coppilot

D2.1: ECOSYSTEM DEFINITION AND REQUIREMERTS

ANNEX 1: COP-PILOT SERVICE MODEL ECOSYSTEM AND

COP-PILOT SERVICE MODEL ECOSYSTEM AND REQUIREMENTS

This annex explores how value and engineering dimensions drive EU industry adoption, outlining supplier and customer roles alongside the technical foundations for sustainable impact, with detailed service requirements available in ANNEX 8.

D2.1: Ecosystem definition and requirements

Work package	WP Number 2
Task	Task Number T2.1, T2.2, T2.3
Due date	14/05/2026
Submission date	12/05/2026
Deliverable lead	RedZinc
Version	1.1
Authors	NETCOMPANY-INTRASOFT SA (INTRA) NOVA TELECOMMUNICATIONS & MEDIA SINGLE MEMBER SA (NOVA) ORGANISMOS TILEPIKOINONION TIS ELLADOS OTE AE (OTE) TATA COMMUNICATIONS (UK) LTD (TATA) GIOUMPITEK MELETI SCHEDIASMOS YLOPOIISI KAI POLISI ERGON PLIROFORIKIS ETAIREIA PERIORISMENIS EFTHYNIS (UBI) ONE SOURCE CONSULTORIA INFORMATICA LDA (ONE) SUITE5 DATA INTELLIGENCE SOLUTIONS LIMITED (SUITE5) AGENTSCAPE AG (AGE) AXON LOGIC IDIOTIKI KEFALAIOUXIKI ETAIREIA (AXON) KONNEKT ABLE TECHNOLOGIES LIMITED (KON) INCITES CONSULTING SA (INC) ARTHUR'S LEGAL BV (ARTHUR) EREVNITIKO PANEPISTIMIAKO INSTITOUTO SYSTIMATON EPIKOINONION KAI YPOLOGISTON (ICCS) UNIVERSITY OF BRADFORD (UBRAD) INSTITUTO PEDRO NUNES ASSOCIACAO PARA A INOVACAO E DESENVOLVIMENTO EM CIENCIA E TECNOLOGIA (IPN) FIWARE FOUNDATION EV (FIWARE) DIGITAL FOR PLANET-D4P (D4P) LULEA UNIVERSITY OF TECHNOLOGY (LTU) RISE RESEARCH INSTITUTES OF SWEDEN AB (RISE) HOSCH FÖRDERTECHNIK RECKLINGHAUSEN GmbH (HOSCH) THINGWAVE AB (TAB) PREDGE AB (PAB) ROCKSIGMA (ROC) LTU BUSINESS AB (LTUB) UNIVERSITAT POLITECNICA DE VALENCIA (UPV) FUNDACION DE LA COMUNIDAD VALENCIANA PARA LA INVESTIGACION, PROMOCION Y ESTUDIOS COMERCIALES DE VALENCIAPORT (VPF) TELEFONICA INNOVACION DIGITAL SL (TID) NESPRA (NES) 5G COMMUNICATIONS FOR FUTURE INDUSTRY VERTICALS SL (FIVE) FUNDACION DE LA COMUNITAT VALENCIANA PARA LA PROMOCION ESTRATEGICA EL DESARROLLO Y LA INNOVACION URBANA (VCH) AYUNTAMIENTO DE ALMUSSAFES (ALM) PANEPISTIMIO PATRON (UoP) AGRICULTURAL UNIVERSITY OF ATHENS (AUA) UNIVERSITA DI ROMA "TOR VERGATA" (TOR) DIMOSIA EPICHEIRISI ILEKTRISMOU ANONYMI ETAIREIA (DEI) MPARMPA STATHIS ANONYMI VIOMICHANIKIKAI EMPORIKI ETAIRIA

	(BAR) BIOGAS PREVEZA ONE PC (BPO) AGRICULTURAL APPLICATIONS IKE (AGA) P-NET NEW GENERATION EMERGING NETWORKS & VERTICALS PRIVATE COMPANY (PNET) ILINK NEES TEXNOLOGIES OE (ILINK) ENAKRONIK- KATANEMIMENES LYSEIS TECHNITIS EFFYIAS P.C. (ENIC) REDZINC SERVICES Ltd (RZ) J.I.G. INTERNET CONSULTING SL (JIG) TERRAVIEW GMBH (TER)
Reviewers	NETCOMPANY-INTRASOFT SA (INTRA) GIOUMPITEK MELETI SCHEDIASMOS YLOPOIISI KAI POLISI ERGON PLIROFORIKIS ETAIREIA PERIORISMENIS EFTHYNIS (UBI) NOVA TELECOMMUNICATIONS & MEDIA SINGLE MEMBER SA (NOVA) ORGANISMOS TILEPIKOINONION TIS ELLADOS OTE AE (OTE)
Abstract	The COP-PILOT platform is an open collaborative system for managing services across IoT, edge and core computing environments. COP-PILOT is built to enable secure and intelligent operations that connect diverse sectors. This document brings together an ecosystem of technical blueprints and services models across 5 main domains to support the development of these infrastructures. With a focus on seamless cross domain integration, it lays the foundation for private edge deployments and digital ecosystems across Europe. This deliverable sets the direction for building a platform that drives smarter, more secure, and collaborative digital transformations across multiple industries.
Keywords	IoT Interoperability. Edge Computing. 5G Connectivity, System Intelligence, Automation, Private Edge Systems, Large Scale. Mining, Ports and Logistics, Energy, Agriculture, Viticulture,

Document Revision History

Version	Date	Description of change	List of contributors(s)
V0.1a	3.7.2025	Table of Contents	Donal Morris, RedZinc
V0.1b	4.7.2025	Table of Contents PMT Review	PMT
V0.1c	10.7.2025	Table of Contents WP2 Review	WP2
V0.2	24.9.2025	Working Draft	WP2
V0.3	15.10.2025	Working Draft	WP2
V0.4	15.10.2025	Working Draft	WP2
V0.5	20.10.2025	Working Draft	WP2
V0.6	15.10.2025	Working Draft	WP2
V0.7	24.10.2025	Review Document	WP2
V0.8	25.10.2025	Quality Control Document	WP2
V0.9	25.10.2025	Quality Control Document	RedZinc Team
V1.0	31.10.2025	Final Version for Submission	RedZinc Team NetCompany
V1.0	22.1.2025	Final Version for Submission with info graphics	RedZinc Team NetCompany
V1.0	12.05.2026	Sections made into a separate annexes	RedZinc Team NetCompany

Grant Agreement No: 101189819 | **Topic:** HORIZON-CL4-2024-DATA-01-03
Call: HORIZON-CL4-2024-DATA-01 | **Type of action:** HORIZON-IA

DISCLAIMER

Co-funded by the European Union

Project funded by

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

Co-funded by the European Union (COP-PILOT, 101189819). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them. This work has received funding from the Swiss State Secretariat for Education, Research and Innovation (SERI).

COPYRIGHT NOTICE

Project Co-funded by the European Commission in the Horizon Europe Programme		
Nature of the deliverable:	R	
Dissemination Level		
PU	Public, fully open, e.g. web (Deliverables flagged as public will be automatically published in CORDIS project's page)	X
SEN	Sensitive, limited under the conditions of the Grant Agreement	
Classified R-UE/ EU-R	*EU RESTRICTED under the Commission Decision No2015/ 444*	
Classified C-UE/ EU-C	*EU CONFIDENTIAL under the Commission Decision No2015/ 444*	
Classified S-UE/ EU-S	*EU SECRET under the Commission Decision No2015/ 444*	

* R: Document, report (excluding the periodic and final reports)

DEM: Demonstrator, pilot, prototype, plan designs

DEC: Websites, patents filing, press & media actions, videos, etc.

DATA: Data sets, microdata, etc.

DMP: Data management plan

ETHICS: Deliverables related to ethics issues.

SECURITY: Deliverables related to security issues

OTHER: Software, technical diagram, algorithms, models, etc.

