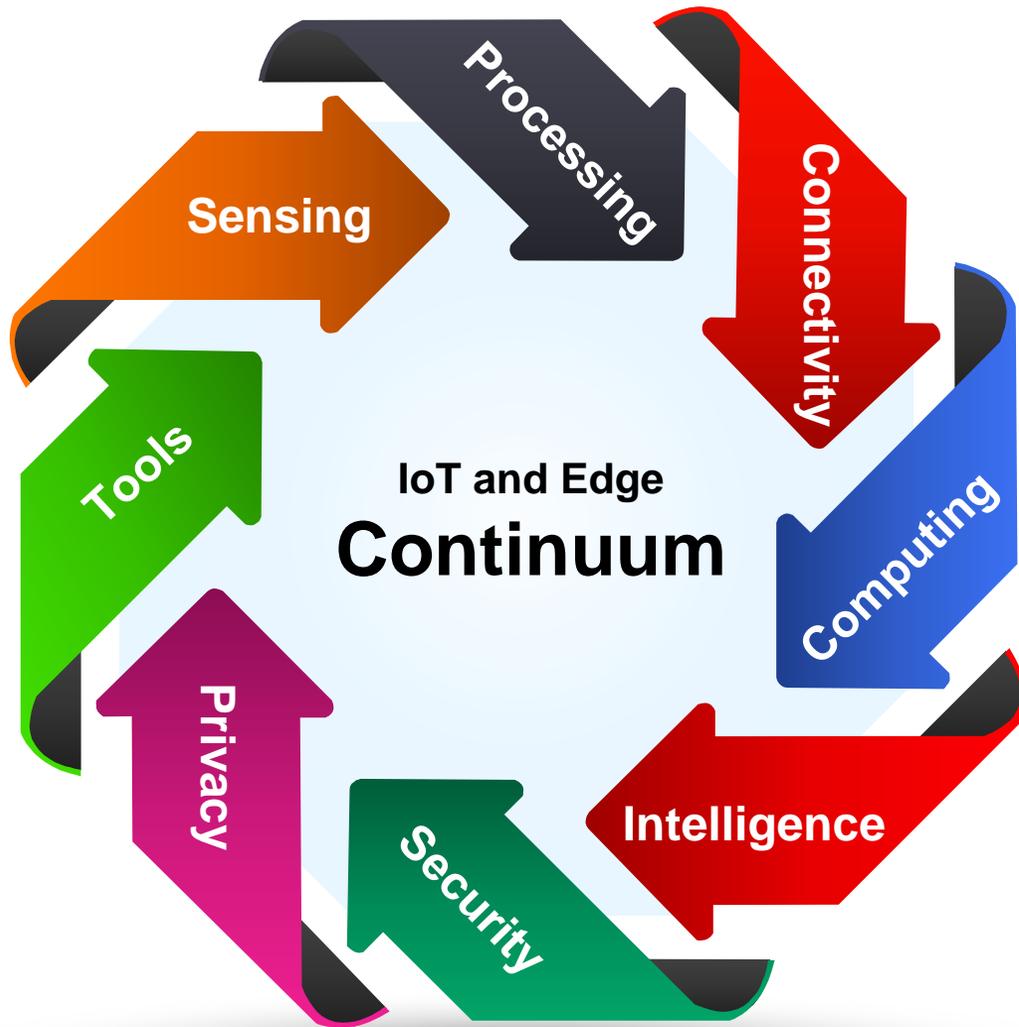
IoT device automation, based on real-time edge processing using AI, advanced mesh connectivity and end-to-end security implemented based on outcome-driven platforms. Novel architectures based on various edge concepts.

Real-time data capture, storage, processing, analytics, knowledge discovery, decision-making, actuation and context awareness capabilities.

New decentralized security paradigms, automatic authentication and access control for IoT devices and edge computing platforms.

Optimized low and ultra-low latency, faster response and efficient over the air updates and upgrades.

Scalability, efficiency, adaptability and transparency (processing capabilities, bandwidth, resources, management).

