AIRBUS

Airbus Amber

2023, 14th April
Reference: D23010458

This document reflects Airbus' answer to the call for Expression of Interest on future visions and research directions 2025-27 in the area of Cloud-to-Edge-to-IoT for European Data.
Ref:https://swforum.eu/news/call-expression-interest-future-visions-and-research-directions-2025-27-area-cloud-edge-iot

Motivation

As in many other sectors, the data used or created along all aircraft development phases, the aircraft operations and its entire life will lead to new game changers in aviation. This will be emphasised by the aircraft manufacturers' needs looking for more sustainable products, more efficient, autonomous and eco-friendly aircraft. Passengers and operators will additionally take benefits of new data management technologies through new services.
All technologies enabling an efficient and fast collection & treatment of any data will benefit aircraft performance and maintenance. They will help monitor the health of aircraft components, sensitive environments, or the efficiency of manufacturing stations. Increasing the availability and processing of data in real time will create opportunities to control the emissions produced across the industrial system or the product operations, to optimise trajectories for weather avoidance and GHG emissions. Right data at the right time is the first source of informed decision making.

With digitalisation and generalisation of smart devices, interactions at the edge between digital and physical world are becoming ubiquitous while the "Edge" is about organising locally such interactions between the digital & physical worlds.
There are definitely stronger needs for more data supporting these interactions like IoT in order to better support our AI based systems. Data demand will grow dramatically and the dedicated IT infrastructures will have to evolve accordingly. The use of internal & external cloud & edge infrastructure seamlessly & securely integrated, as new platforms will facilitate the deployment & integration of the new generation of Airbus digital ecosystem, while edge computing is expected to reduce data traffic, especially to centralised data centres and increase energy savings.
Innovating and deploying Cloud-to-Edge-to-IoT technologies transversally and harmoniously to industrial sectors, including aviation, will definitely contribute to reach the environmental objectives of the Green Deal and support the digital european sovereignty while expanding the needs for global governance norms.

Current Status

The IoT has grown in popularity in recent years, with more and more devices being connected to the internet. In 2016, there were an estimated 8.4 billion connected devices, and this reached the number of 20.4 billion in 2020. It is estimated that there will be 75 billion devices connected to the internet by 2025. The Internet of Things is transforming society, economies and the industrial landscape by enabling a new level of connectedness and intelligence. It creates new opportunities for businesses and organisations to increase efficiency and optimise operations. The IoT is helping to drive a new wave of economic growth and development.

AIRBUS

2023, 14th April
Reference: D23010458

Airbus Amber

Airbus has invested for many years in innovative data services, in collaboration with airline customers, based on operational data collection and advanced analytics. One of the key areas of development is typically referred to as “managing the Cloud to Edge continuum” and it is related to the challenges of extended operation of our commercial aircraft products.
There are developments to extend the scope of such data analysis across the whole aircraft product cycle, from product design to airline operations. This involves a variety of technical environments across diverse operation responsibility domains. All these technical environments are part of a business continuity chain on which each business operation has a dependency.

Research Challenges

European actors will need to secure a global approach enabling the digital continuity or security already put in place by various key industrial players. New means are required to allow a very structured vision on edge usages, building a flexible decentralised digital architecture (e.g. for PLM or manufacturing) that will ease fast deployment and adaptations to the market.
One common challenge is cyber resilience that spans across all those environments. Interoperable uninterrupted connectivity advancements will necessitate data reliability and cybersecurity to ensure safe operations both in the skies and on the ground.
Considering the complexity of such an environment, leveraging new modelling, machine learning, AI based to develop autonomous and adaptive systems will require a disruptive new approach in technology.
The key stakes will lay on the availability of owned and trusted data, their agreed exploitation and local processing that will induce needs in new architectures and strategies able to guarantee the data privacy and security under operational constraints and conditions. Specific edge devices with built-in security protocols will be required for the security of the systems.
The final end goal is to diligently feed new services. New applications ‘cloud and edge compatible’ will be developed, using artificial intelligence potentially coupled to IoT on edge ultra low power devices or systems. The computing power and performance as well as the network latency will be of importance to comply with the requirements of real time data processing.
All these edge devices and systems will undoubtedly tackle the needs for harmonised and mature interoperability approaches where a european standardisation sounds key for the efficient management of all required interfaces between IT collaborative ecosystems. Part of the standardisation, standards for data sharing, semantic integration, connectivity are mandatory.
Generic infrastructure based on standard edge cell services will help Airbus in various areas like manufacturing (new plug-ins for smart sensors, tools, bots), experimental tests (embarked environment, communication tunnelling, …), logistics, new fuel production and transport ecosystems (e.g. liquid H2).
The development and delivery of the next generation of safe and net-zero emission aircraft will undeniably concur with the deep integration of new digital technologies in all life-cycle phases and their exploitation through interoperable cloud & edge infrastructures.