COP-PILOT SERVICE VALUE MODEL ECOSYSTEM AND COP-PILOT SERVICE MODEL ECOSYSTEM REQUIREMENTS

INTRODUCTION TO COP-PILOT SERVICE VALUE MODEL

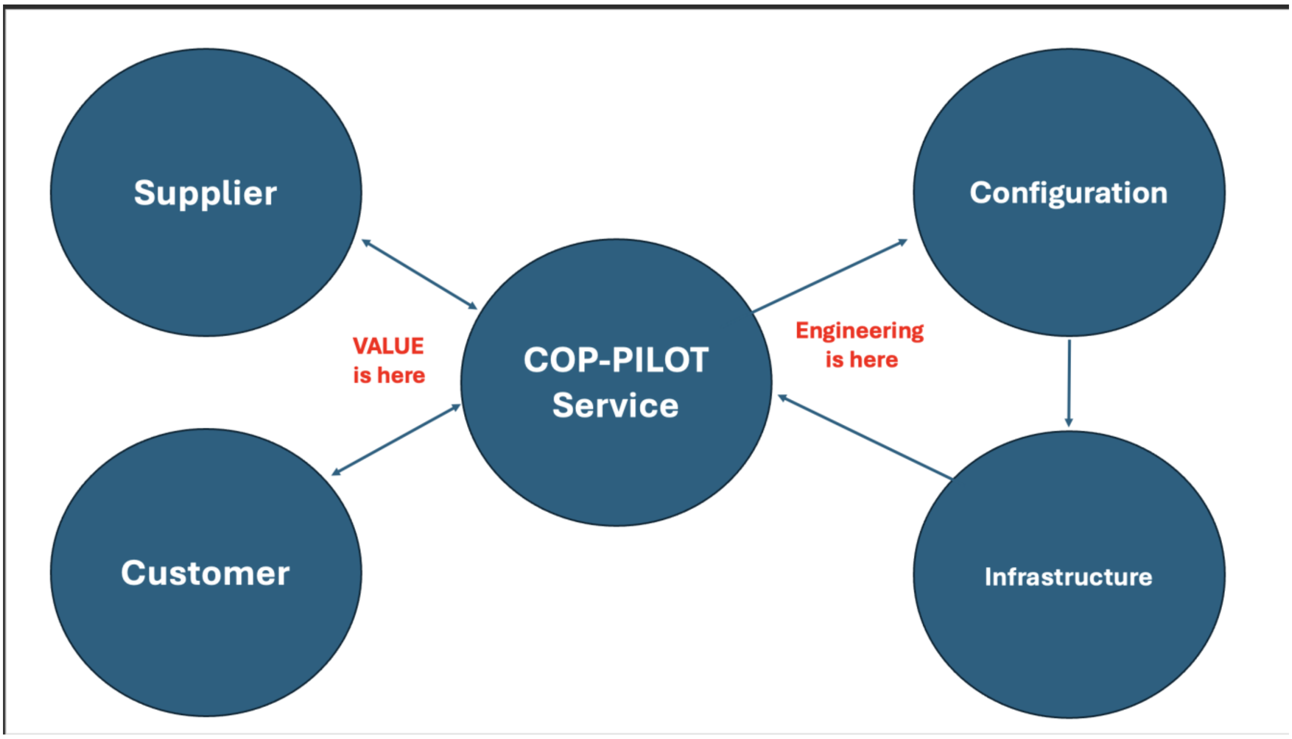

Figure 1.1: COP-PILOT Service Model – Business and Configuration view

To deepen the understanding of how the integration of COP-PILOT will influence industries and businesses within the European Union, the COP-PILOT service model illustrated in Figure 1 is applied. This model embodies a balanced integration of two critical dimensions central to COP-PILOT's commercialization in the EU: Value and Engineering. The service model outlines the essential components that enable COP-PILOT to function effectively and to generate tangible benefits for both society and the economy. It acknowledges the pivotal roles of Suppliers and Customers as the two interconnected ends that facilitate COP-PILOT's adoption and utilization within the broader ecosystem. Furthermore, it emphasizes that successful implementation requires a deliberate and competent establishment of robust technical configurations and advanced information technology systems, thereby providing a strong foundation for sustainable impact.

This section presents service models corresponding to each use case within their respective clusters, providing a comprehensive visualization and conceptual understanding of how the integration of the COP-PILOT service contributes to value creation within the industrial ecosystem.

To delve into further details of the service requirements required for successfully integrating COP-PILOT into the clusters, please refer to ANNEX 8: Detailed Service requirements per use case.

Sample Application for COP-PILOT Service Model

To further enhance our understanding of the service model, two illustrative examples are considered. The first involves a factory operating multiple robots equipped with approximately 1,000 IoT sensors connected to a European Data Space (EDS). The second example focuses on an AI-driven process that analyzes data from these IoT sensors to identify and signal anomalies, triggering alerts in response to detected or anticipated operational errors in robotic systems.

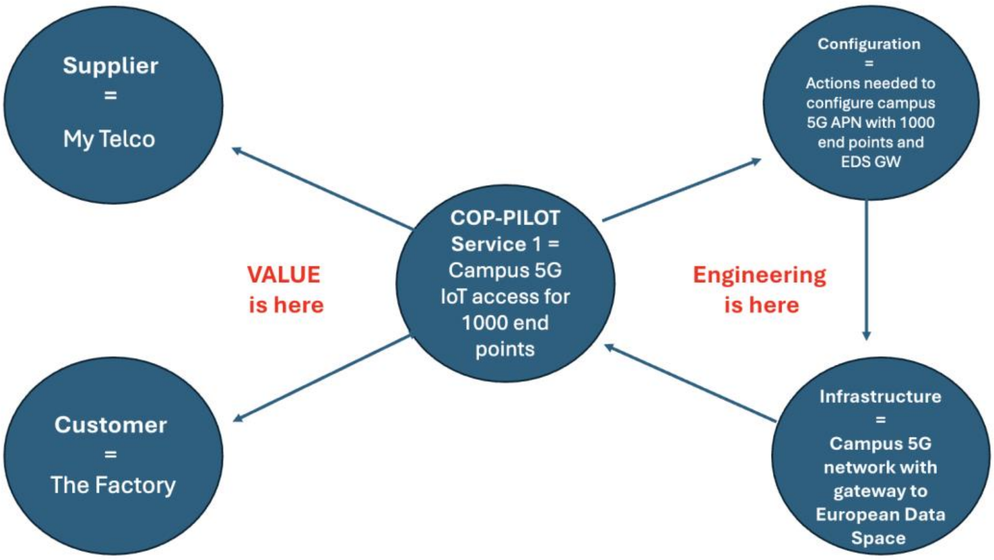

Figure 1.2: Sample COP-PILOT Service Model - Campus 5G IoT Access For 1000 End Points

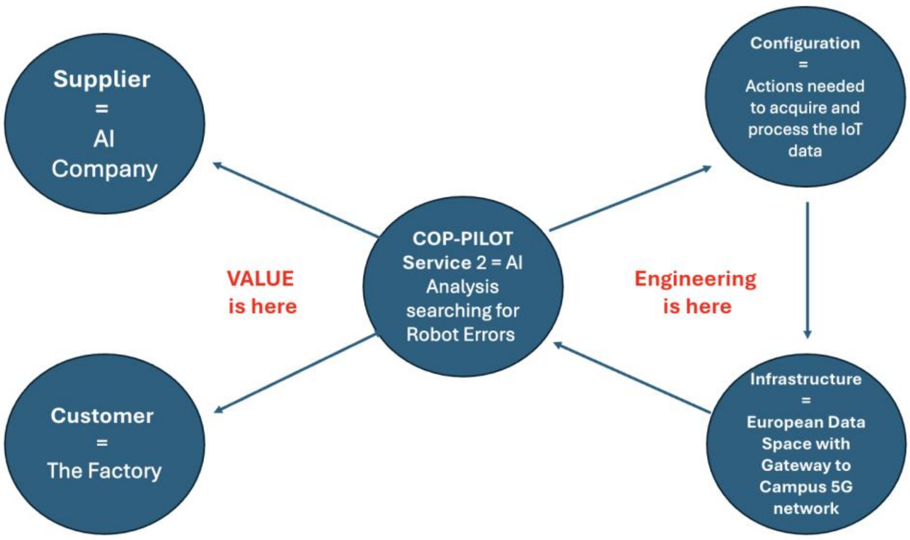

Figure 1.3: Sample COP-PILOT Service Model - AI Analysis Searching For Robot Errors

CLUSTER 1 (BUSINESS INTEGRATION IN MINING) SERVICE AND VALUE MODEL

The integration of the COP-PILOT system in industrial applications, particularly within the mining, manufacturing, and recycling sectors, facilitates the orchestration of an advanced edge-to-edge (E2C) continuum aimed at transforming industrial performance. This system enables real-time process monitoring, exemplified in agricultural contexts such as crop management, through the deployment of advanced Internet of Things (IoT) technologies. The implementation of COP–Pilot is projected to reduce intervention response times by 40-60% and minimize chemical input inefficiencies by enabling targeted applications through IoT-enabled units such as Unmanned Ground Vehicles (UGVs). Moreover, the incorporation of blockchain technology enhances end-to-end traceability and supports intelligent logistics planning.