IoT Edge Operating Continuum
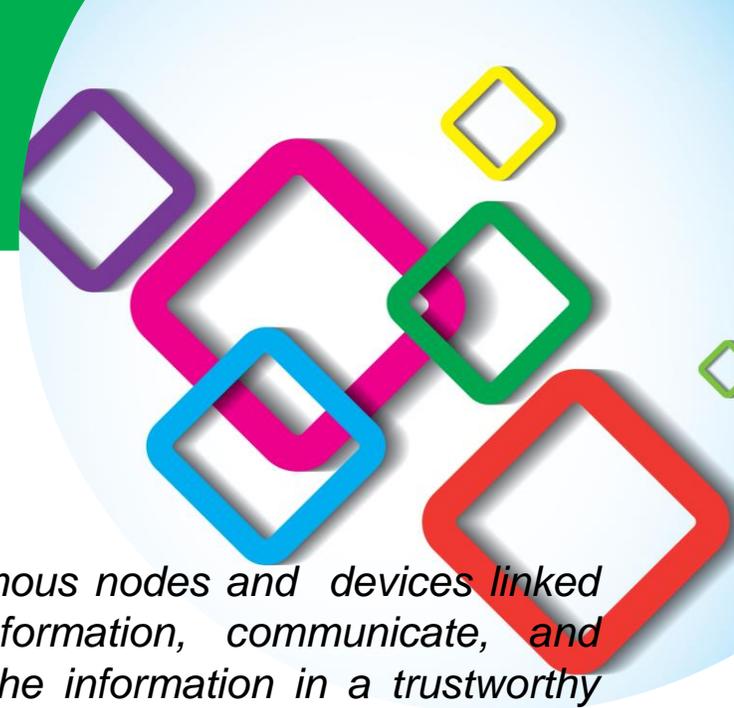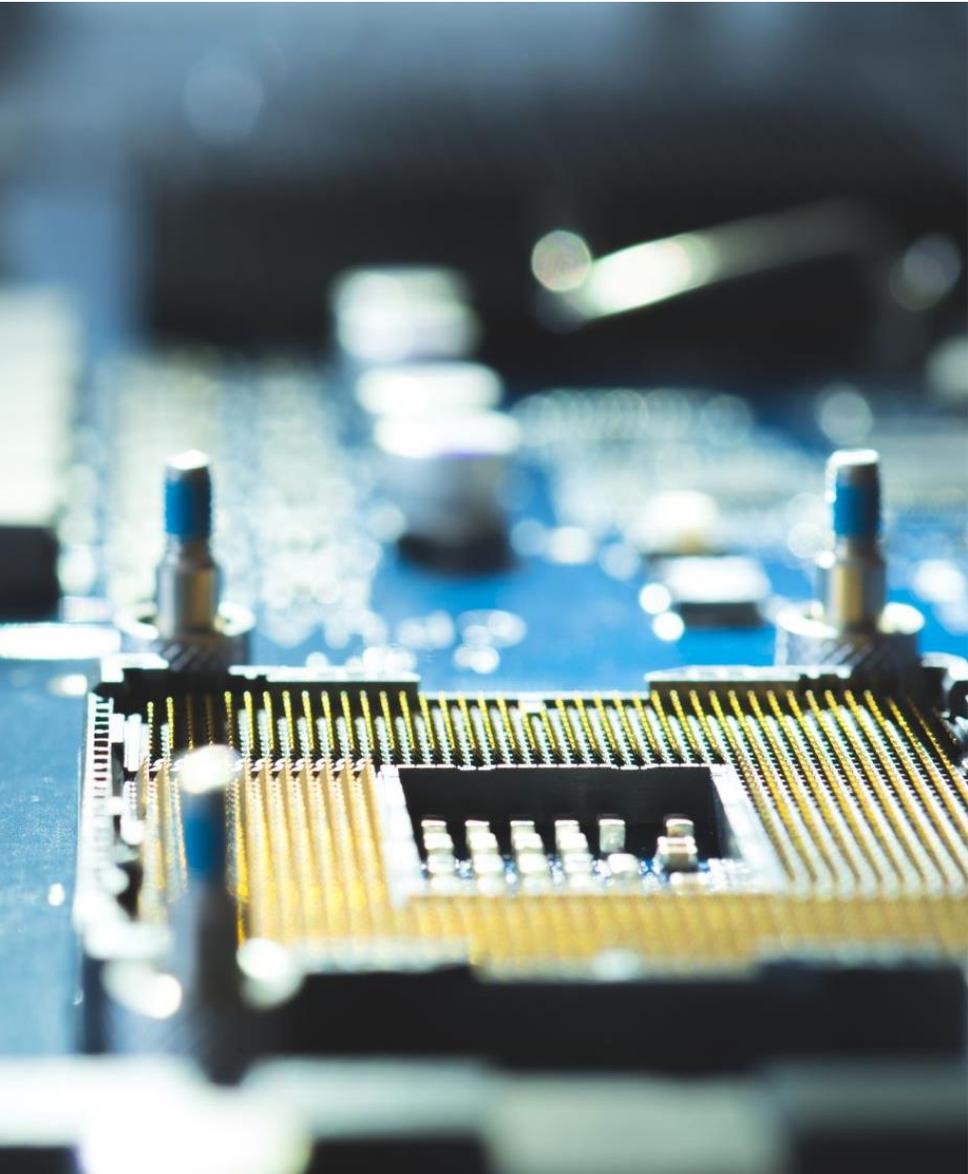
IoT device able to work as autonomous nodes and devices linked by mesh networks to share information, communicate, and exchange information and act on the information in a trustworthy manner.

