

# Ahtapot – Open Source Omnichannel Retail Middleware Platform

*AI- and RFID-enabled research platform for inventory  
intelligence and Digital Product Passport transition*

Horizon Europe R&I project idea | TRL 5 → 7

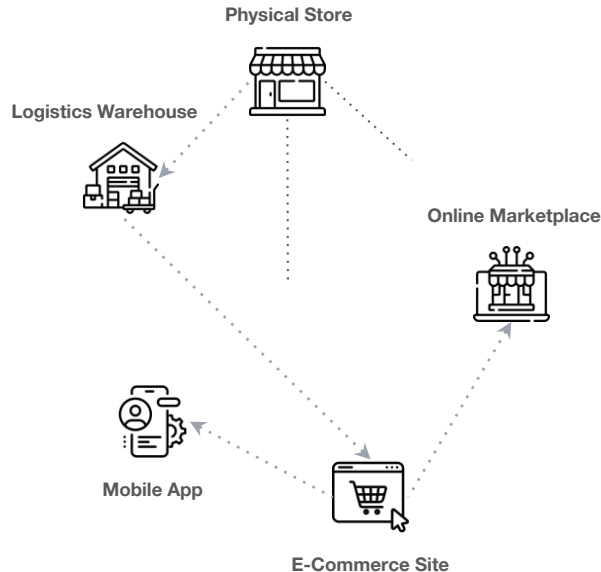


*"End-to-End Digital Commerce Partner"*



# Challenge and Conceptual Approach

## Inventory and Data Inconsistencies in Multi-Channel Retail



Many retailers experience persistent **inventory inaccuracy** and **delayed data integration** in their sales operations across physical stores, e-commerce sites, mobile apps and online marketplaces.

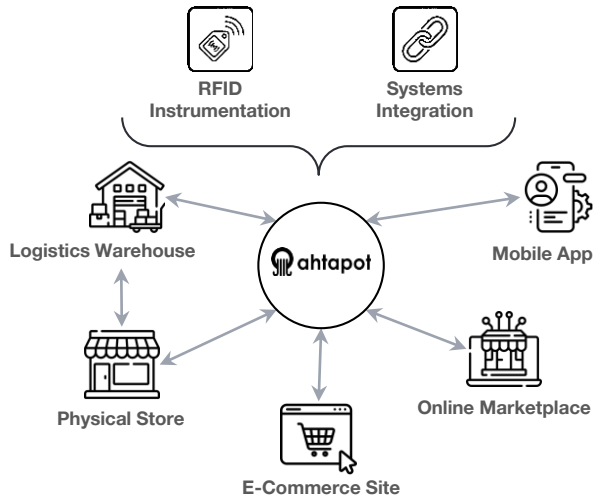
However, most solutions currently on the market are **channel-specific, limited in scalability** and insufficiently designed for integrated multi-channel retail operations.

Despite widespread adoption of digital commerce platforms, retailers still lack near-real-time, AI-assisted, cross-channel inventory intelligence at scale across **heterogeneous EU retail environments**.



# Proposed Solution and System Architecture

## Ahtapot - Open Source Omnichannel Retail Middleware Platform



**RFID technology** plays a key role in addressing these challenges, thereby reducing **revenue loss**, **operational inefficiencies** and **negative customer experiences**.

When complemented by **RFID** data acquisition modalities and an **AI-enabled analytics layer**, the proposed system, using **Ahtapot** as a baseline research and **experimentation platform**, enables coverage of the full range of **RFID** use cases and unifies physical stores, e-commerce sites, mobile applications and online marketplaces within a **centrally managed**, integrated architecture.

**Open-source**, modular and interoperable architecture designed for research, validation and **large-scale EU deployment**, including support for **Digital Product Passport requirements**.