The anticipated outcomes from the deployment of COP-PILOT within Cluster 1 include the optimization of resource allocation through dynamic provisioning and autoscaling. Furthermore, organizations are expected to achieve up to a 30% reduction in operational costs, supported by a system architecture that promotes real-time data exchange. In addition, COP-PILOT contributes to the development of early-warning mechanisms for seismic activity, thereby enhancing industrial safety, resilience, and sustainability.

Use Case 1.1: IoT Mining Seismics

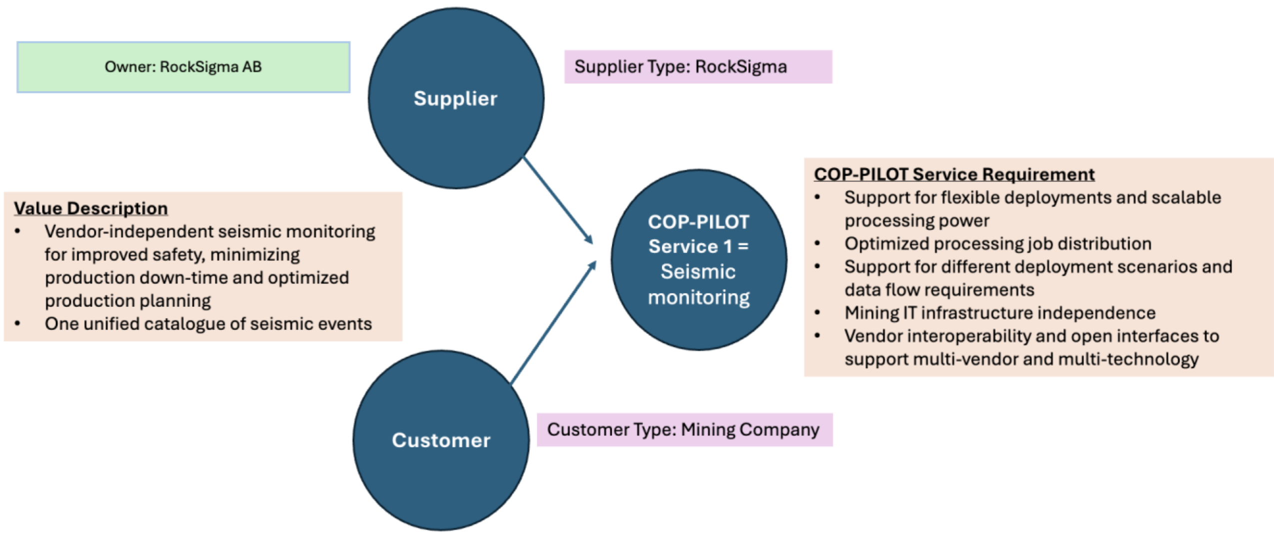

Figure 1.4: Service Model for Use Case 1.1 - IoT Mining Seismics

Use case 1.2: Logistics of IoT

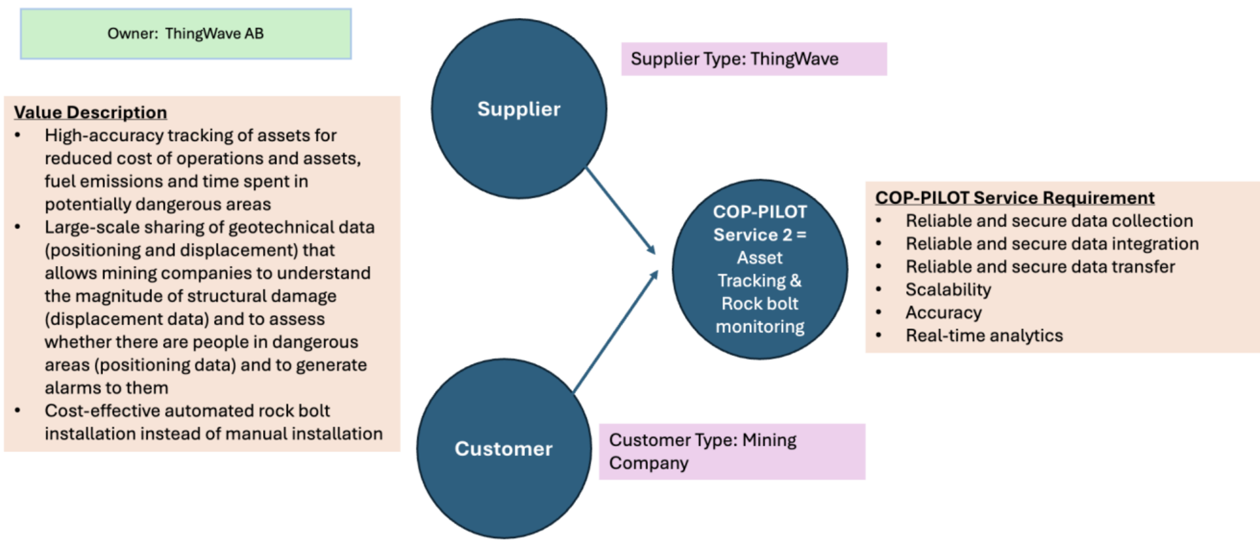

Figure 1.5: Service Model for Use Case 1.2 - Logistics of IoT

Use case 1.3: Condition Monitoring and Predictive Maintenance in Mining

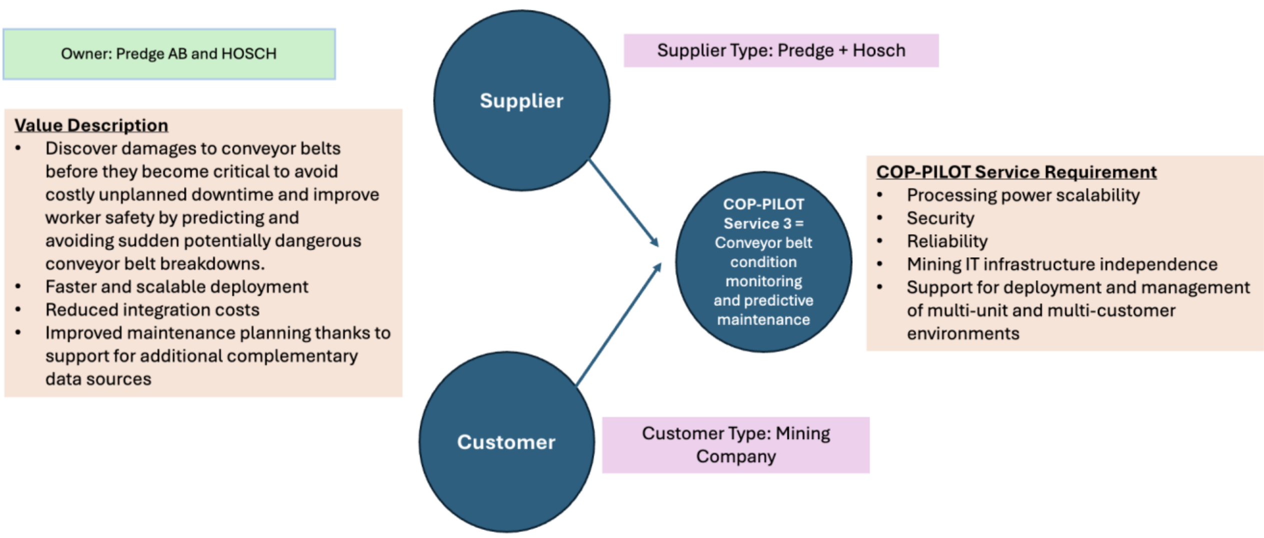

Figure 1.6: Service Model for Use Case 1.3 - Condition Monitoring and Predictive Maintenance in Mining

