Next generation of IoT

Opportunities for Europe

AIOTI Signature Event

29 September 2020

Dr. Max Lemke

European Commission - DG CONNECT

HORIZON 2020

We must make this Europe's Digital Decade

Ursula von der Leyen,
President of the European Commission

European Commission

”

Data is at the heart of
of digital transformation.
It will change our societies, our economies and our industries

- Thierry Breton

European Commission

European Data Strategy: 4 pillars

A governance framework for data access and use

Enablers

High impact project on European data spaces and cloud federation

Competences

User empowerment
Data literacy
Skills
Capacity building for SMEs

Rollout of common European data spaces

in crucial economic sectors and domains of public interest

International Aspects: Analytical framework for measuring data flows

European Commission

Political Priorities

Deployment of technology that works for people

A fair and competitive digital Economy

An open, democratic and sustainable society

European federation of cloud infrastructure and services

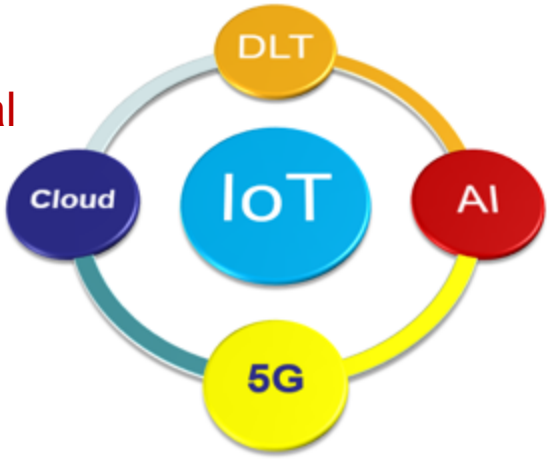
Establishing common European data spaces

