



EUCloudEdgeIoT.eu

FIRST POST-WEBINAR REPORT

Understanding Cloud-Edge-IoT: Challenges and Opportunities - Webinar Highlights



Funded by
the European Union



September 19 2022 saw the first webinar of the EUCloudEdgeIoT.eu initiative, which aims at fostering the business and technical convergence of Cloud, Edge and IoT (CEI) in Europe. The webinar presented the goals of this newly launched initiative, explained its interaction with the wider policy context and clarified benefits and opportunities of getting involved in the planned activities. The event was convened by **Maria Giuffrida** (Senior Researcher, Trust-IT) and saw the participation of several consortium members and experts. It was also attended by stakeholders from several nationalities all over the EU.

The European Cloud, Edge and IoT Continuum Initiative

Through the Cloud, Edge & IoT Continuum, Europe has a unique opportunity to regain a significant role in the computing market and retain digital autonomy.

The first speaker, **Golboo Pourabdollahian** (Consulting Manager, European Government Consulting, IDC), opened the webinar with a talk about the shifting paradigms of Cloud Edge IoT. Golboo explained the advantages of shifting from the Cloud layer for data generation to where the data is generated - the Edge and IoT layers. As shown in figure 1, this shift will likely benefit low latency services, reduce the communication burden, avoid cloud transpiration and support resilience and protection. According to a recent IDC survey, more than 40% of companies consider “low latency services” and “reduced communication burden” as the main benefits of edge implementation. Moreover, 30% of companies believe that edge implementation will benefit them by cost reduction.

