



Next-generation Cloud Computing

The NESSI view

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Smart Networks and Services Partnership - Stakeholder workshop

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**The European Technology Platform
dedicated to Software, Services and Data**

**Leading the transformation towards the
new digital information society and economy**



<http://www.nessi.eu/>

“Software is everywhere”



Healthcare
maximum
revenue in
software segment
of IoT healthcare
market

Automotive

Software-defined
cars, mobility
services



Industry 4.0

International data
spaces, digital
twin software, ...



IoT (e.g. Smart Cities)

40% of value
through
interoperability

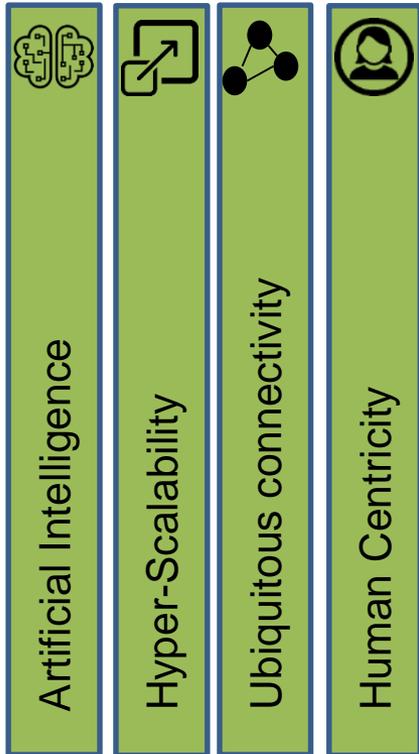


Telecom

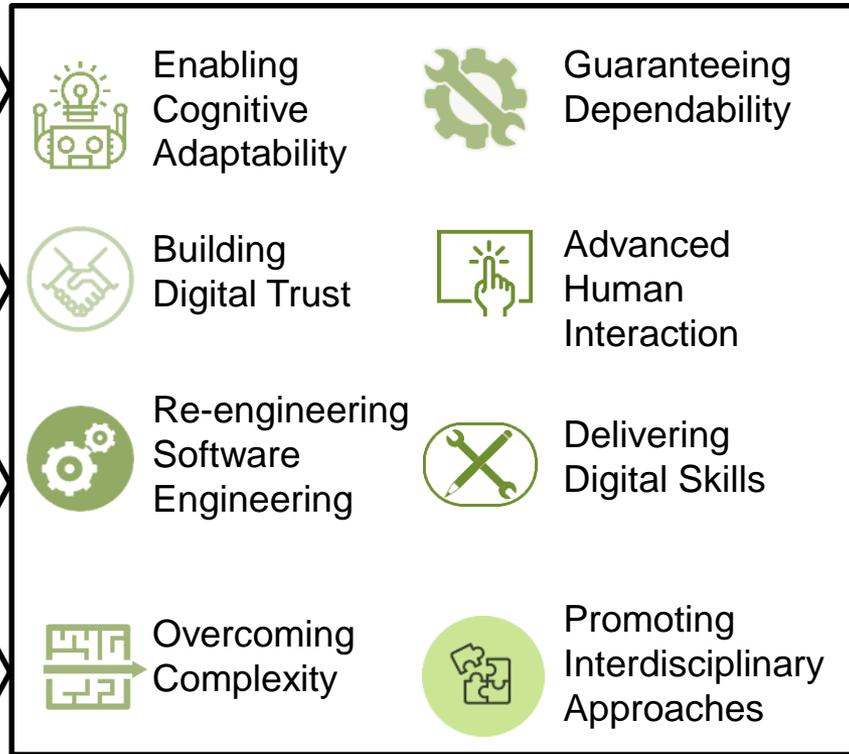
Software-defined
networks, network
slicing, ...