Strengthen and connect AI research excellence centres with TEFs

At least one digital innovation hub per Member State specialized in AI

Next Generation Internet of Things

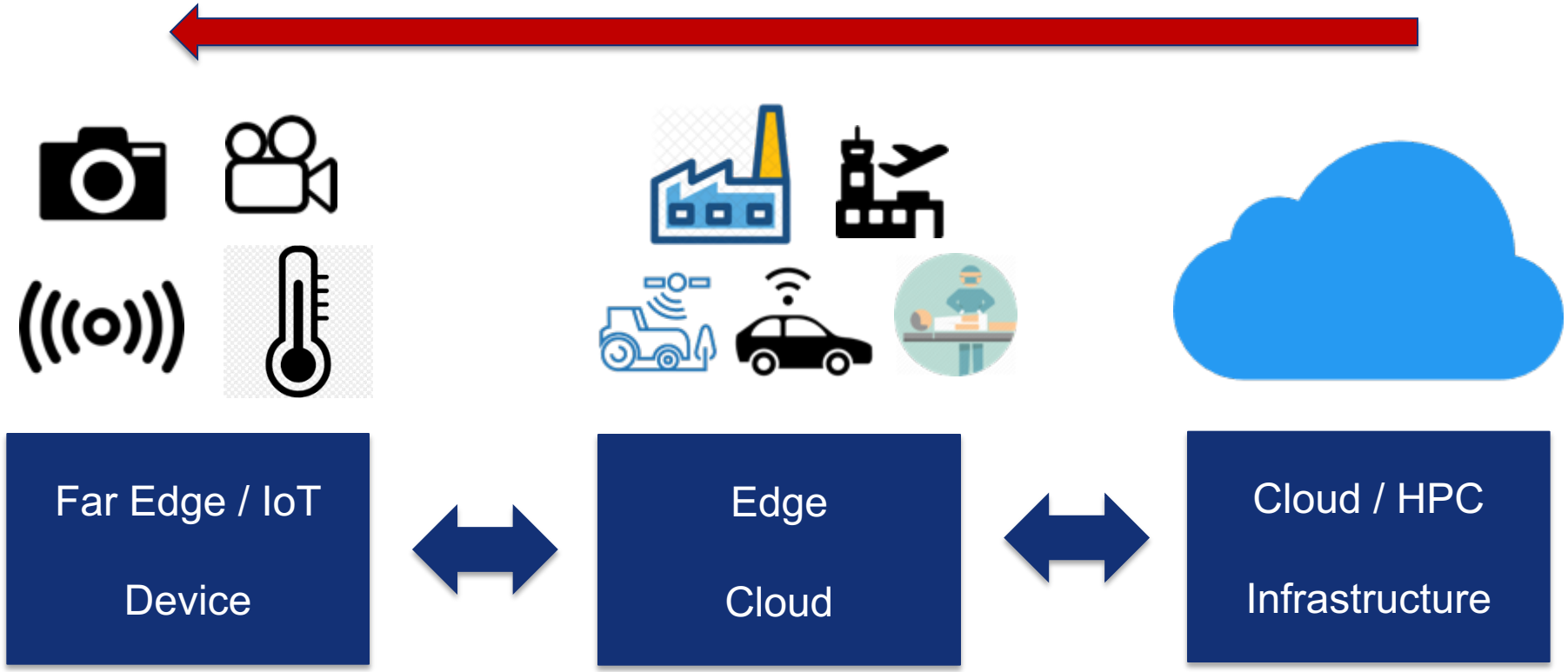
- Digital enabling technologies strategies converge: need for holistic approaches
  - Data – Processing – Connectivity – Intelligence
- System level approaches enabled by these technologies (very similar):
  - Cognitive Cyber-Physical Systems - Next Generation Smart Internet of Things
- Trend / paradigm shift to the edge:
  - Today 80% to 20% processing on cloud versus edge – reverse in 5 years?
  - Security- and privacy-critical, time- and safety-critical, environment/energy -critical
  - Computing power to the edge and to the data
  - Intelligence to the edge: smart devices
- The closer to the edge – the more application specific customisation needed
  - Cloud computing services: largely general purpose and application agnostic
  - Edge computing must be strongly customised towards the application
- Concepts for the future
  - Compute continuum - IoT/Edge (Meta-level) Operating systems - Digital Industrial Platforms