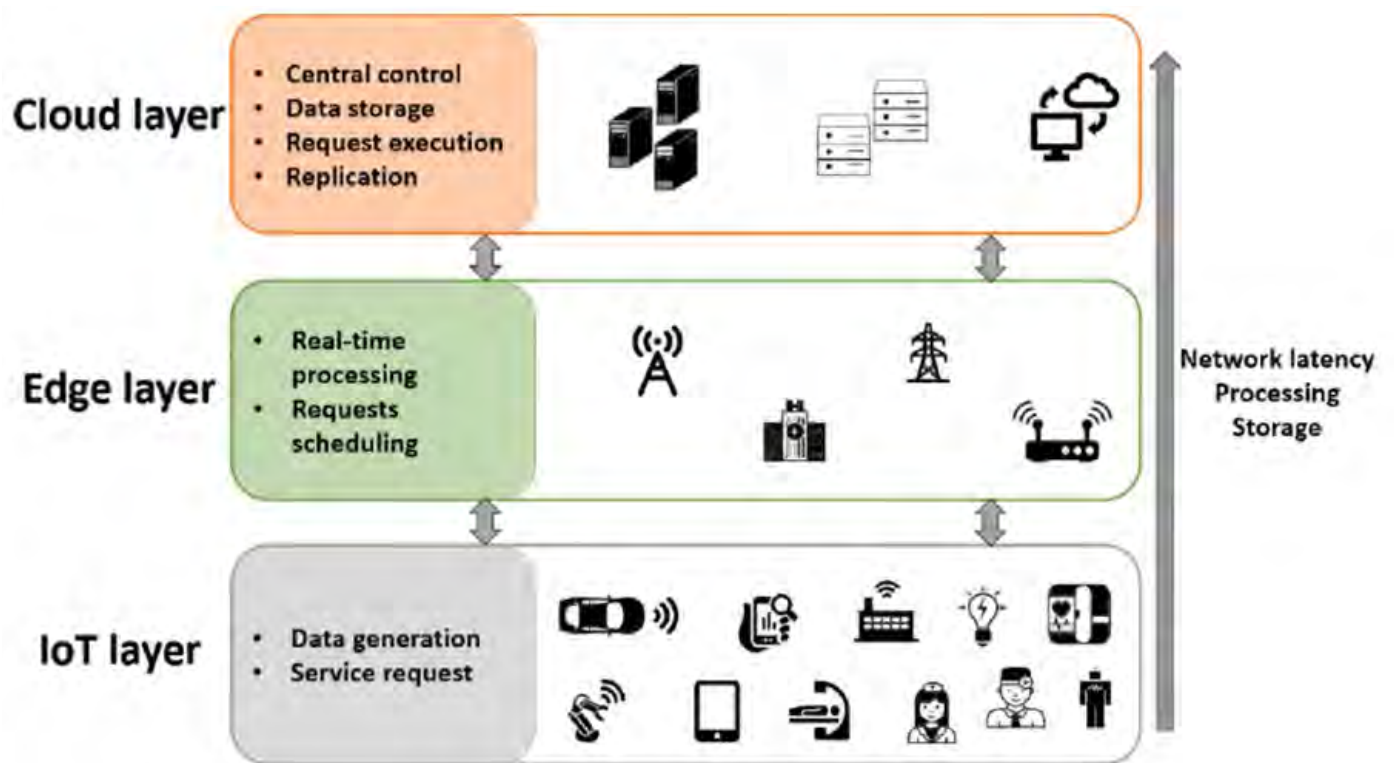


Fig. 1 Data Storage Layers



This paradigm shift toward Edge and IoT technologies is an emerging market opportunity, opposing hyper-scaler markets dominated by American companies. As a result, Europe has a unique chance to regain a significant role in the computing market and retain digital autonomy. For this reason, the European Commission has dedicated investments and efforts to the Cloud, Edge & IoT Continuum. The launch of the European Cloud, Edge & IoT Continuum Initiative reflects such an investment, which will help a series of relevant projects funded under the Meta-Operating Systems for the Next Generation IoT and Edge Computing Cluster (see figure 2 below), to join the forces and synergise for the development of the future CEI market.

Cloud-Edge-IoT for European Data

HORIZON-CL4-2021-DATA-01-05,07,08



Fig. 2 Cloud-Edge-IoT for European Data

Apart from the six Research and Innovation Actions (RIAs) listed in the purple boxes above, there are other Coordination and Support Actions projects (CSAs) currently funded by Horizon Europe. Among these, Open Continuum is focused on the Supply side and UNLOCK CEI on the demand side.

Open Continuum aims at fostering European strategic autonomy and interoperability through an open ecosystem for the computing continuum especially among CEI supply representatives, while UNLOCK CEI - the organiser of this first presentation webinar- aims to support research projects, and technology providers to get closer to market and commercialise their CEI offering more effectively taking into account the demand side's (business users) needs and requirements. This will be possible by understanding CEI's future market scenarios and the demand landscape and building a CEI industry constituency. The main project's outputs are reported in figure 3.



Fig. 3 UNLOCK CEI's projected outcomes

Why Investigate the Cloud-Edge-IoT Domain?

Cloud, Edge and IoT technologies are critical for Europe's future in many ways. The EU can lead their development and generate large market revenues with the right policies.

The second speaker, **John Gole** (Research Director, European IoT Practice, IDC), stressed the growing importance of Edge and IoT technologies. These domains have become one of the most extensive technology plans for European organisations, with many already investing in these solutions. Thus, the real challenge lies in expanding them, although the market is already moving toward widespread adoption. As shown in the figure below, these technologies will generate significant market revenues in 2022 - IoT 176 billion Euros and Edge 36 billion Euros.

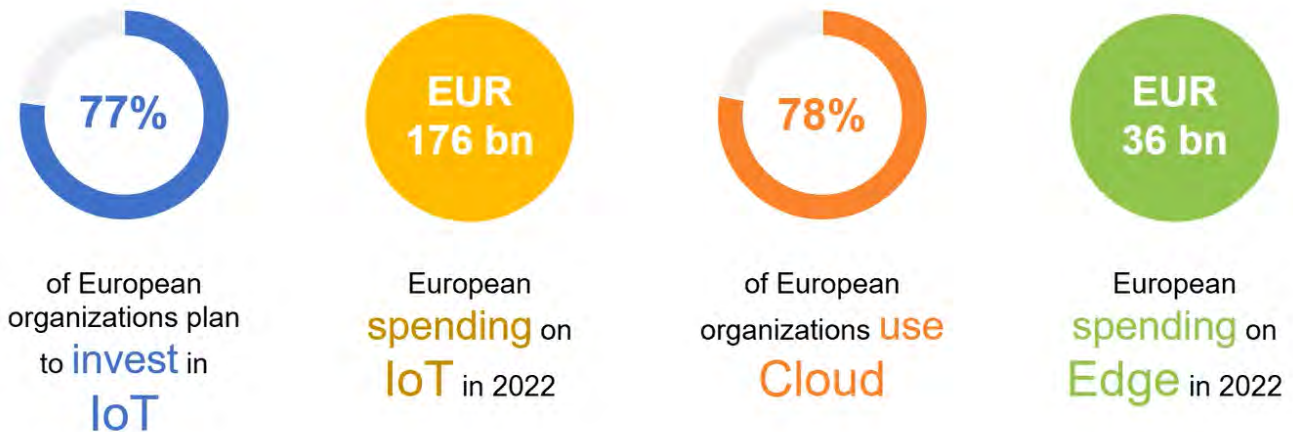


Fig. 4 Percentage of European organisations investing in IoT and Cloud technologies and total revenues generated

Due to the amount of data generated and the quick responses required, many companies' IoT use cases for the next few years will leverage IoT and require both Cloud and Edge technologies. Many of these use cases bridge Cloud and Edge, and the three technologies already blend in several instances. Cloud, Edge and IoT technologies are critical for Europe's future in many ways, impacting different domains - from energy infrastructures to national security to healthcare and economics in larger terms. Finally, these technologies also play an essential role in achieving sustainability goals. However, despite widespread adoption, IoT and Edge technologies are still in their very early application stages among companies. As to the supply side, IoT creates a wide range of opportunities for different companies by incorporating many different technologies. However, because this is still a relatively fragmented market with no dominant player, EU policies can influence its future shape.

