



## DISTINGO

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### Partners:

BEIA Consult International S.R.L., Romania

HI Iberia Ingeniería y Proyectos S.L., Spain

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### Project Website

[www.celticnext.eu/project-distingo](http://www.celticnext.eu/project-distingo)

[Http://distingo.hi-iberia.es/](http://distingo.hi-iberia.es/)

## RECONFIGURABLE SMART LOCKERS— DISTributeurs INTelliGents RecOnfigurables

For years now smart lockers have been purely used as end-points for final product delivery but these lockers are smart computing devices with plenty of potential for improvements. **DISTINGO** intends to use smart lockers in an intelligent, reconfigurable and flexible way to empower new business models and applications, from the B2C deliveries to B2B logistics and C2C transactions, and get the maximum out of these elements by using IoT concepts, artificial intelligence and blockchain.

### Main focus

Smart lockers are connected, sensorised computing elements that most often sit idle at their locations and just perform a minimal gatekeeping of the stored contents by means of basic recognition primitives such as a PIN or a QR code. **DISTINGO** steps in to build on top of this infrastructure modern features that can result in richer services:

The key expected outcomes are:

- A seamless user-interface designed for best User Experience: accessible through the web and mobile, able to reconfigure the implemented services on the fly and provide metrics to the administrator about usage and capacity.

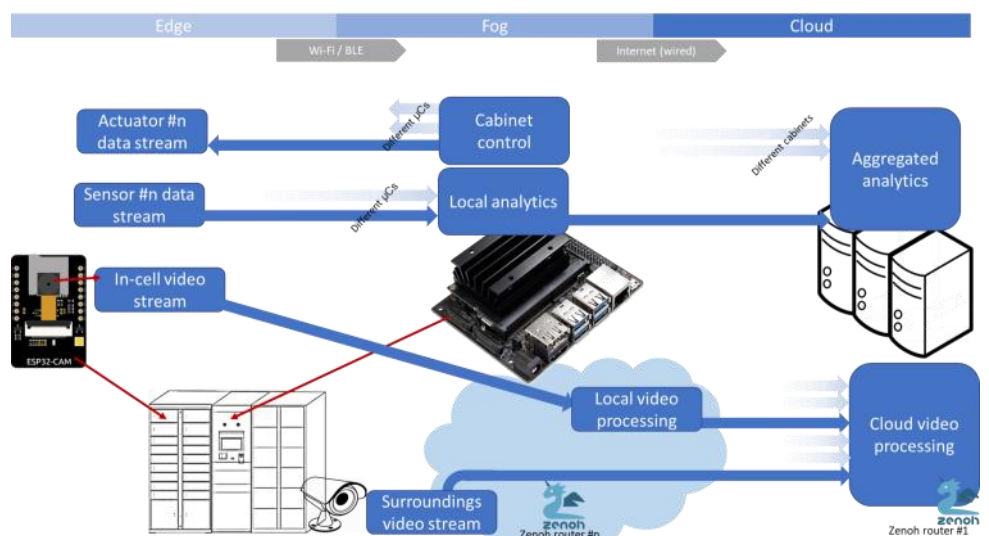
- Distributed computing: Lockers feature computing capabilities and are connected to one another. They thus present excellent potential to serve as a computing network, featuring Edge (closer to the sensor) and Fog (intermediate between sensor and cloud) levels that complement the traditional cloud approach.

- Enhanced security: Security assurance is a key enabler and currently it's implemented on its most basic layer. Capabilities such as facial recognition are available. In addition, private blockchain can help to manage data securely and with full traceability.

- New markets: With all of the above new capabilities, it would be limiting to just use smart lockers for their traditional final mile logistics role. **DISTINGO** proposes to implement novel services (e.g., hospital logistics with advanced sensing for sensitive items) that fully exploit the full feature set.

### Approach

**DISTINGO** builds from the user needs: by being in contact with current problems of the end-users (bottom up) and envisaging new uses for the technology (top down) a full set of requirements for a novel system of smart lockers was developed. With the



consortium's expertise in IoT solutions, distributed computing and AI, we proposed a multi-level architecture (from the edge to the Fog and the cloud) that can accommodate the needs of the envisaged services.

## Achieved results

We developed the following results during the project:

- ◆ A flexible architecture, built around distributed computing and IoT principles that accommodates the needs from the locker cells (edge) to the cabinets (Fog) and the wider Cloud computing paradigms.
- ◆ AI-enabled algorithms to empower computer vision capabilities: detecting items in the interior of the locker cells, detecting the number of people approaching the cabinet, recognizing the user of the locker.
- ◆ A mobile app for managing and reconfiguring the system, enabling several services to be deployed in the same infrastructure adapting to the available resources.
- ◆ A private blockchain infrastructure that enables the collection of data according to principles of traceability and tamper detection, so that data captured (e.g., from sensors) can be trusted in future analyses to not have been tampered with.

## About Celtic-Plus

Celtic-Plus is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects in the area of telecommunications, new media, future Internet, and applications & services focusing on a new „Smart Connected World“ paradigm. Celtic-Plus is a EUREKA ICT cluster and belongs to the inter-governmental EUREKA network. Celtic-Plus is open to any type of company covering the Celtic-Plus research areas, large industry as well as small companies

## Impact

The major result from the project is the development of a new generation of components for the creation of smart locker systems: fully interoperable, with added value for the end user, but also for every actor participating in the locker value chains, from sellers (e-commerce & local) to the delivery man, and including novel actors such as regular citizens using the lockers for private affairs. Our solution can be the cornerstone in an ecosystem that enhances the creation of new services in urban environments.

- ◆ Secure storage of sensitive products such as food, medicines or valuable objects with increased security and full traceability.
- ◆ General-purpose distributed network for computing that can be reconfigured for any computing needs.
- ◆ Re-configurable network of storage containers that can be flexibly adapted to new situations in the short term, maximizing resource utilization.

The final results of the project are now available and open to exploitation by partners. Preliminary contact has been established with smart lockers users for several industrial domains (e.g., hospitals, pharmacies, supermarkets, logistics) and with smart locker manufacturer themselves.

or universities and research organizations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.

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