Advanced Software for the Digital Transformation

Digital Enablers



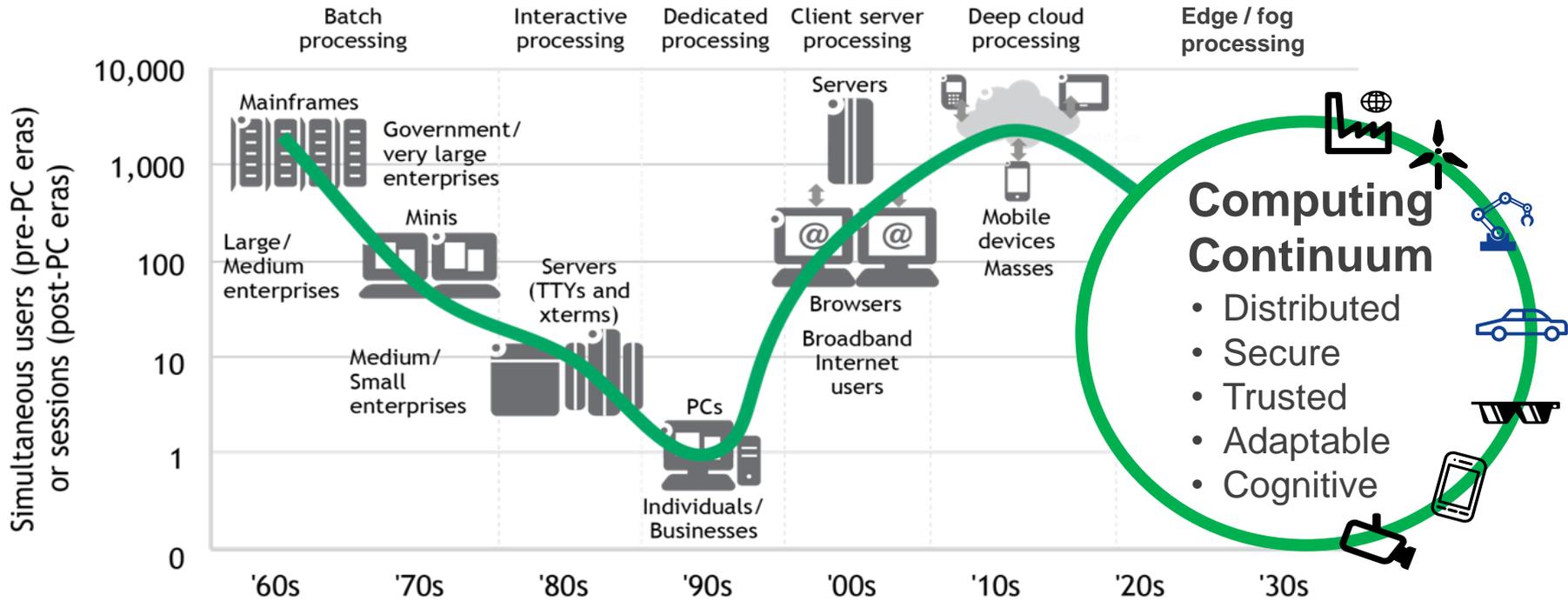
Software Research Challenges



Digital Needs



Centralized / de-centralized computing



Source: The Future X Network, CRC Press, 2016
Strategic Research and Innovation Agenda, NESSI, 2017

Basic enablers

Ubiquitous connectivity



Artificial Intelligence



Hyper-Scalability



Human Centricity



Next-generation Cloud Computing

Focus: next generation computing platforms to **support service delivery**, both from an **infrastructure management perspective** with blurring boundaries between computing, connectivity and devices, and from the **perspective of enabling future applications** based on big data and AI. This will cover the related technological building blocks and outline European industry opportunities beyond the established platforms.