Europe is a strong leader in some technology fields (e.g. Telecom Network Technologies), but it lags in others, such as semiconductor chip production. In both instances, policies (or the lack of such) have played a central role in determining the success of these technologies. It is, therefore, essential to understand trends and opportunities so that the right policies can follow.

The key takeaway, therefore, is that this is a big market and critical for the future of Europe, which can be a market leader by influencing the right policies.

Get involved: value and benefits

Value chain adopters in 5 key sectors (manufacturing, agriculture, health, energy and utilities, and transportation) can help improve services and actively reshape CEI's agenda.

The third speaker, **Marlene Eisenträger** (Consultant, VDI/VDE IT), illustrated the Value Chain Adopter (VCA) groups. These groups of potential CEI business users will be recruited in the next few months and support the collection of user needs and requirements in 5 key sectors: manufacturing, agriculture, health, energy and utilities, and transportation (see figure below).

Our approach: Value Chain Adopter Groups

-  Manufacturing
-  Agriculture
-  Health
-  Energy and Utilities
-  Transportation



Fig. 5 CEI's Value Chain Adopter Groups

She then described the UNLOCK CEI project's structure as consisting of different workshop waves (3-4 workshops for each wave) lasting from three to four hours.

The first wave will start in 2023 and consist of a virtual event that identifies business drivers and revenue streams. It will also look at the potential vendor lock-ins, gaps and business opportunities. The second workshop wave, also starting in 2023, will be a hybrid event based on the market scenarios used to identify and validate service requirements regarding specific topics such as security, sustainability, and sovereignty. It will also try to understand the new players in the CEI ecosystem and identify novel business models and opportunities. The last wave will be a cross-domain panel discussing pathways for developing the market structures with crucial decision points for government actions and recommendations for large-scale pilot projects funded by the European Commission (2023-2024).

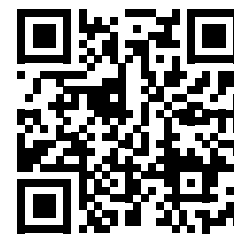
Finally, Marlene described the advantages for stakeholders of attending the workshops and joining the Value Chain Adopter Groups. The groups will indeed contribute with recommendations for the large-scale pilots, actively shape CEI towards environmental goals (e.g. energy efficiency, reduction of CO2 emissions, resilient supply chains, and data privacy), estimate the cost-benefit ratio regarding infrastructure investments and foster the green and digital "twin" transition to build sustainable European data-driven value chains.

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Panel discussion

A panel discussion moderated by Maria Giuffrida (Senior Researcher, Trust-IT) followed featuring experts from all over the EU. The panel discussion was divided into two topics.



Kay Bierzynski
Senior Project Manager
Infineon



Brendan Rowan
Managing Consultant for Tech,
Policy and Skills, Bluspecs



Natalie Samovich
WG Energy Chair
AIOTI



Albert Seubers
Director
Martel BV



Rainer Sträter
SVP Cloud Services & Global
Platform Hosting, IONOS

Fig. 6 Panellists

1st Round: CEI's Convergence Early Stage Challenges

Brendan Rowan (Managing Consultant for Tech, Policy and Skills, Bluspecs and Partner of UNLOCK CEI) illustrated the market challenges of the CEI convergence's early stages. While the recent transition to the cloud has posed a real challenge for resources, the next five years will witness new challenges to overcome the historic investments companies have already made. Such a transition is likely to be led more by use cases, given these new technological approaches' considerable future value. Thus, as these technologies are developed, they must ensure easy access to their tools in order to face potential competition. Although the business models for these technologies are still in the making, providing a clear, well-structured commercial offer is essential, making this a win-win decision for everyone.