An IoT-centric View

Sources: EIU 2020

Trend: from Cloud to Edge
Bringing compute resources closer to the data



Federating far edge resources ad hoc via 5G
to provide cloud resources close to the edge

IoT Strategy in Horizon 2020

2014-15 Building the IoT- EPI cluster (**E**uropean **P**latforms **I**nitiative)

EPI: *Building the eco-system, breaking silos CPS-IoT, Using architectures integrating devices, systems and networks for a multiplicity of novel applications*

http://iot-epi.eu

55 M€

2016-17 Building the IoT **F**ocus **A**rea

LSPs: Focus Area on Internet of Things will focus on experimentation with real-life solutions being tested at large scale with users

+ ODI, FI-ware accelerators, IERC, standardisation etc.

https://european-iot-pilots.eu/projects/

100 M€

2018-20 FA DEI Strategy

DEI Platforms: Focus Area Digitising European Industry will focus on integrating digital innovation across societal challenges

+ ***DEI Policy support****, e.g. security, privacy, ownership, liability, GDPR .*

300 M€

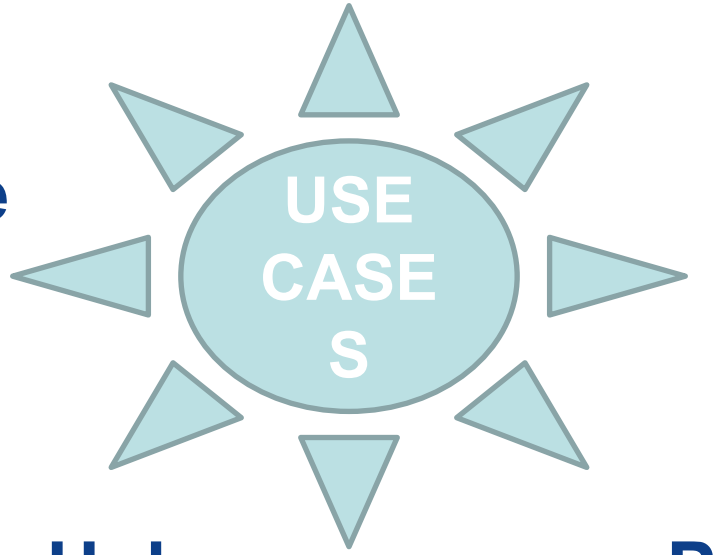
EU Markets

Take away from the last 5 years

Common Reference Architectures

Standardisation

Interoperable Platforms



Demand Side Engagement

Innovation Hubs

Partnerships

AIOTI

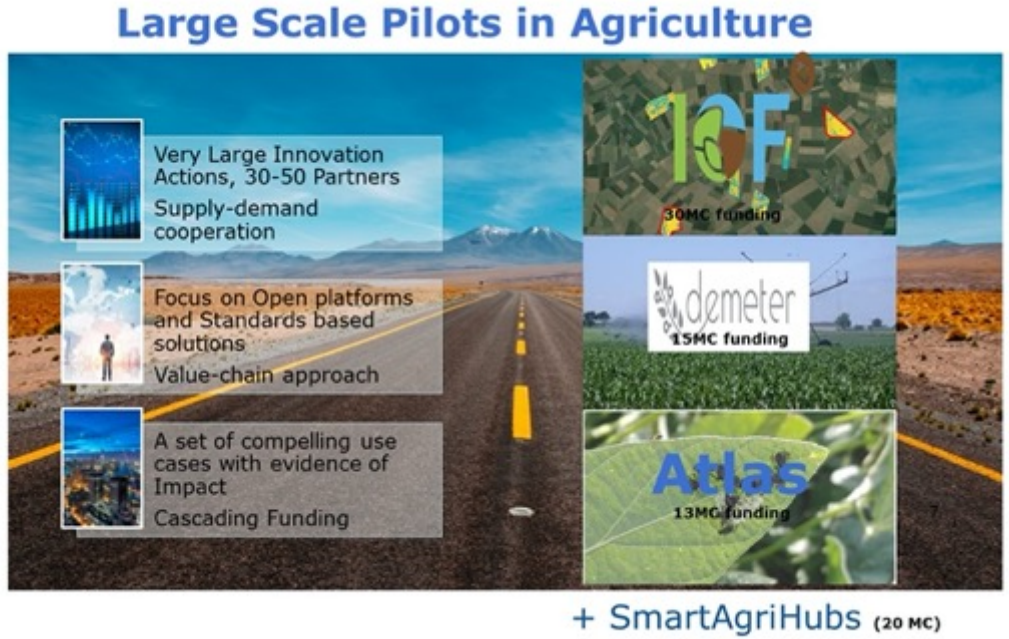
Alliance for Internet of Things Innovation

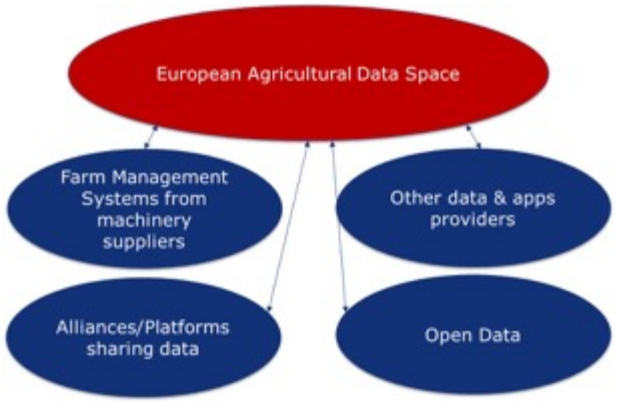
was instrumental in implementing the IoT strategy in Horizon 2020

European Commission

Multiple dimensions of Digitsation

- Precision farming (remote sensing & earth monitoring, IoT)
- Automatisation (IoT, AI, robotics, drones…)
- Agri-food chain (traceability, new business models, market organisation…)
- Common Agricultural Policy (CAP) administration
- Connectivity, broadband