Use Case 1.4: IoT Edge Cloud Continuum For Digital Mines

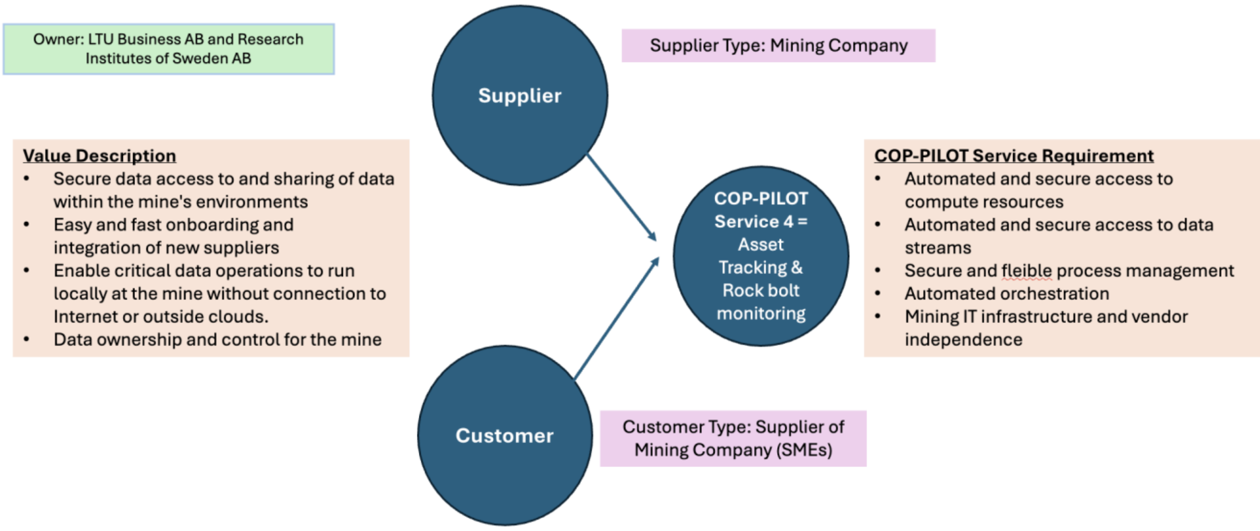

Figure 1.7: Service Model for Use Case 1.4 - IoT Edge Cloud Continuum For Digital Mines

CLUSTER 2 (SMART SUSTAINABLE IOT SOLUTIONS IN VALENCIA) SERVICE AND VALUE MODEL

The introduction of the COP-PILOT service within Cluster 2, which explores smart and sustainable IoT solutions, presents a powerful advancement toward attaining urban sustainability and systemic efficiency across interconnected infrastructures. By deploying a multi-layer and open orchestration framework that leverages IoT, AI-based extensions, and edge-to-cloud computing, COP-PILOT encourages seamless interoperability among various urban domains. This enables city planners and governments to derive enhanced, data-driven insights for sustainable planning, emission reduction, and congestion mitigation, ultimately improving urban lifestyles.

For citizens, the platform translates into tangible societal gains, including improved mobility, optimized public service delivery, and cleaner air. Academic campuses benefit through energy and water optimization, accelerating progress toward carbon-neutral targets. Additionally, port authorities and logistics operators gain from enhanced safety, resource efficiency, and improved scheduling, while third-party developers and startups are empowered through open APIs and data ecosystems that foster innovation.

By providing a real-world demonstration of scalable IoT and edge-cloud infrastructures, COP-PILOT not only amplifies cross-sectoral collaboration but also establishes a blueprint for sustainable, data-intelligent urban ecosystems, enhancing both environmental resilience and socio-economic value creation.

Use Case 2.1: Smart City Data Monitoring and Sustainable Mobility

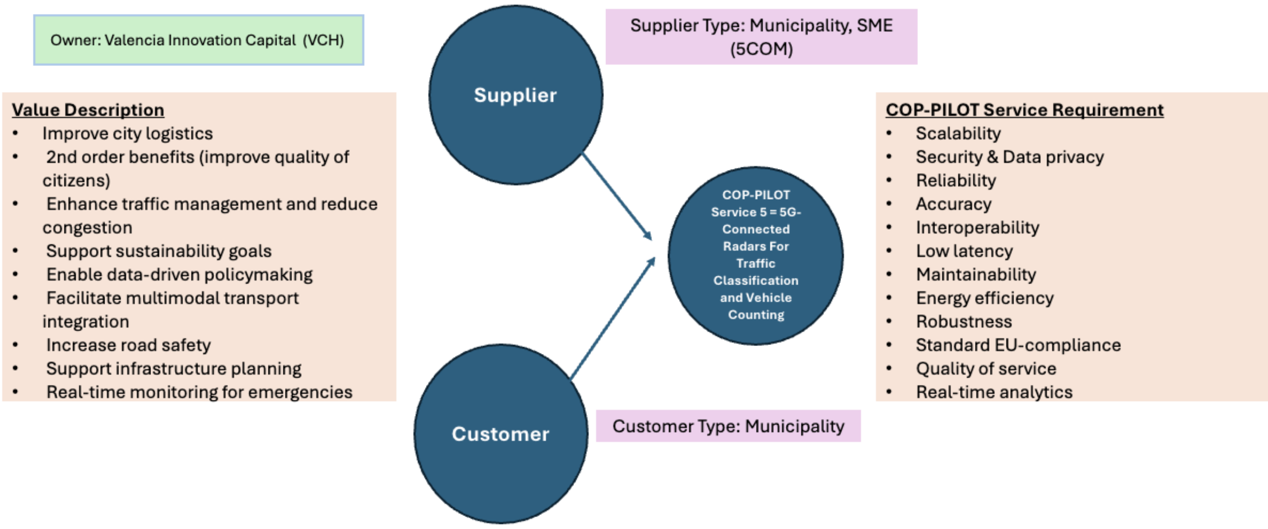

Figure 1.8: Service model for use case 2.1A – 5G-Connected Radars for Traffic Classification and Vehicle Counting

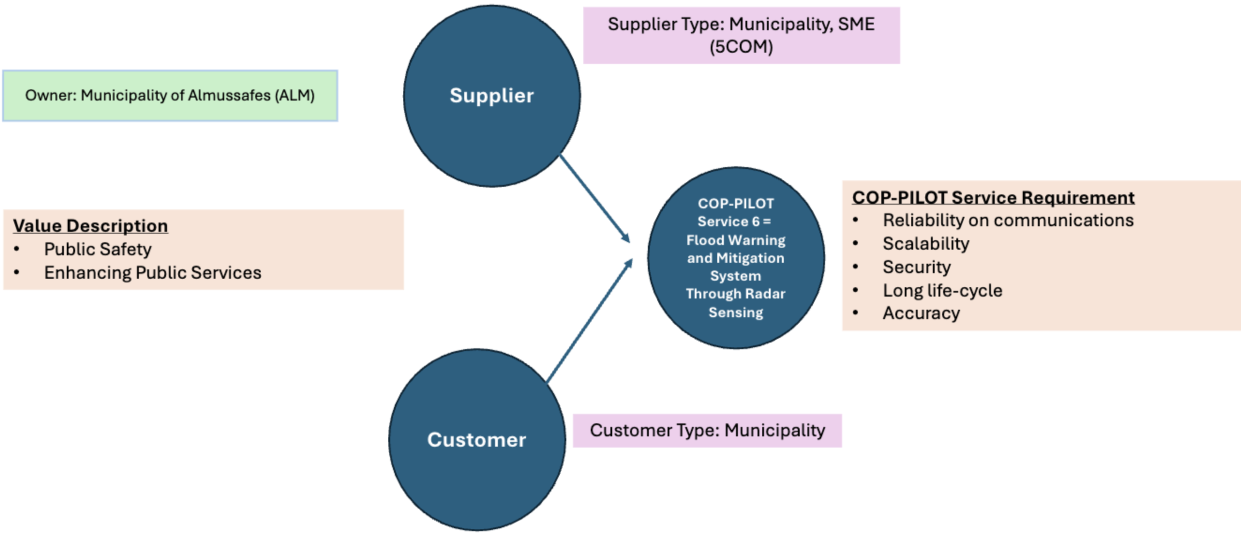

Figure 1.9: Service model for use case 2.1B – Flood Warning and Mitigation System Through Radar Sensing

