# Future visions for IoT

# EU perspective

*IoTWeek 2019, 20/6/2019, Aarhus*

**Peter Wintlev-Jensen**
**Internet of Things**
**DG Communications Networks, Content and Technology**
**European Commission**

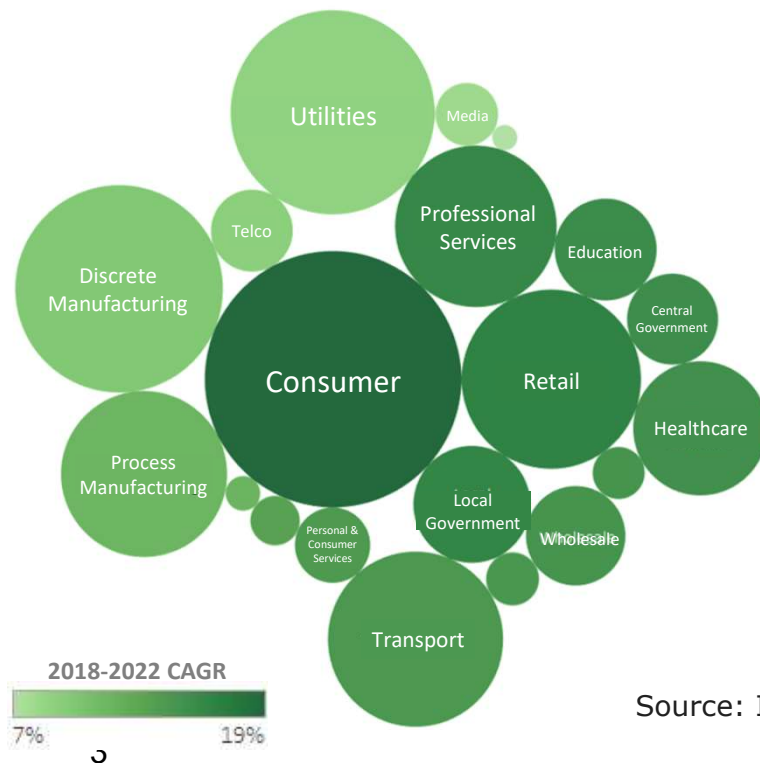# DEI – Digitising European Industry Strategy
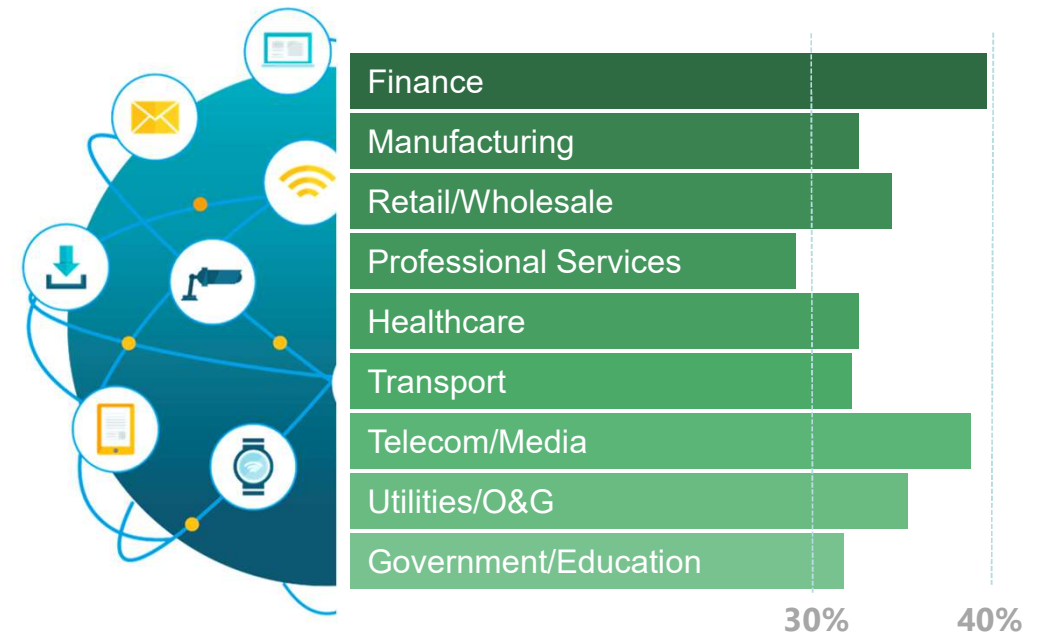
# IoT adoption is maturing in Europe