New open federated architectures for decentralized and distributed IoT systems.

Challenges in advancing novel multitiered IoT architectures and converging the distributed and network operating systems for heterogenous intelligent IoT devices, edge computing combined with distributed IoT systems integrated with middleware.

IoT Edge Challanges

IoT edge distributed systems *challenging related to deployment and maintenance (concurrency, failure handling, dependability, etc.).*

Scaling challenges *both horizontally to account for more traffic and vertically to integrate more functionality and intelligence.*

Modular growth challenge *at hardware, software, algorithms and connectivity*

Fault tolerance *of IoT distributed systems, AI and swarm intelligence integration.*

Cost effectivity vs scalability *and increased optimization at each IoT architectural layer.*

On demand *latency for matching the distributed IoT requirements based on the context, multiple locations and traffic.*

Efficiency *at each IoT and edge computing distributed systems, processing of relevant data and energy efficiency optimization per IoT function provided.*

Parallelism *paradigm both at the physical and virtual IoT edge systems in the IoT platforms (digital and virtual IoT twins in computing continuum).*

IoT and Edge Challenges

01   **Integrated IoT Edge systems**

Integration of independent IoT intelligent devices that appear to its users as a single coherent system federated with other IoT systems .

02   **IoT and edge mesh**

Heterogenous IoT nodes, with intelligent connectivity, processing, intelligent capabilities, organized in a mesh topology and running new operating system on the open federated IoT architectures.

03   **IoT and edge sharing of resources**

Sharing resources in the decentralized and distributed IoT and edge environments – data, computing resources, storage, processing and intelligence.

04   **IoT and edge virtualization functions in the real-digital-virtual-cyber continuum**