### Target Functional Capabilities of the Platform

- Near-real-time inventory visibility and operational efficiency
- Centralized inventory and order management
- Flexible multi-location fulfillment, online order dispatch balancing.
- Scalable domestic and cross-border e-commerce operations in **EU as one market**.
- Open and interoperable architecture for **heterogeneous EU retail environments**.
- Research-driven foundation for transition to the **EU Digital Product Passport** requirements

# Implementation Roadmap

## Development Phases and Collaboration Requirements

### System Building Blocks

### Planned Development Scope



#### Open Source Omnichannel Middleware Platform

Target AI-enabled capabilities:

- Inventory reconciliation and anomaly detection
- Demand forecasting and stock optimization
- Fulfillment source and routing optimization



#### RFID Instrumentation

Development Aspects	RFID data acquisition modality		
	Handheld	Fixed	Autonomous robot
Prototype development	●	●	●
Integration and validation of RFID sensing modules	◐	◐	◐
near-Real-time ingestion of RFID data into the omnichannel middleware platform	◐	◐	○
Adaptation to EU-wide retail environments	○	○	○

Target TRL progression: **TRL 5** → **TRL 7** Target validation: real retail omnichannel pilot environments

# Previous R&D projects and Expertise



MNM Teknoloji has been actively engaged in research and innovation activities since 2016 and has successfully completed **three publicly funded, peer-reviewed R&D projects** supported by **TÜBİTAK (The Scientific and Technological Research Council of Türkiye)** under the **TEYDEB programme**, a national competitive public R&D funding scheme.

Building on more than **25 years of experience in digital commerce**, MNM Teknoloji has been delivering **highly scalable, end-to-end e-commerce** and **omnichannel infrastructures** for major retail brands **since 2000**.

Our R&D activities focus on **RFID**, data-driven decision support systems, automation and **omnichannel operations**, directly addressing real-world challenges in retail and online commerce.

- **2023 – TÜBİTAK TEYDEB ( Project No: 7230820 )**  
*Development of an RFID-Enabled Autonomous Robot for Inventory and Location Tracking*  
Focused on near-real-time inventory accuracy, autonomous data collection and RFID-based location intelligence in retail & warehouse environments.
- **2019 – TÜBİTAK TEYDEB ( Project No: 7190894 )**  
*A Location-Based Recommendation System to Improve the Performance of Low-Selling Commercial Products*  
Developed data-driven recommendation mechanisms combining location intelligence and sales analytics to optimize product performance.
- **2016 – TÜBİTAK TEYDEB ( Project No: 7160532 )**  
*Development of an Omni-Channel Order Management System (OMS) & Smart Decision Support System for e-commerce*  
Developed an OMS architecture enabling synchronized inventory, order orchestration, and decision support across multiple sales channels.

# Calls of Interest (Horizon Europe 2026–2027)

## Cluster 4 – Digital, Industry and Space

MNM Teknoloji is interested in participating in Horizon Europe projects where **e-commerce, omnichannel operations, data-driven decision-making and real-world digital platforms** play a central role. We are particularly aligned with the following calls:

- **HORIZON-CL4-2026-04-DATA-06**  
*Efficient and compliant access to and use of data*  
→ Projects requiring **near-real-time data integration**, multi-source data orchestration and compliant use of operational data generated across physical and digital commerce channels.
- **HORIZON-CL4-2026-05-DIGITAL-EMERGING-03**  
*Apply AI: Next-Generation Agile and Intelligent Robotics Platforms for Industrial and Service Applications*  
→ Projects combining **AI, robotics and operational platforms**, especially where **RFID-enabled environments, autonomous systems and digital commerce workflows** intersect.
- **HORIZON-CL4-2027-04-DIGITAL-EMERGING-05**  
*Apply AI: AI-Driven Robotics for Industry – Enabling System Integration and Adoption*  
→ Projects focusing on **AI-driven automation**, system integration and large-scale deployment in operational environments, including retail, logistics and omnichannel ecosystems.

## Cross-Cutting Interest

- **E-commerce and omnichannel experience** is required as a core competence
- Digital platforms must be validated in **real operational settings**
- Integration with **physical environments (stores, warehouses, robotics)** and **digital system (e-commerce, OMS, data platforms)** is critical
- Industry-driven use cases are needed to bridge **research outcomes and market adoption**