## EUROPEAN IoT SPENDING BY INDUSTRY
(2018 Size and 2018-2022 CAGR)



2018-2022 CAGR

7%        19%

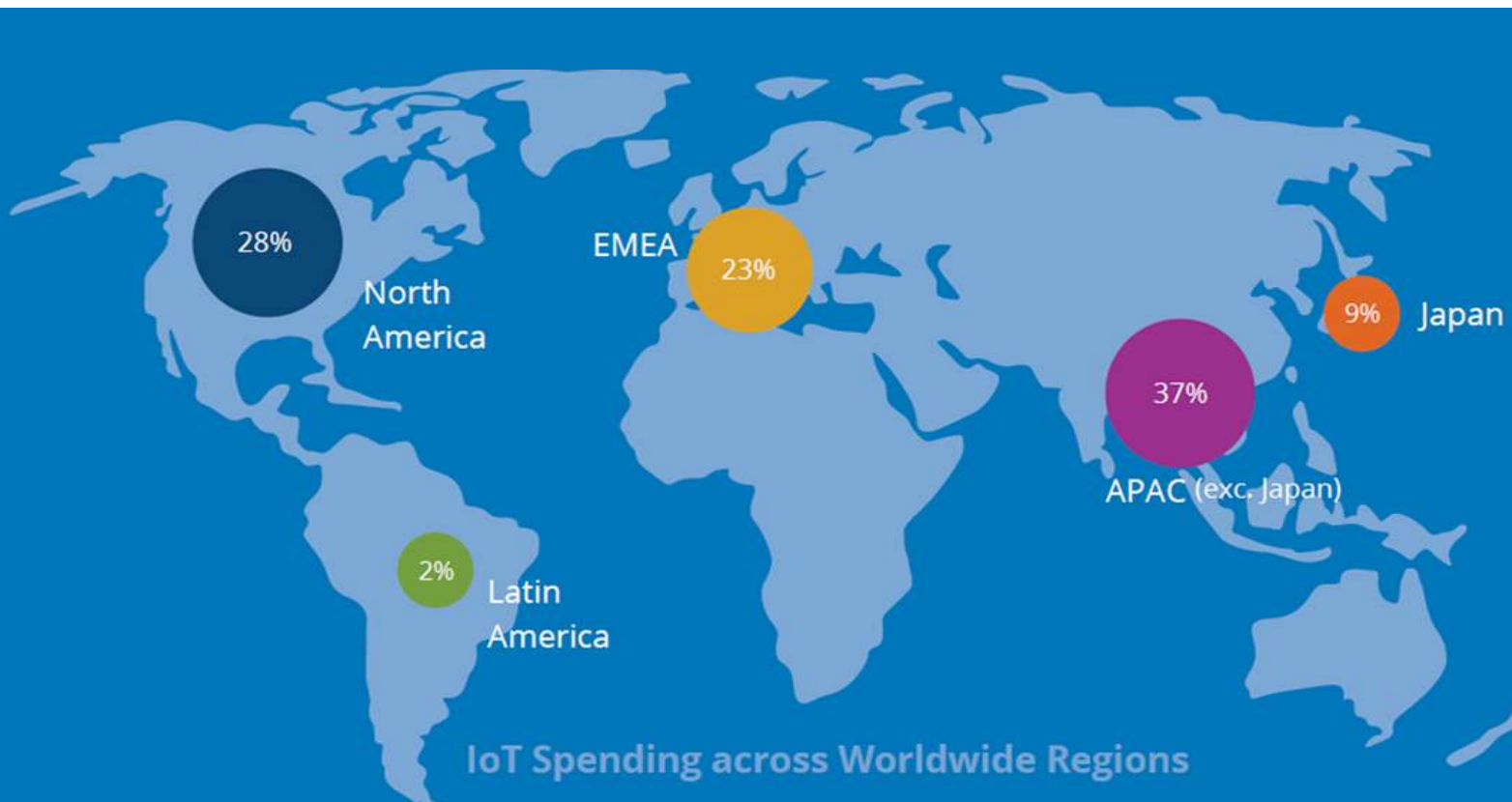## IoT ADOPTION ACROSS EUROPEAN VERTICALS
(% of companies with more than 10 employees adopting at least one IoT solution in 2018)



Finance
Manufacturing
Retail/Wholesale
Professional Services
Healthcare
Transport
Telecom/Media
Utilities/O&G
Government/Education

30%        40%

Source: IDC Worldwide Semiannual Internet of Things Spending Guide, 2019

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# IoT Spending across Worldwide Regions