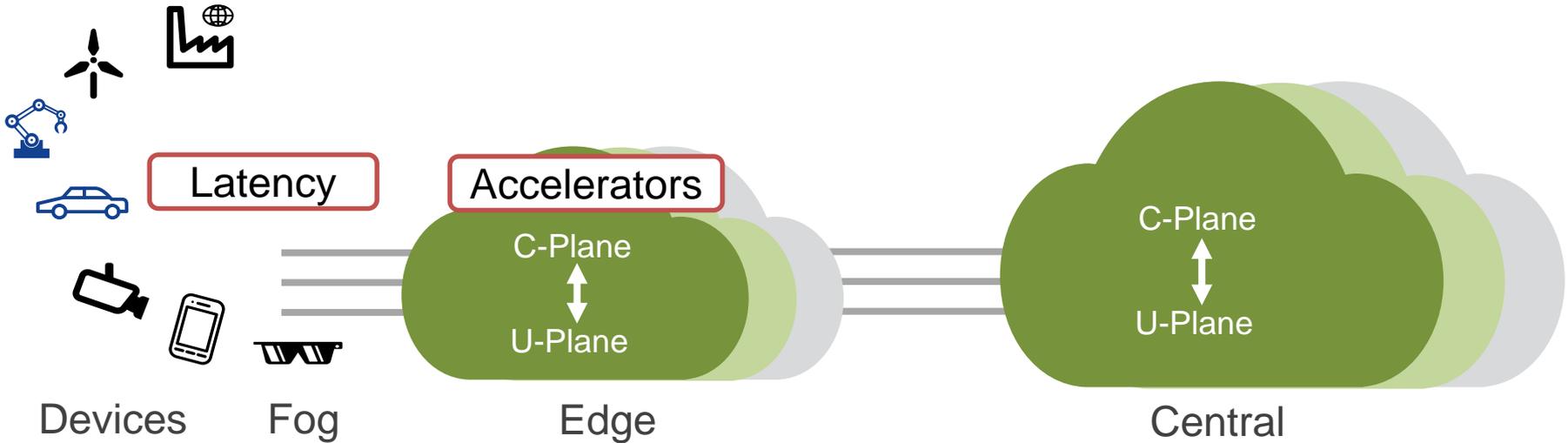
Software and Infrastructure Management

Overcoming Complexity

Guaranteeing Dependability

Programmable / adaptable function placement (AI/ML – based)

Interoperability / Integration

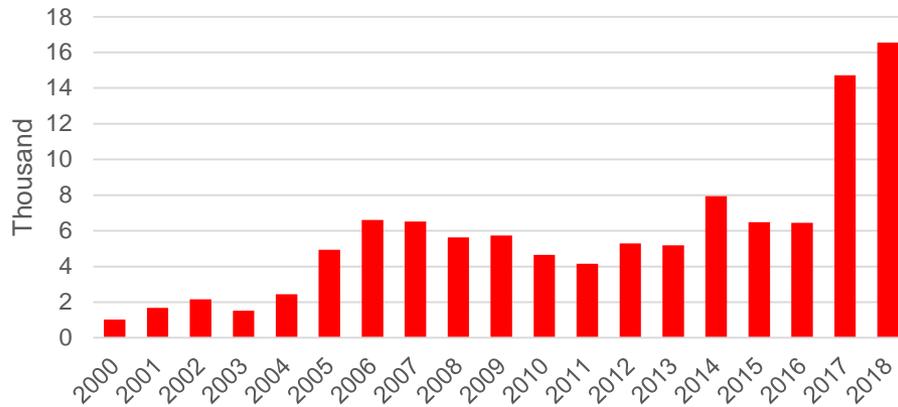


Energy-aware programming / services

E2E security & trust & resilience

Software and e2e Cybersecurity & Trust & Resilience

Dramatic increase in the number of
Software Vulnerabilities



Source: <https://www.cvedetails.com/vulnerabilities-by-types.php>

- > 16k new SW vulnerabilities in 2017
- “111 billion lines of new SW code is created every year with billions of vulnerabilities included”
(Source: cybersecurity ventures, 2017)
- AI will enable smarter kind of cybersecurity, but AI will be also used by attackers