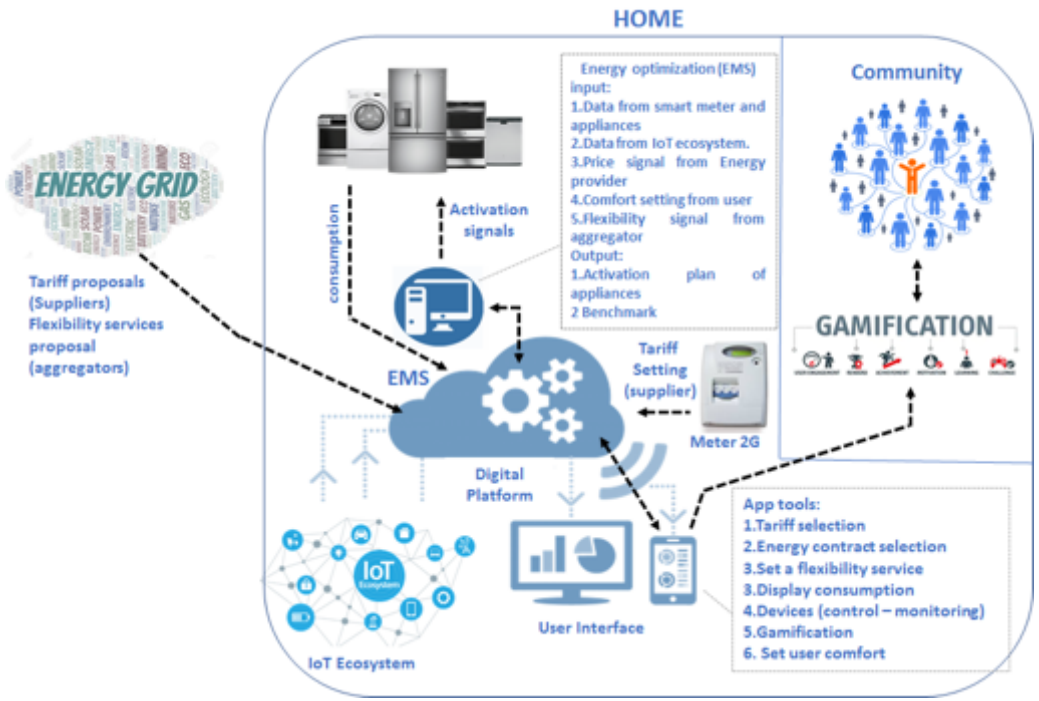
What is missing?

•Integration of different digital applications through platforms and dataspaces

The application perspective: Energy

INTERCONNECT Large Scale IoT Pilot:

- Target **home comfort and energy**
- Focus on Appliances
- New business models
- 7 large scale pilots across EU leading to market-driven deployment



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Key challenges:

- Efficient integration of renewables
- Integrated smart home services through IoT
- Interoperable smart grids (production capacity optimisation)

Next Generation IoT Solution Space:

- Decentralisation
- Intelligence at the far edge
- Interoperability

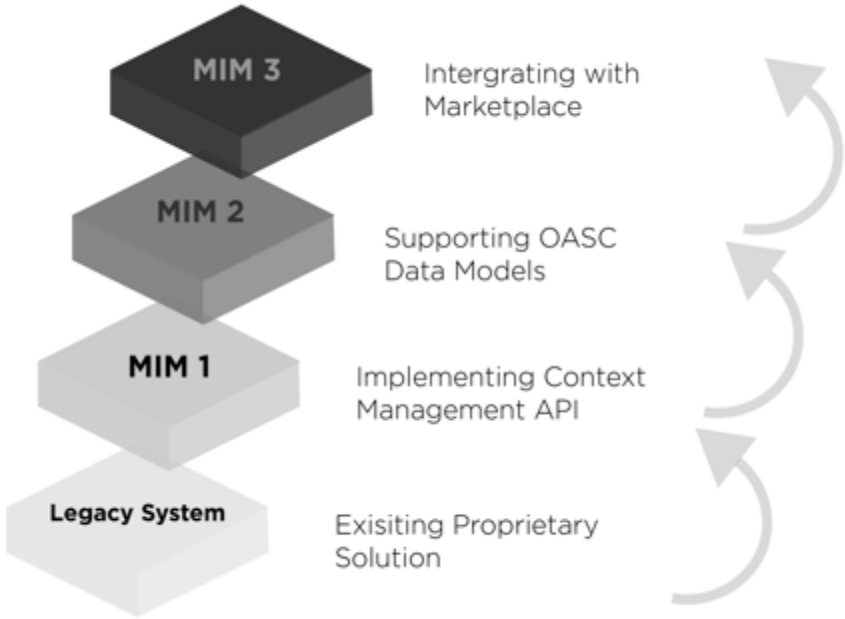
The application perspective: Smart Cities and Communities