28% North America

EMEA 23%

9% Japan

37% APAC (exc. Japan)

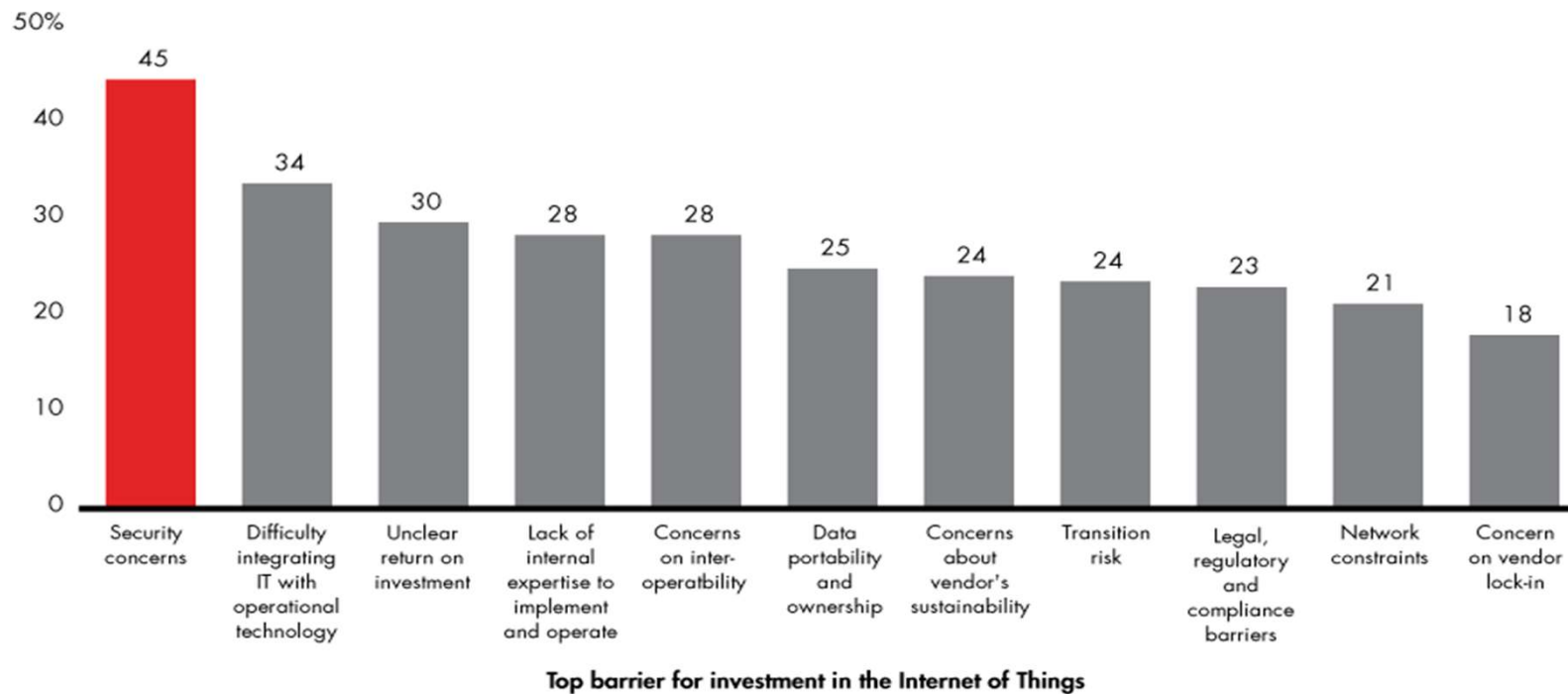2% Latin America

IoT Spending across Worldwide Regions

After years of customers evaluating the case for IoT, now the market is entering a critical phase, with European IoT spending expected to reach € 127 billion in 2019..

Source: IDC Worldwide Semiannual Internet of Things Spending Guide, 2019
Sum of percentages may differ from 100% due to rounding

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# Key Barriers/concerns for IoT Adoption

Figure 1

**Security remains the leading barrier for IoT adoption**

Percentage of IoT buyer respondents



Top barrier for investment in the Internet of Things

Source: Bain 2018 IoT customer survey (n=521)

# EU IoT Strategy and Actions

## Research and Innovation

H2020 R&D + Large Scale Pilots
H2020 IoT Security & Privacy
    Cluster
Horizon Europe:
    Next Generation Internet

    Nearly 500 M€ in H2020

## Policy

- DEI
- GDPR
- Cybersecurity Act
- NIS Directive
- Liability SWD
- 5G Cybersecurity
- ….