Use case 2.2: Smart Resources Management in The UPV Campus

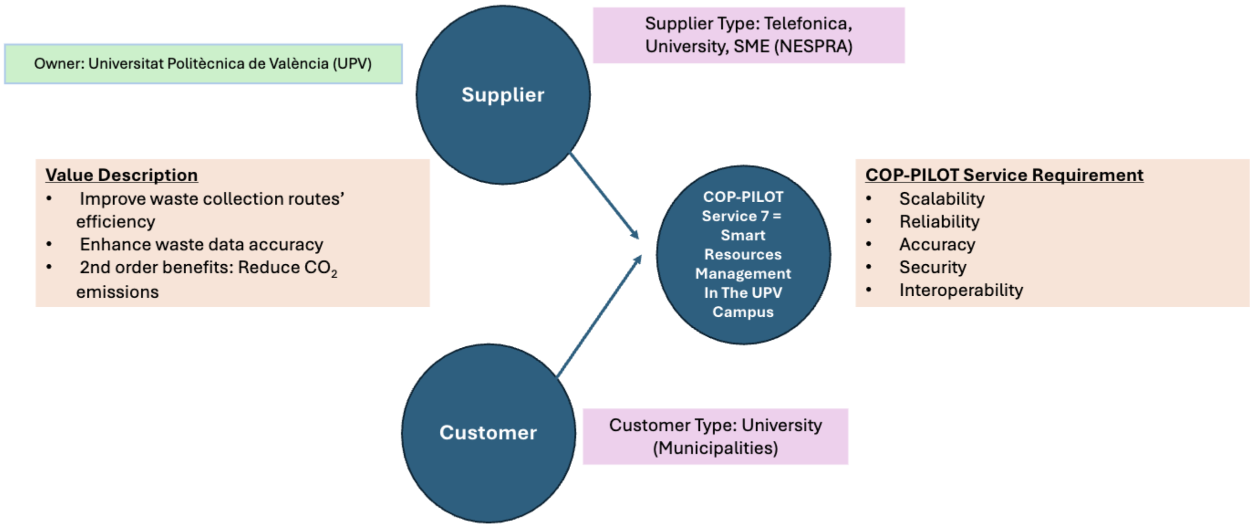

Figure 1.10: Service model for use case 2.2A – Smart Resources Management in the UPV Campus

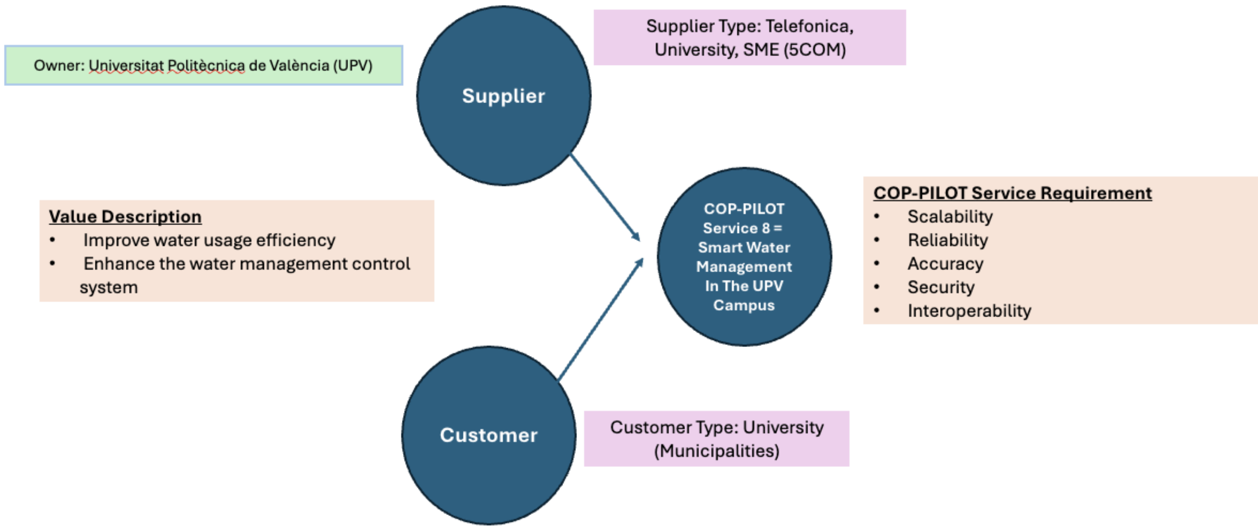

Figure 1.11: Service model for use case 2.2B – Smart Water Management In The UPV Campus

Use case 2.3: Maritime Traffic Monitoring and Berthing Assistance

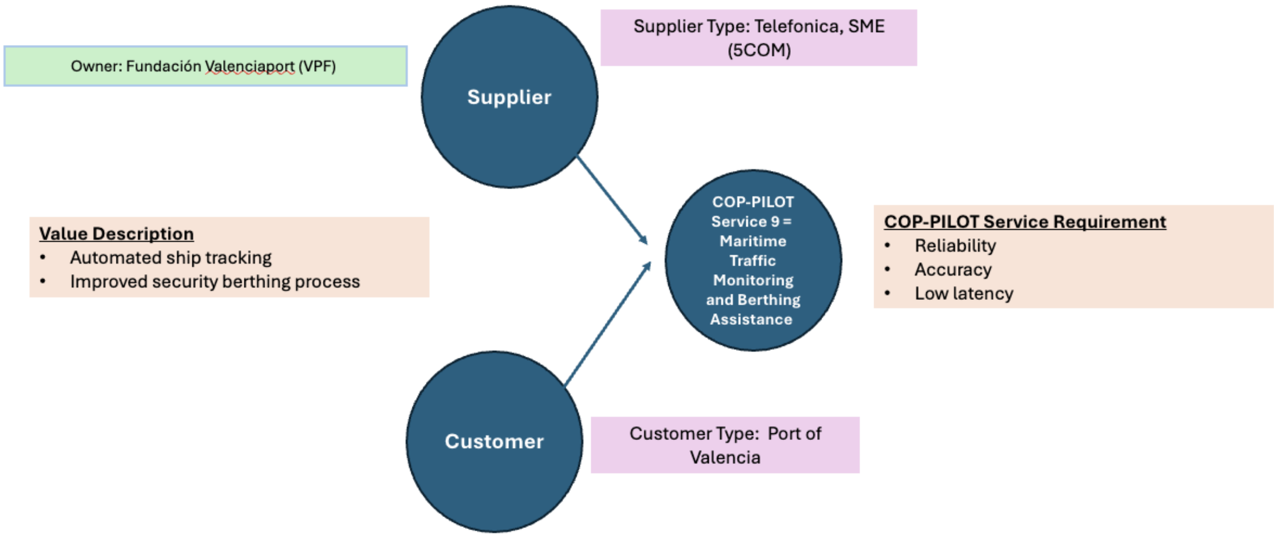

Figure 1.12: Service model for use case 2.3 – Maritime Traffic Monitoring and Berthing Assistance