SYNCHRONICITY

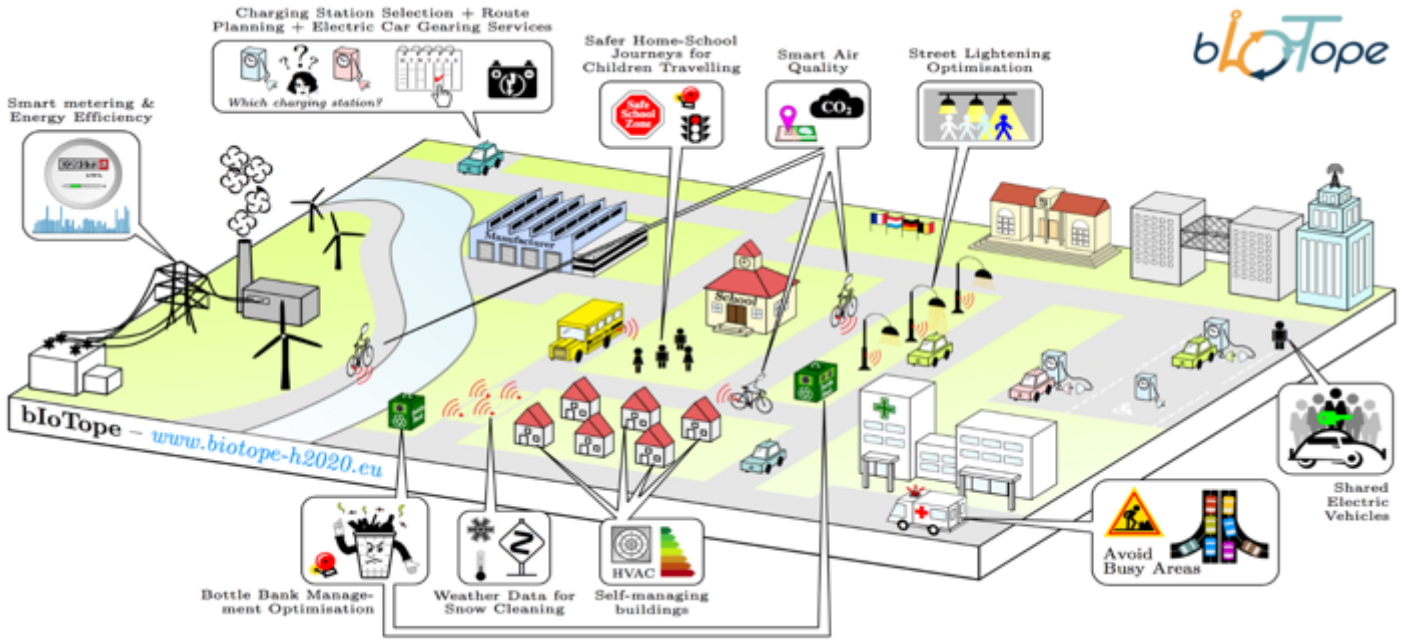
The power of Minimal Interoperability:

MIM 5: Fair AI

MIM 4: Personal Data Management



MIMs 1-3 adopted by OASC Council of Cities 2019.
MIMs 4-5 approved as work items 2020



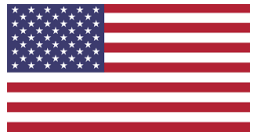
Key IoT Challenges:

- Interoperability between
  - Smart Energy
  - Smart Mobility
  - Smart Buildings
- Rural communities

R&I Challenges on the autonomous and fully electric vehicle:

- Next generation processor technology: customisation at the far edge
- Next generation AUTOSAR: IoT at the core – fast standardisation is crucial
- Holistic approach to energy and mobility – IoT at the core
- Europe is reasonably positioned but competition is strong
- Innovation-friendly regulation for autonomous driving
- Infrastructure investments
- Speed – Speed – Speed