## Stakeholder engagement

ENISA
AIOTI
IERC
Demand side actors
    Energy, Agriculture,
    Health/Care, Smart Cities etc.
IoTWeek ......

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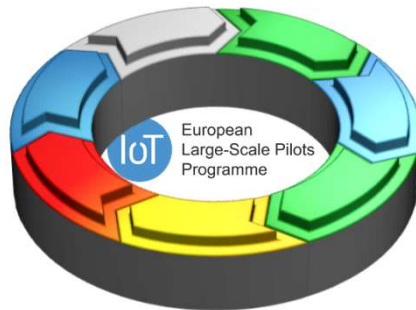
# IoT Large Scale Pilots



**MONICA - Management Of Networked IoT Wearables – Very Large Scale Demonstration of Cultural Societal**: Wearable devices containing sensors and actuators for massive scale applications. Europe (EU contr: 15M€, 28 partners in 9 countries)
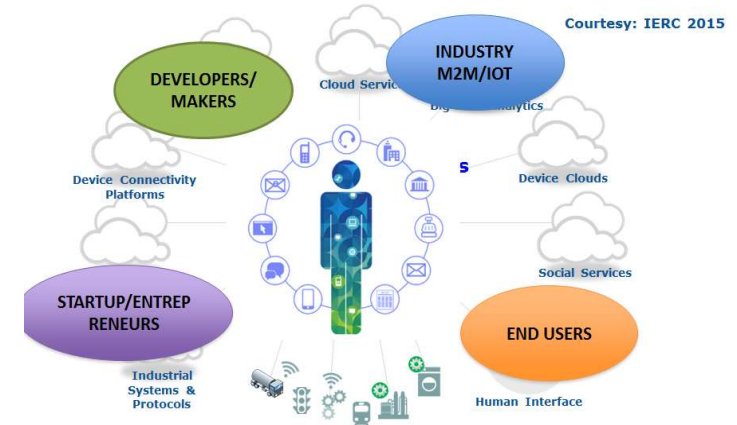
**ACTIVAGE - ACTivating InnoVative IoT smart living environments for AGEing well**: Active and healthy ageing. Europe (EU contr: 20M€, 48 partners in 9 countries)

**IoF2020 - Internet of Food and Farm 2020**: Strengthen competiveness of farming and food chains in Europe. Europe (EU contr: 30M€, 70 partners in 16 countries)

**AUTOPILOT - AUTOmated driving Progressed by Internet Of Things**: Automated driving and infrastructure. Europe (EU contr: 20M€, 43 partners in 14 countries)

**SYNCHRONICITY - Delivering an IoT enabled Digital Single Market for Europe and Beyond**: Single digital city market for Europe (EU contr: 15M€, 33 partners in 9 countries)

Courtesy: IERC 2015

DEVELOPERS/ MAKERS

INDUSTRY M2M/IOT

STARTUP/ENTREP RENEURS

END USERS

Cloud Service

Device Connectivity Platforms

Device Clouds

Social Services

Industrial Systems & Protocols

Human Interface

**+ 5 new LSPs in Energy, Agriculture and Healthcare**

7

european-iot-pilots.eu

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# IoT Security and Privacy project cluster

**IQT CRAWLER** ~~Blockchain/DLT~~

Trusted Discovery
and search

**SERIOT** ~~Blockchain/DLT~~

Secure Software
Defined Networks

**ENACT DevOps**

Trusted IoT design
and implementation

**BRAIN-IoT**

Modelling and
integration for secure
and trusted IoT

**CHARIOT** ~~Blockchain/DLT~~

Industrial IoT
Security Privacy

**SOFIE** ~~Blockchain/DLT~~

Industrial IoT Security

**SecureIoT**

Predictive IoT Security

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# Where are we heading?