Use case 2.4: IoT – Driven Smart Building Management at La Harinera

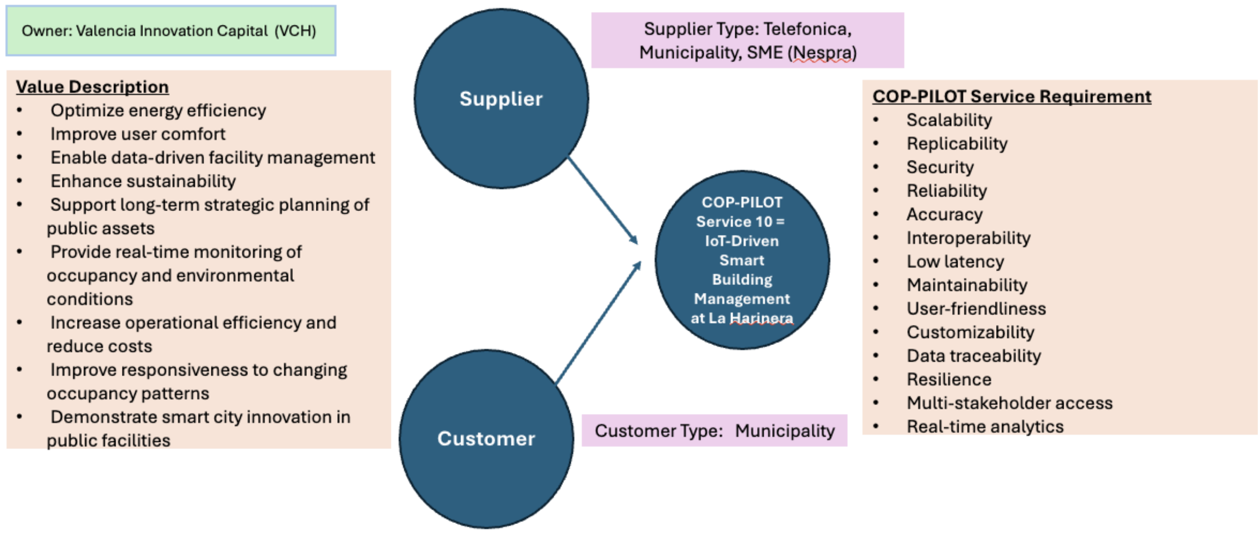

Figure 1.13:Service model for use case 2.4A – IoT-Driven Smart Building Management at La Harinera

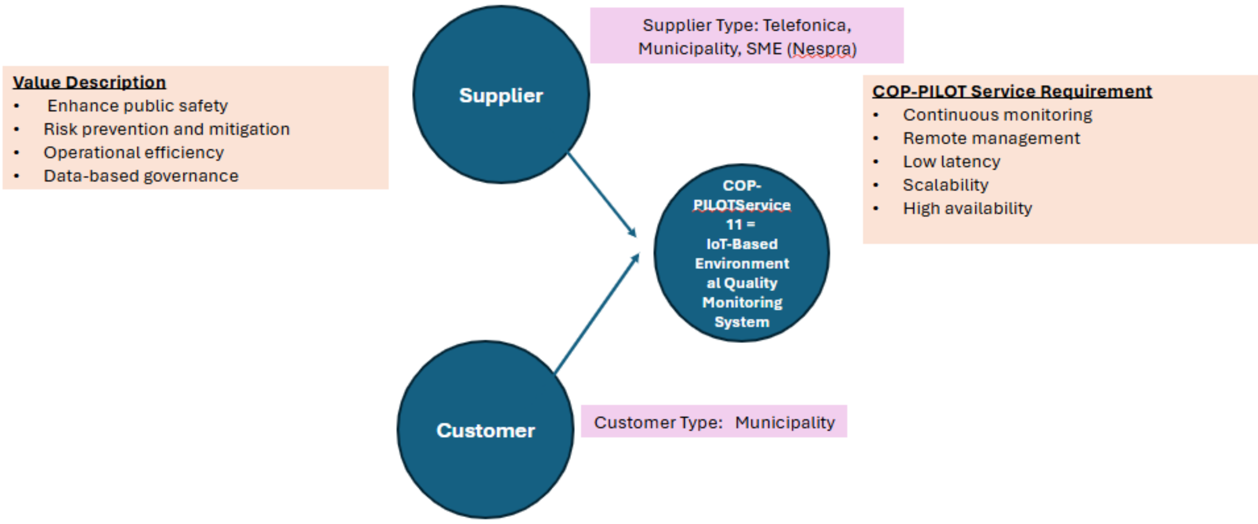

Figure 1.14: Service model for use case 2.4B - IoT Based Environmental Quality Monitoring System

CLUSTER 3A (AGRITECH TRANSFORMATION AND SUSTAINABILITY INITIATIVE) SERVICE AND VALUE MODEL

The introduction of COP-PILOT within Cluster 3A promotes the transformation of the agri-food ecosystem through data interoperability, intelligent orchestration, and real-time optimization. Leveraging comprehensive IoT installations and smart metering infrastructures, COP-PILOT allows the continuous collection of environmental, energy, and operational data, seamlessly incorporated with external datasets such as transport logistics, market prices, and weather conditions. Through edge-residing analytics, the platform improves decision-making by facilitating adaptive demand response (DR), optimizing distributed energy resource (DER) production and consumption, and maintaining grid stability across agricultural operations.

For farmers and growers, this helps to achieve predictive control over resources, higher yields, and reduced input use. Agritech providers attain access to a unified data platform supporting validated use cases and broader tool adoption. Supply chain actors benefit from predictive routing and traceability, minimizing waste and ensuring food integrity. Consumers experience the sustainability of produce and enhanced quality, while data and platform providers establish interoperable, secure exchanges via multi-cloud architectures and blockchain.

In essence, COP-PILOT in Cluster 3A establishes a data-driven and intelligent agricultural infrastructure that improves our efforts as an ecosystem to achieve sustainability, operational efficiency, and resilience across the entire agri-value chain.

Use Case 3A.1: Integrated Precision Agriculture and Crop Monitoring

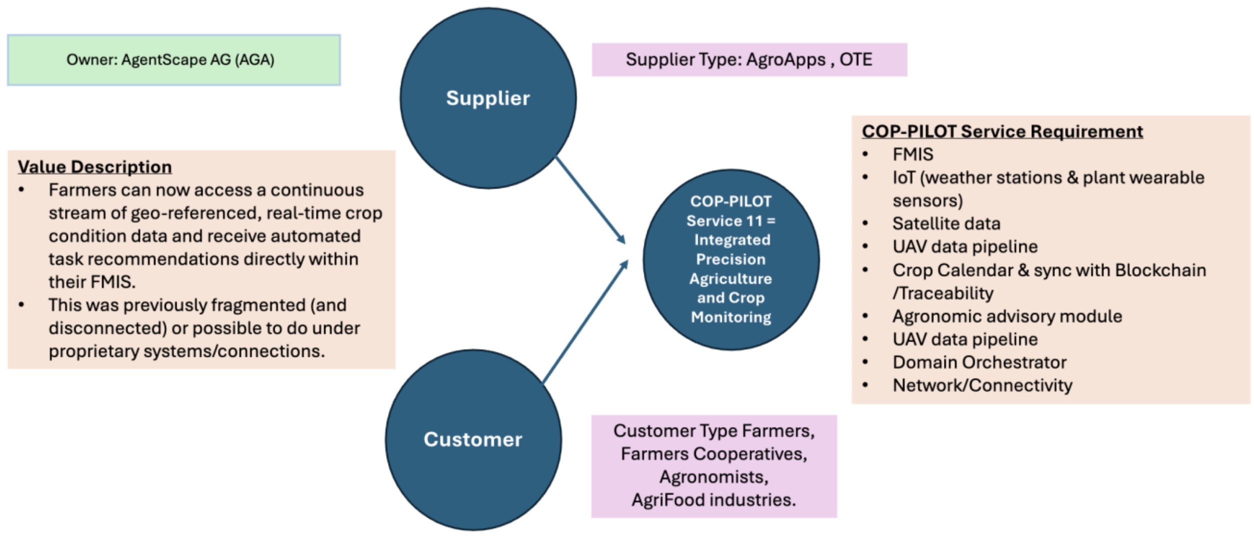

Figure 1.15: Service Model for Use Case 3A.1 - Integrated Precision Agriculture and Crop Monitoring