Intelligent IoT and edge virtualization and platforms infrastructure.
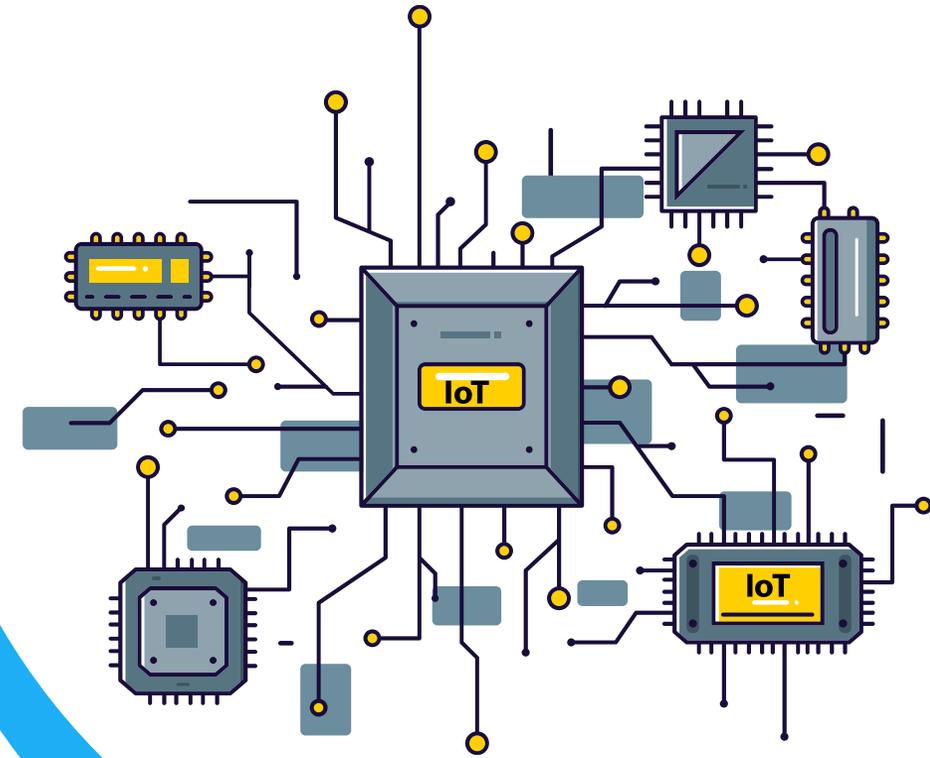
IoT and Edge Challenges

From centralised to decentralised and distributed

D IoT devices	Gateway	Analytics	Knowledge	Security	Dataflow
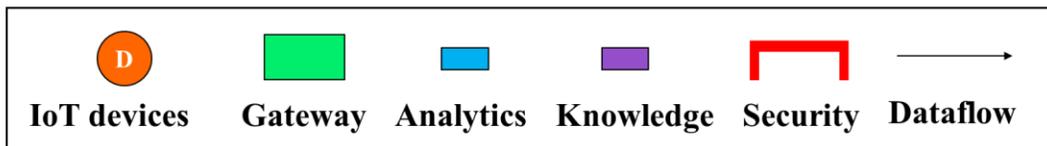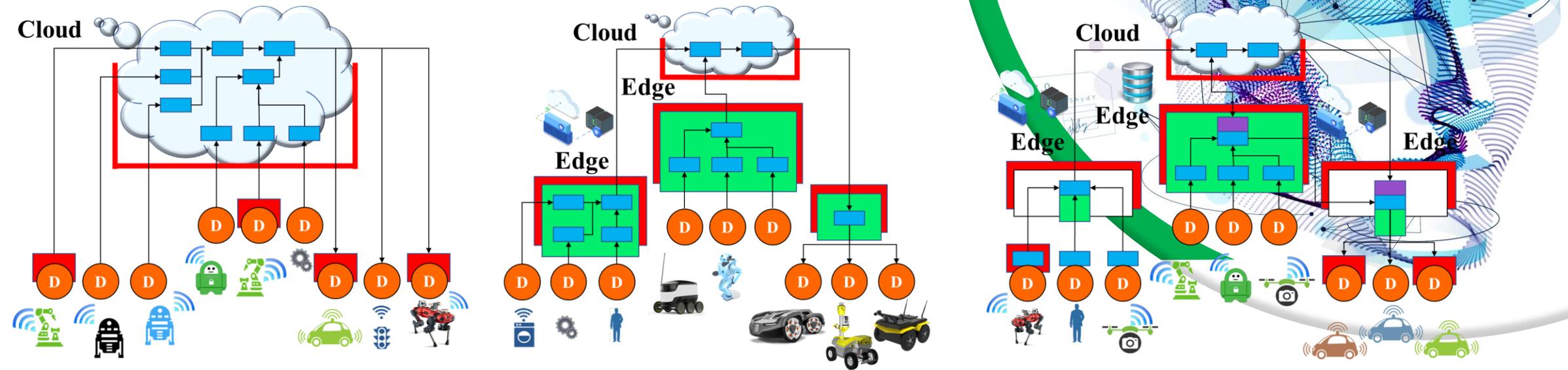
Edge Computing

Internet of Things

Technology Convergence

Thank You!

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