**EDGE COMPUTING**
Finding the Perfect "Core-Cloud-Edge" Infrastructure Workload Balance

**DATA IMPACT**
Going beyond mere **data** collection towards new IoT-driven business models and data monetization

**ANALYTICS**
From Descriptive to Predictive and Artificial Intelligence-infused Analytics

**PLATFORM**
Evolving **ecosystem**, new architecture, functional enhancements, and consumption models

**SECURITY**
From ad-hoc to **by Design** Data Management & Security

**CONNECTIVITY**
**Hybrid** approaches including emerging technologies such as LPWA and 5G

Source: IDC European IoT Practice, 2019

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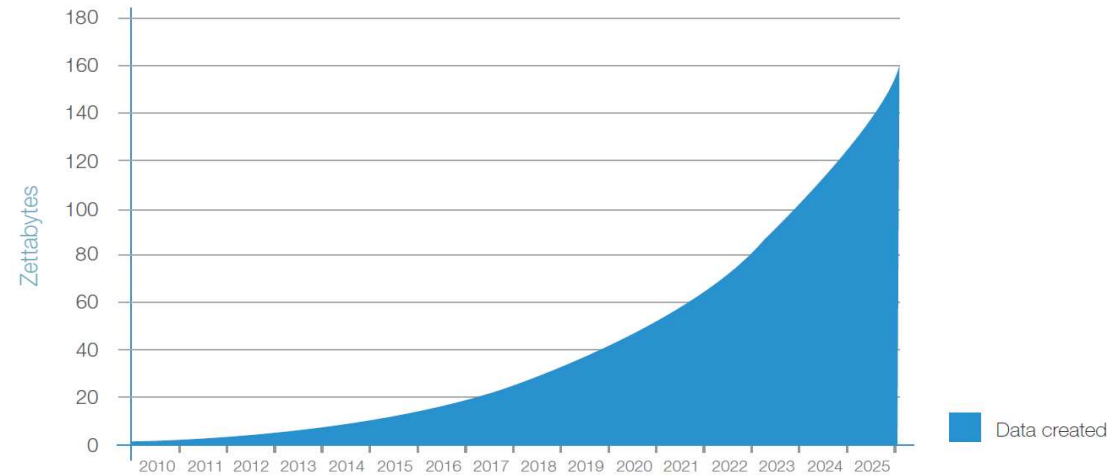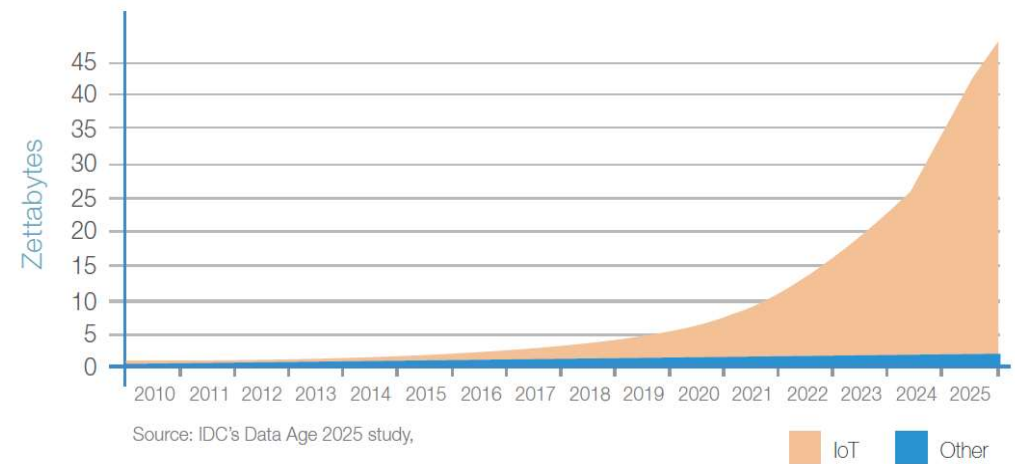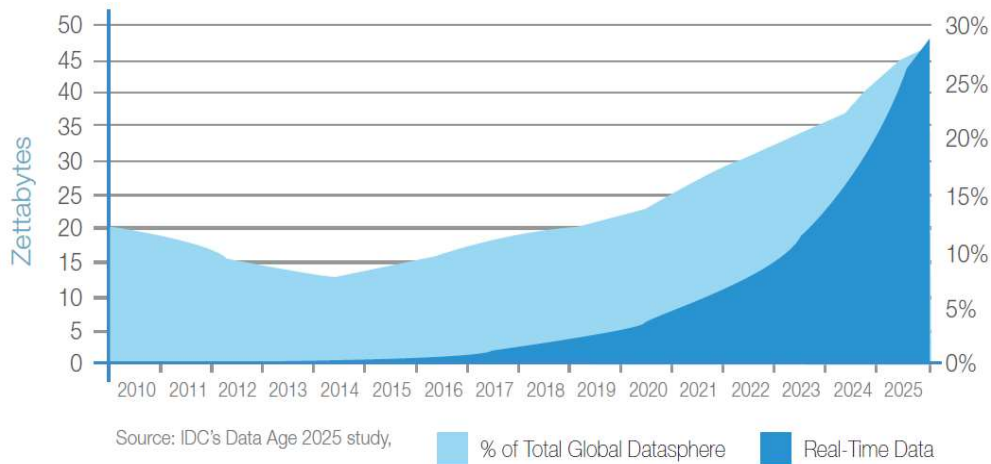
# Next Generation Internet
# Data is driving change