Use case 3A.2: Advanced AgriRobotics For Autonomous Intervention

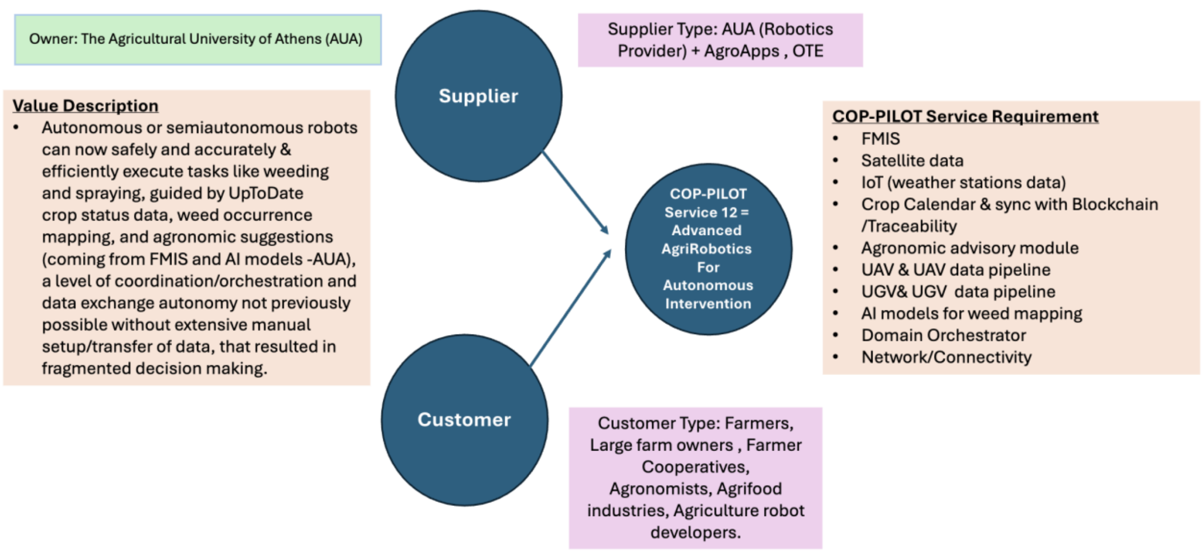

Figure 1.16: Service model for use case 3A.2 – Advanced AgriRobotics for Autonomous Intervention

Use case 3A.3: Secure Data Management and interoperability

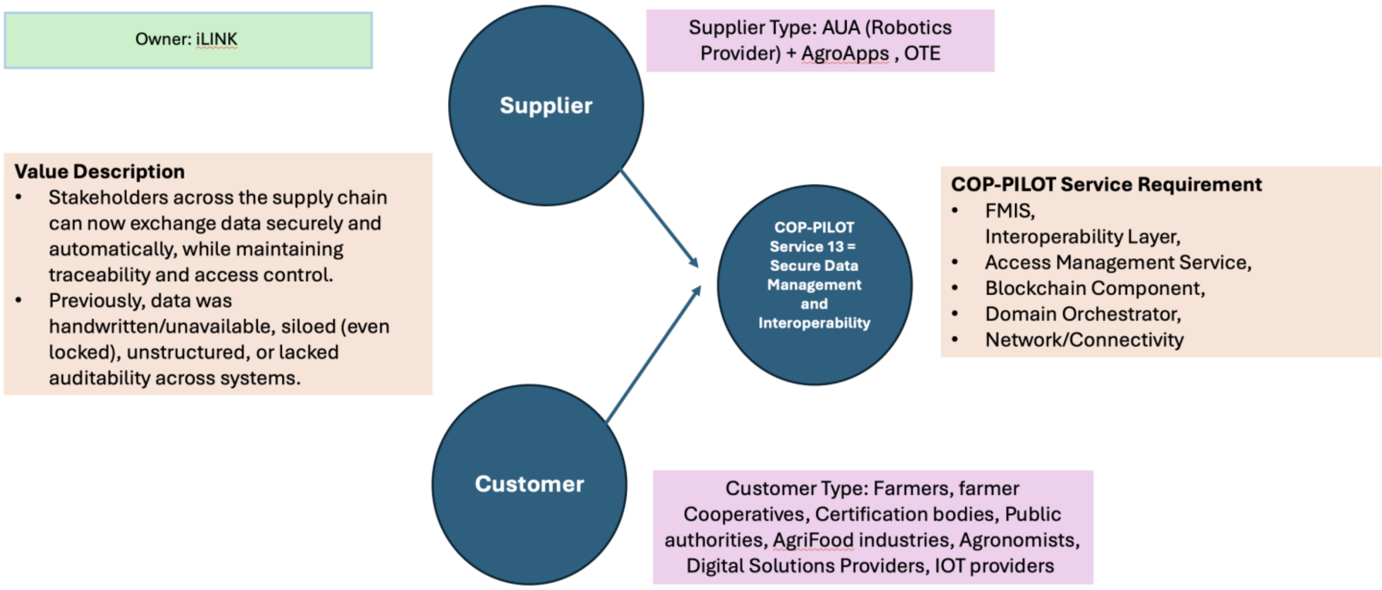

Figure 1.17: Service model for use case 3A.3 – Secure Data Management and Interoperability

Use Case 3A.4: Smart Logistics and Supply Chain Optimisation

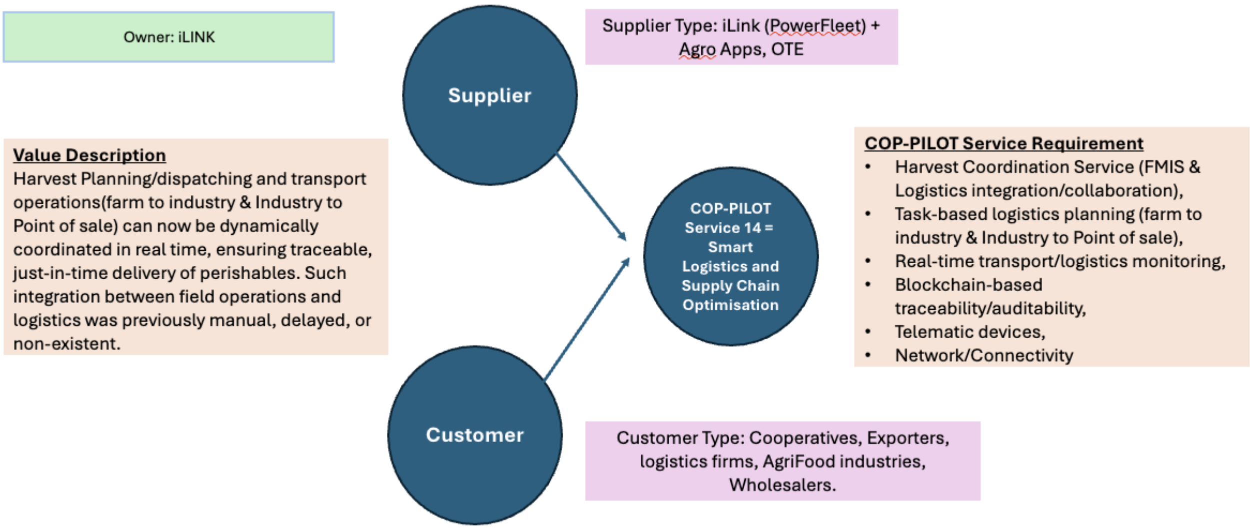

Figure 1.18: Service model for use case 3A.4 – Smart Logistics and Supply Chain Optimization

CLUSTER 3E (EDGE INTELLIGENCE FOR ENHANCING GRID RELIABILITY) SERVICE AND VALUE MODEL

The integration of COP-PILOT within Cluster 3E fortifies the shift toward data-intelligent, low-carbon, and resilient energy systems. It proves to respond to the complexities of decentralized electricity networks, described by high Distributed Energy Resource (DER) penetration. COP-PILOT's edge-based analytics and open orchestration framework deliver adaptive control, interoperability, and real-time monitoring across grid domains. By deploying smart metering data, IoT installations, and external datasets such as weather conditions and market signals, the platform allows for demand response (DR) and predictive flexibility management, stabilizing grids in Renewable Energy Source (RES)-rich regions such as Preveza.