Enabling Cognitive Software System Adaptability



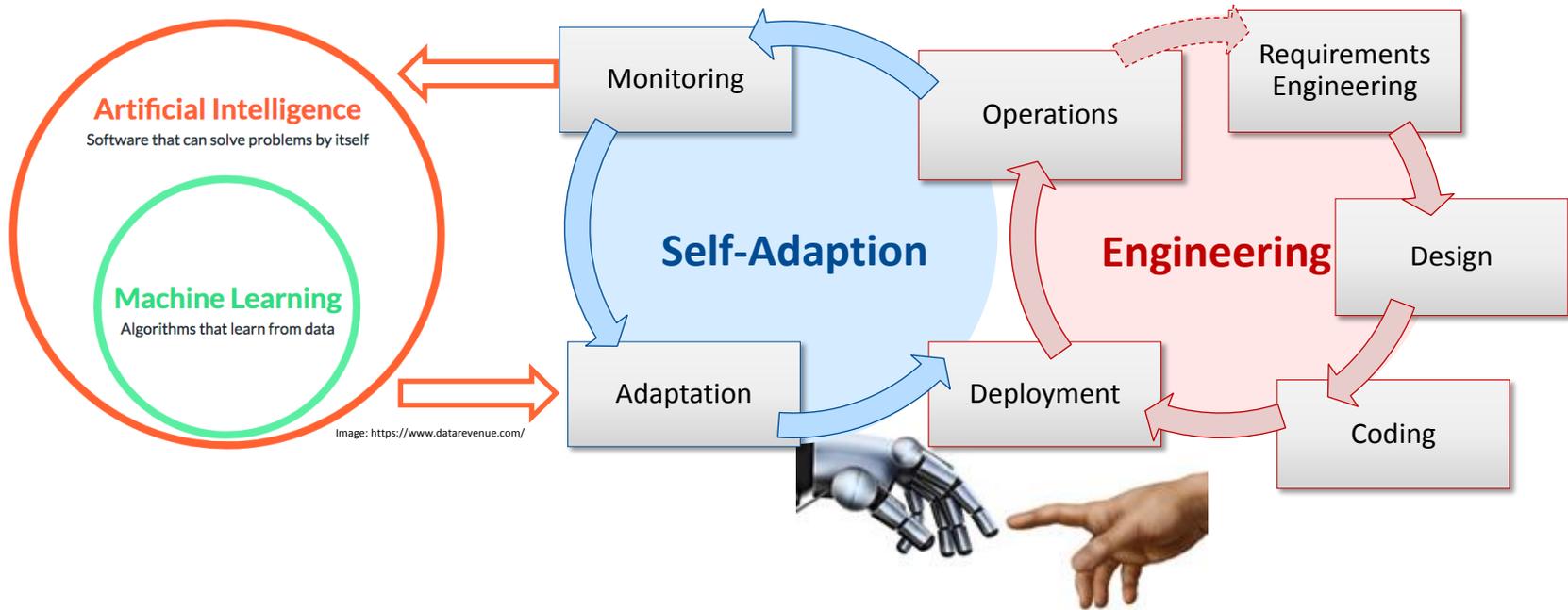
Enabling Cognitive Adaptability



Re-engineering Software Engineering

AI software for complex and flexible systems

DevOps → “DeepOps”



Software enabling Future Applications and Services



Advanced Human Interaction



Building Digital Trust

Enablers for new ways of interactions



Basic services provided by the cloud infrastructure

Next Generation Internet



Creativity and human potential

Adaptability, resilience, and reliability

Transparency and trust

Sustainably open environment

Operating System for mixed reality



“Trusted Computing as a Service”

Automated compliance assurance



Source: NGI4EU

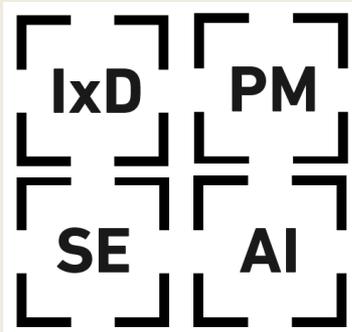
Software Skills are a Critical Success Factor

Multi-disciplinarity of modern SW development teams

Example: Digital Product School
(<https://digitalproductschool.io/>)

Interaction Designer

Product Manager



Software engineer
DevOps / DeepOps

AI / ML engineer
AI / ML scientist
Data Manager

ICT experts missing in
Europe in 2020

500,000

Software a Key Digital Technology complementing Smart Networks and Services

Engineering the Digital World



Enabling
Cognitive
Adaptability



Guaranteeing
Dependability



Re-engineering
Software
Engineering



Delivering
Digital Skills



Building
Digital Trust



Advanced
Human
Interaction



Overcoming
Complexity



Promoting
Interdisciplinary
Approaches

Complementing SW research

Smart Networks and Services