

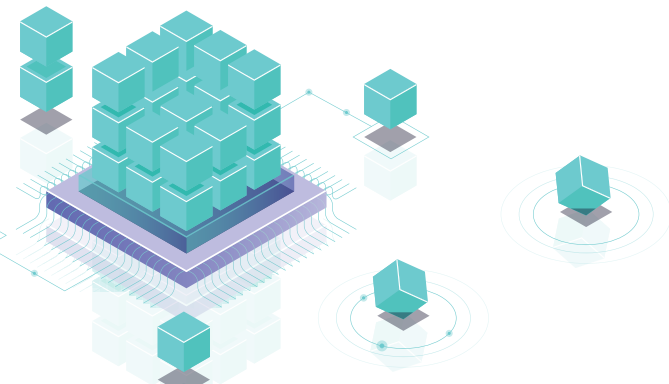
Overall Concept

The COGNIFOG project aims to build an open and modular framework for next-generation information systems that spans from the IoT devices, the edge and to the cloud. It will provide a secure Cognitive-Fog environment with dynamic resources and services orchestration capabilities, real-time scalable monitoring, and AI-based analytical services to ensure adaptability, dependability, scalability, and energy efficiency.

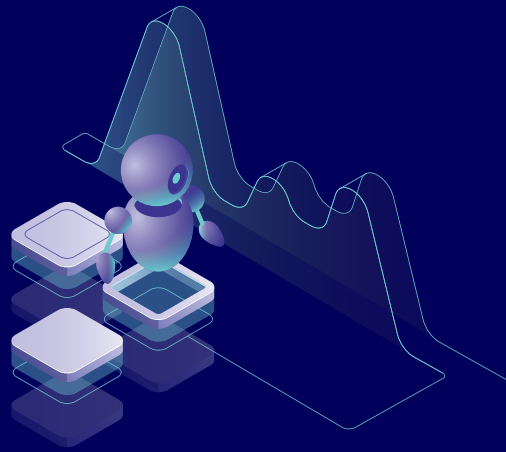
COGNIFOG Methodology

The Cognitive-Fog concept enables the IoT-to-edge-to-cloud continuum and includes interoperability facilities to connect IoT devices to the continuum and communicate with other edge-side components. It will also help to orchestrate resources in the cloud to provide safe and secure end-to-end services. The COGNIFOG framework is composed of the following five layers:

- 01** Application, hardware and dataflow layer
- 02** Connectivity and interoperability layer
- 03** Orchestration layer
- 04** Data Management layer
- 05** Safety and security orchestration layer



 **COGNIFOG**



 **COGNIFOG**

**AI-empowered Edge
Cloud Continuum
for self-aware
cognitive computing
environments**

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01/01/23
Start Date

31/12/25
Finish Date

36
Months

12
Partners

Background & Motivation

The Internet of Things (IoT) has brought new opportunities for increasing safety, automation, and cost and energy savings. However, these opportunities come with an increase in data generation, which is pushing network capacity to its limits. According to an estimation by IDC, the total amount of data generated by connected devices will exceed 40 trillion gigabytes by 2025. Analyzing data closer to where it is generated, rather than sending it to a data center, can reduce network load, save energy and costs, and satisfy the requirements of low-latency applications.

Edge distributed infrastructure can improve the robustness of systems in the event of a disaster. The localization of data and computation can improve privacy, security, reliability, resilience, and safety, increasing trust in these systems. There is a growing demand for software solutions that can monitor and analyze data flows along the IoT-to-cloud path, enabling the processing of data closer to its source and providing real-time responses for smart IoT applications. These solutions should be able to abstract away the hardware complexity and heterogeneity of edge environments. Experts in the energy sector are calling for a framework for enabling flexibility in energy consumption.



Objectives

- 01** To build the architectural foundations of the Cognitive-Fog, an open, flexible, adaptive and modular edge-cloud continuum framework.
- 02** To develop the enabling technologies of the Cognitive-Fog with orchestration capabilities over heterogeneous IT resources and services, so as to form a decentralized computing continuum with real-time scalable AI-based monitoring and analytical capabilities for improved privacy, security, reliability, resilience and safety.
- 03** To empower the Cognitive-Fog with advance load balancing and energy management capabilities to significantly reduce energy consumption and cost.
- 04** To validate the Cognitive-Fog capabilities in novel use cases covering multiple and different domains and to create high impact by promoting the use of Cognitive-Fog through wide dissemination and communication (D&C) means, standardization and clustering actions and exploit its key results to ensure sustainability and trust over a wide edge ecosystem addressing diverse industries.



Consortium