Leadership by World Regions at a glance: the game is open



Technology

Incumbent
Market leaders

Deployment FEV

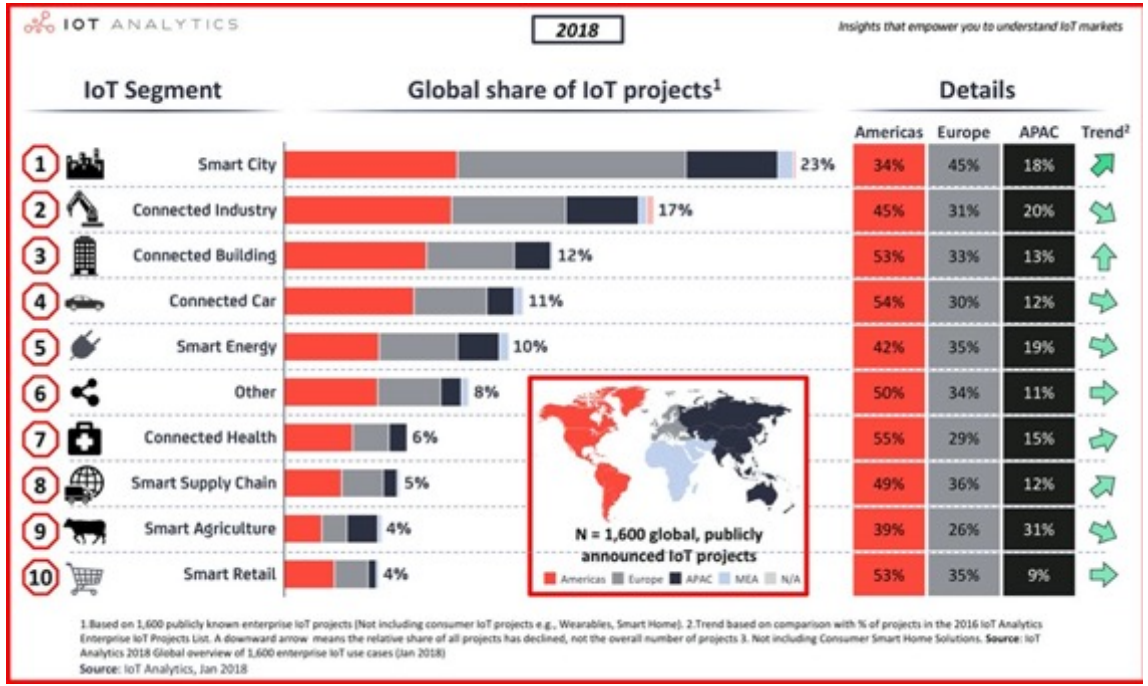
Customisation @ Edge – Proximity to the Application

General purpose	Low energy mobile	Real-time safety	Graphics & matrix processing	Speed for AI Inference	Speed for AI Training	High performance, low energy, low cost, real-time/safety AI Inference
Intel x86	ARM low power	Infineon Tricore	NVIDIA GPU	Tensor processor	Neuromorphic processor	Special purpose processor for electric autonomous driving

General Purpose → Special Purpose

Europe's potential in IoT and Edge Computing

- General purpose Cloud Computing (IaaS) in the hands of US/Chinese digital giants
- Trend "FROM Cloud to Edge" denotes a paradigm shift
- Europe is strong in industrial applications, sensors, CPS
  ➔ opportunity to regain competences and market shares for EU actors
- An opportunity for Europe to reinforce its place between US and China
- Technological autonomy - Mastering full value chains in key sectors
- Broad approach needed – a lot is already on-going:
  - Microelectronics, Photonics, IoT, SW and Systems, data analytics/fusion, 5G and beyond
  - Operating Systems, Platforms
  - Large Scale Piloting and Partnerships
- Speed – speed – speed: competition is not sleeping



10 Key Messages from the September 2020 Workshop on IoT and Edge Computing

1. **Key Sectors see great potential from edge computing**
2. **Next Generation IoT: smart, connected, powerful devices at far edge**
3. **Edge Computing drives Decentralisation and Decarbonisation**
4. **Edge Computing: glueing control/automation systems and the cloud**
5. **Europe can build on its strength: sensors, applications, systems**
6. **Driving Cloud-Edge convergence beyond GAIA-X**
7. **A paradigm shift for IoT: from monitoring to outcome-driven platforms**
8. **Need for new Operating System at the edge**
9. **EU actors need a platform approach to get their act together**
10. **EU needs to identify the catalysts that speed up innovation at the edge**

Next EU Programming Period: IoT

5G IA

AENEAS
EPOSS
ARTEMIS-IA

BDVA
GAIA-X
European Alliance for Data and Clouds
NESSI

EFFRA

Horizon Europe
Cluster 4: Digital, Industry, Space
- JU KDT
- JU SNS
- Work Programmes
  - Destination 3 World leading data & computing technologies
  - Destination 1: Climate neutral, circular and digitised production

Digital Europe
- Artificial Intelligence
  - Data Spaces
  - Cloud to edge federation
  - Testing & Experimentation
- Cybersecurity

Horizon Europe
Cluster 3: Security

Horizon Europe
Cluster 5: Energy and Mobility

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Cluster 6: Agriculture, …

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