- Exploding Volume

- Increasing Real-Time requirements, e.g.
  - Autonomous Driving
  - Industry 4.0

- Needs ultra fast communication, distributed processing and analytics



Source: IDC's Data Age 2025 study,

Data created



Source: IDC's Data Age 2025 study,
% of Total Global Datasphere
Real-Time Data



Source: IDC's Data Age 2025 study,
IoT
Other

# R&D drivers for Next Generation IoT



Real-Time Applications

Distributed AI and Analytics

Edge Computing

5G/6G Network infrastructures

Data-Centric and Secure Architectures

Augmented Reality and Tactile I/F

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# Next Generation IoT



New Architectures
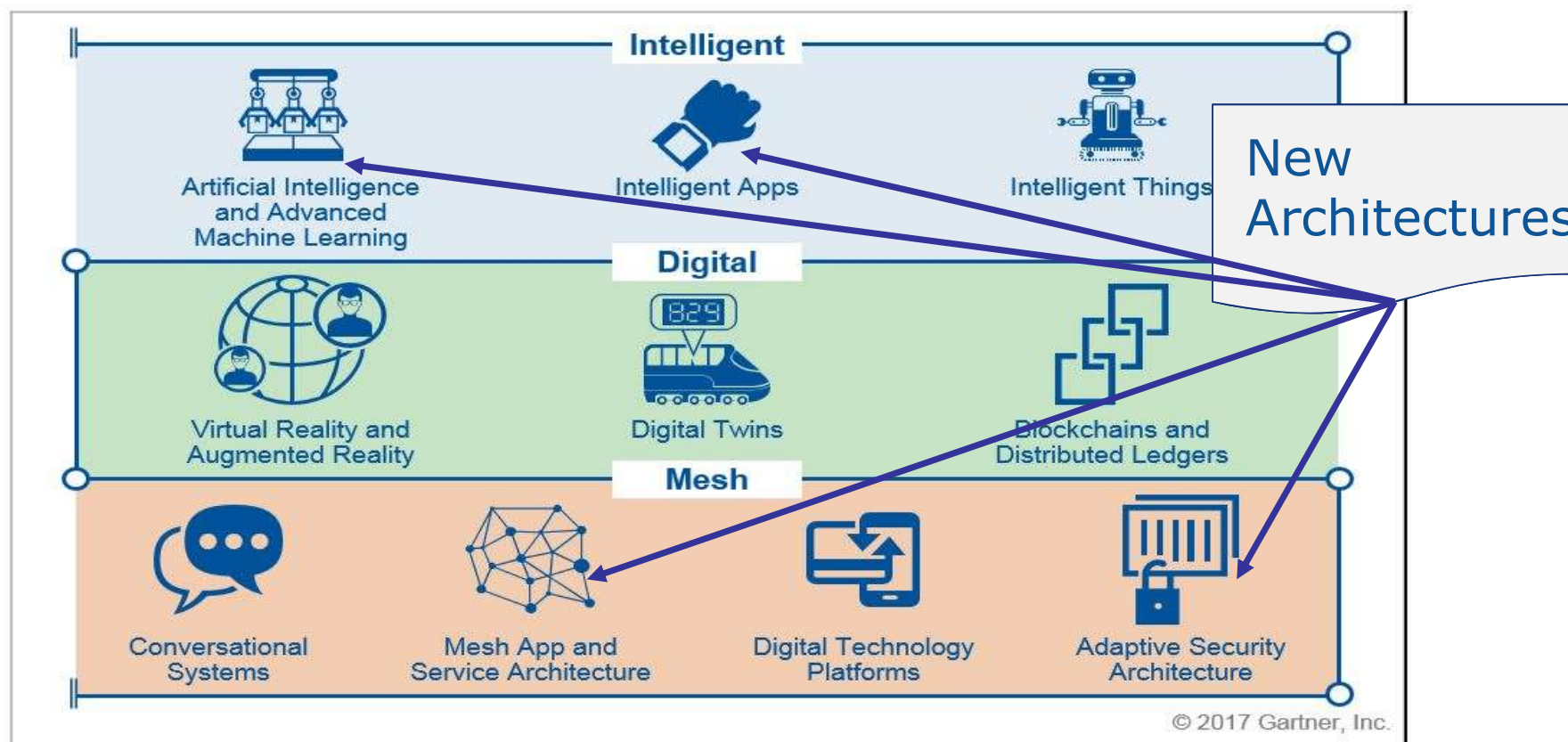
Source: NLnet & Gartner; Next Generation Internet study