Natalie Samovich (WG Energy Chair, AIOTI) discussed Edge and IoT's technological challenges. In this context, the buzzword is certainly complexity, considering that several of these technologies face the overcharging adaptation and cost challenges of converging with the digitalisation continuum. For example, IoT is expanding beyond static monitoring as it starts to activate device automation, real-time processing of data usage and edge processing linked to AI. Intelligent IoT devices advance digital transformations within several areas (energy, agri-food, automotive, mobility, transport, manufacturing, smart cities and smart communities). In this context, challenges are, however, not uniform within the computing continuum because of different levels of state infrastructure, ability to transform company industries and sensitivity to decarbonisation. Other areas face similar challenges. First, the shift between architecture and topologies, as new IoT and Edge capabilities are driving the decentralisation of overall ICT architectures and topologies while simultaneously holding the key for the decarbonisation of applications and sectors. Second, Edge computing has already triggered a paradigm shift in cloud computing, and there is a clear need to orchestrate the resources to optimise along the way. Finally, she mentioned the need to scale up environments: it is important for Europe's vast markets to cooperate and create a single harmonised market for these technologies.

Kay Bierzynski (Senior Project Manager, Infineon and EPoSS) discussed the challenges faced by integrators. The first one certainly concerns heritage infrastructures: part of their software is written in old programming languages (from the 1950s), and updates and experts to improve and modernise these codes are no longer available. However, this type of know-how is still needed to integrate this IoT and Edge infrastructure. Another problem is the performance: because these technologies are still in their early stages, all the IoT and Edge raw data gathered would break down networks. The third and last point lies in determining relevant data for future developments, given that data points and correlations tend to move away from each other in time.

2nd Round: Leveraging Barriers to Exploit Opportunities

Albert Seubers (Director, Martel BV and Coordinator of Open Continuum) discussed some of the main dilemmas faced by experts in trying to implement Edge and IoT technologies. For example, data needs to be triggered very closely to the source for privacy and network reasons while at the same time maintaining a distributed model among different sources to reduce environmental impacts. Another dilemma is overcoming the challenge of “built trust” through attention to design and legal aspects of security in this environment. An example is security cameras recently installed in the Netherlands, which utilised Chinese Edge technology and raised people’s distrust. In this context, Unlock CEI and Open Continuum should build a bridge to empower people by defining and designing open source/open standards that must collaborate and be delivered together.

Natalie complemented this topic with a discussion on CEI’s opportunities in energy. IoT and Edge computing are, in principle, directly involved in the transformation toward decarbonisation on many levels. In light of the recent geopolitical events, it is essential to find quick solutions through innovations, adjusting long-term goals to present-time challenges. In this context, embedded AI and neuromorphic computing can lead to new design intelligence for smart systems’ physical and functional integration into devices. Also, new concepts such as requirements for AI interference, distributed Edge linked to 5G devices, and enmeshed network functionality linked to the energy sector pose short and medium-term opportunities for these technologies to step up. In this context, because privacy and confidentiality are paramount, how these topics are integrated into the Continuum is very important.

As a provider **Rainer Sträter** (SVP Cloud Services and Global Platform Hosting, IONOS) shared his experience with opportunities and use cases. He mainly focused on mobile networks built for 5G and next generation 6G on cloud technologies with all the Edge functionalities, including some low latency specific use cases. One example is the significant lift in digital twins, not only single factory ones but also among factories of different sizes. Some companies do not want their traffic to leave the Schengen area, which poses several challenges with mobile networks requiring connecting clouds, Edge, far-edges and devices. A solution is to build the backbone – the so-called DNS of the Internet – for all the data rooms and data spaces with IoT and IoT stacks to build local data processing spaces. This creates a significant advantage for factories of different sizes. However, these innovations require substantial improvements in the data spaces considering that IoT stacks are still not at a high level. A second example is the application of IoT to connect offshore wind parks in the maritime sector. Overall, there are many significant potential use cases, but further platform improvements and more functional links between the resource industry and the providers are still needed to implement them better.

Kay complemented the discussion with the example of the automation sector. For instance, office sensors in office buildings can monitor room occupancy and temperature levels and optimise energy consumption through Edge computing and Cloud systems. Moreover, factories currently use robots for the most physically demanding tasks while humans focus on managing them. In another Munich-Singapore experiment, IoT and Edge computing clouds were used to reduce errors in circuit designs, thus optimising material costs.

3rd Round: Concluding Remarks

In a quick last round of questions, Rainer, Albert and Brendan wrapped up the seminar by discussing cooperation opportunities between industries and research.

Rainer insisted on the need to scale out infrastructure experience to contribute to building suitable consortia, engaging not only the usual prominent actors but also mid-sized companies.

Albert remarked on the importance of creating a real open continuum ecosystem that spans from delivery to demand and embeds parts of in-between ecosystems. For example, government bodies embracing new technologies for projects such as smart cities and care appliances would need standardisation rules that span a continuum between delivery and demand. Every actor can make a difference.

Finally, **Brendan** reiterated the excellent opportunity for IoT and Edge to act as enablers for a technological turn, as organisations improve at using complex data sets and a wide range of use cases can be developed.



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