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# Next Generation Internet in Horizon Europe Human-centric and decentralised

- Ensure that Europe can take the lead in defining the Internet of tomorrow and it's values
  - Human-centric
  - Inclusive
  - User trust and control

- New requirements are emerging from areas such as digitizing Industry, Autonomous driving, Health, Education, Energy, Finance, Media, Entertainment, …

- The Internet is one of the most critical infrastructures for all aspects of Society and Economy
  - Ensure availability and control within the Global context
  - Digital competiveness of key Internet technologies

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# Next Generation Internet in Horizon Europe

## Broad lines:



- Future network and service infrastructures, bringing together beyond 5G, Internet of Things, distributed clouds, blockchains/ledgers
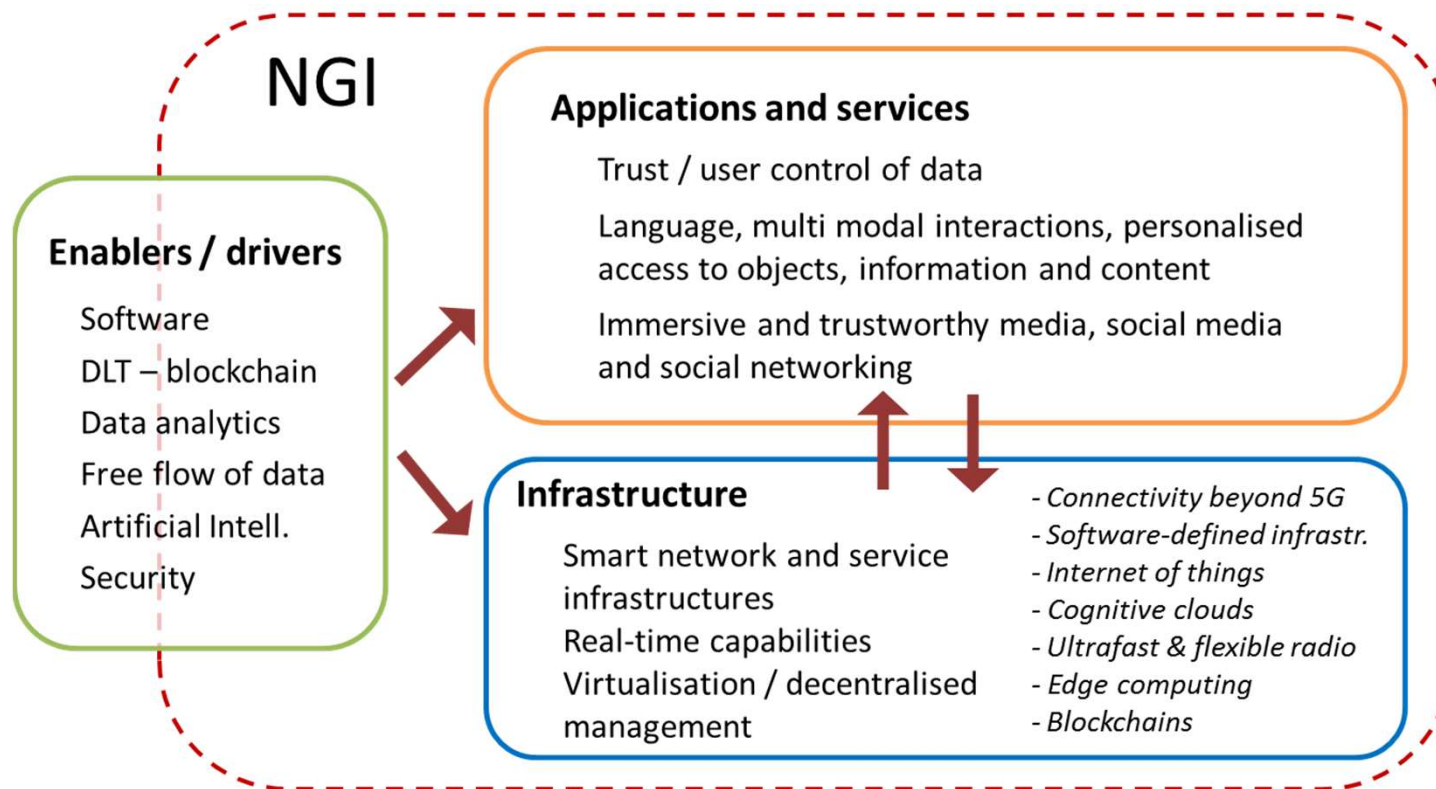


- Human-centric Internet applications, including trust and privacy, inclusive multi-modal interaction concepts, language independency and trustworthy social connectivity and media



- Distributed processing and data analytics, incl. distributed ledger technologies, embedded Artificial Intelligence
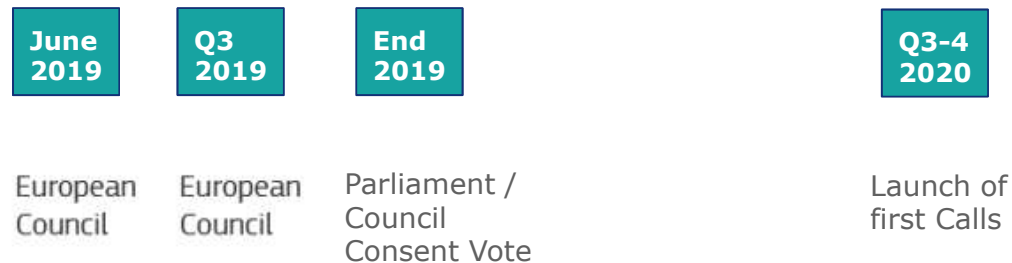
# Next Generation Internet

## Proposed Structure



### NGI

**Enablers / drivers**

Software
DLT – blockchain
Data analytics
Free flow of data
Artificial Intell.
Security

**Applications and services**

Trust / user control of data

Language, multi modal interactions, personalised access to objects, information and content

Immersive and trustworthy media, social media and social networking

**Infrastructure**

Smart network and service infrastructures
Real-time capabilities
Virtualisation / decentralised management

- Connectivity beyond 5G
- Software-defined infrastr.
- Internet of things
- Cognitive clouds
- Ultrafast & flexible radio
- Edge computing
- Blockchains

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# NEXT STEPS (TENTATIVE PLANNING)

## Horizon Europe/Digital Europe/CEF2 Formal Decisions(including budget)

| **June 2019** | **Q3 2019** | **End 2019** | **Q3-4 2020** |
|---|---|---|---|
| European Council | European Council | Parliament / Council Consent Vote | Launch of first Calls |

## Horizon Europe/Digital Europe/CEF2 Strategic Directions 2021-2024

| **July 2019** | **Sept 2019** | **24-26 Sept 2019** | **End 2019** | **Autumn 2020** |
|---|---|---|---|---|
| Public Consultation | | Research & Innovation Days Event | Publication of Strategic Programming for 2021-2024 | Publication of workprogramme for 2021-2022 |
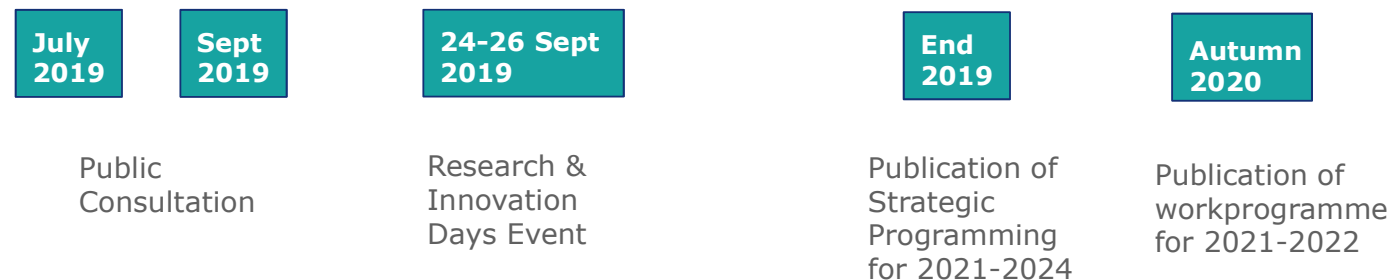
# Thank you - useful links

- Horizon Europe

  https://ec.europa.eu/info/designing-next-research-and-innovation-framework-programme/what-shapes-next-framework-programme_en

- Digitising European Industry Strategy (DEI):

  **https://ec.europa.eu/digital-single-market/en/digitising-european-industry**

- EU Internet of Things in DAE:

  **http://ec.europa.eu/digital-agenda/en/internet-thing**



- The Alliance of Internet of Things Innovation

  **http://www.AIOTI.eu**

- NGIoT CSA

  **https://www.ngiot.eu/**

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