For distribution system operators, COP-PILOT reduces maintenance interventions, mitigates line congestion and overvoltage, and improves grid reliability. EV charging operators and customers experience improved charger availability and optimized load balancing. Biogas and generation plant operators gain from reduced operational costs, smoother grid integration, and predictive fault detection. Energy market aggregators benefit from improved forecasting accuracy and monetization opportunities through flexibility services. Meanwhile, consumers and society profit from a more stable, renewable-integrated energy supply with reduced blackout risks.

Therefore, COP-PILOT in Cluster 3E exhibits a scalable model for climate-resilient and intelligent grid orchestration, advancing Europe's digital energy transition and sustainability goals through real-time optimization and federated data.

Use Case 3E.1 Ensuring Uninterruptible Power Supply For Fast EV Chargers

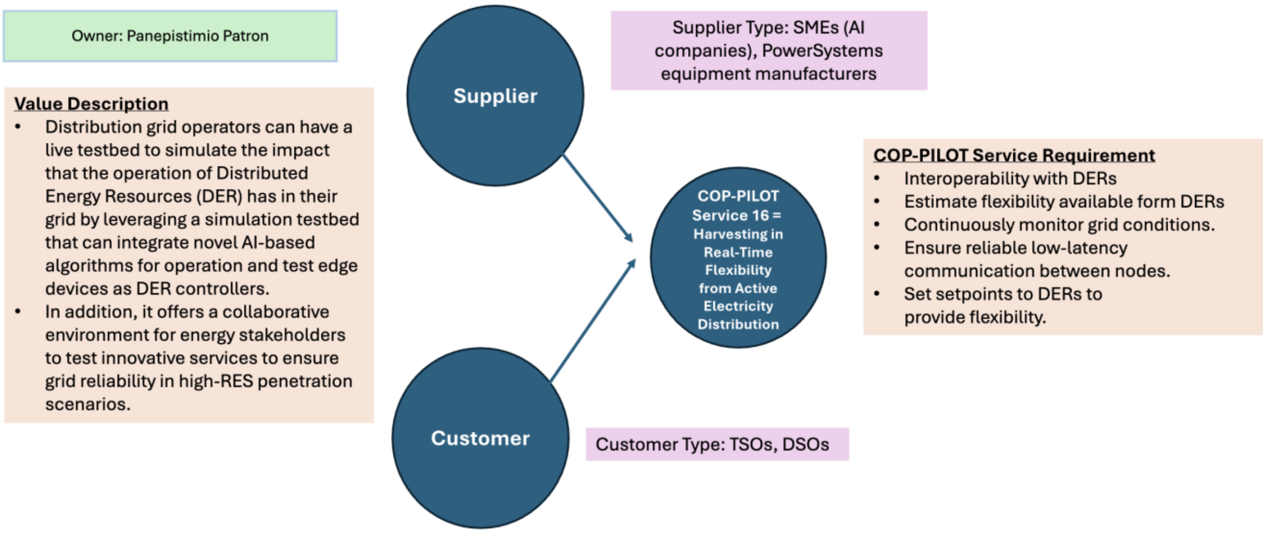

Figure 1.19: service model for use case 3E.1 – Ensuring Uninterruptible Power Supply For Fast EV Chargers

Use case 3E.2: Ensuring Uninterruptible Power Supply for Fast EV Chargers

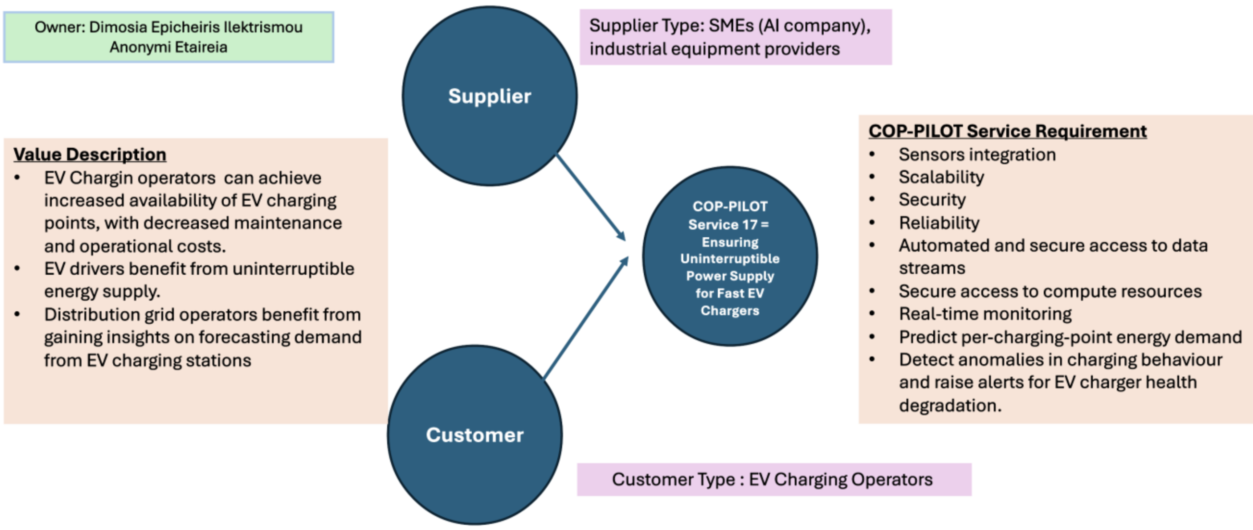

Figure 1.20: Service model for use case 3E.2 - Ensuring Uninterruptible Power Supply for Fast EV Chargers

Use case 3E.3: Predictive Maintenance and Monitoring of Anaerobic Digestion In A Biogas Plant

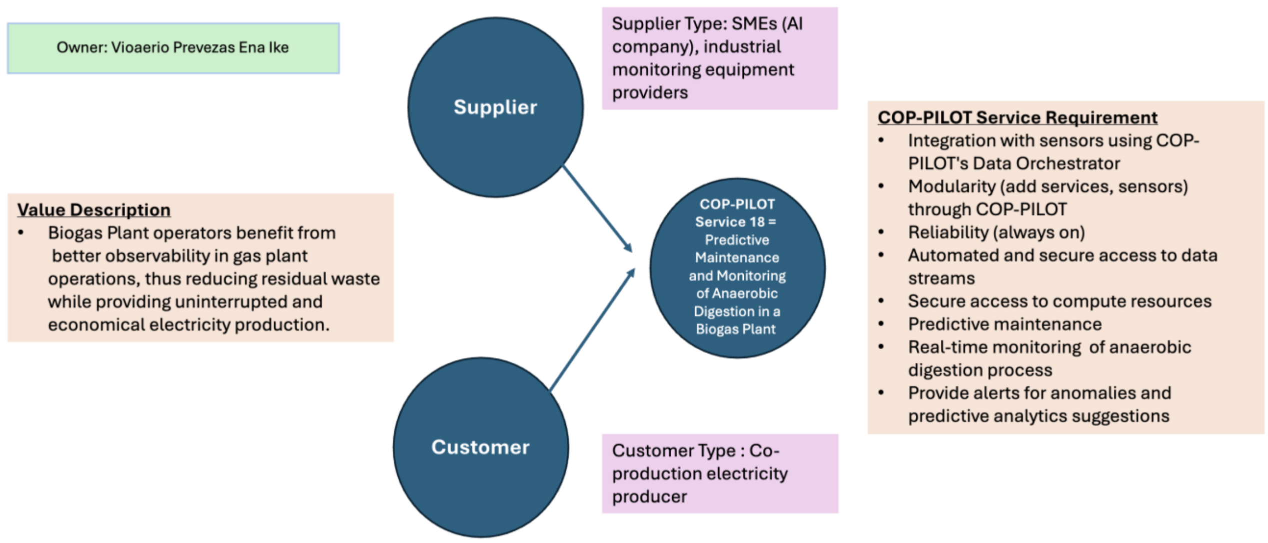

Figure 1.21: Service model for use case 3E.3 – Predictive Maintenance and Monitoring of Anaerobic Digestion in a Biogas Plant

CLUSTER 4 (SMART VINEYARDS & SUSTAINABLE WINERY ECOSYSTEMS) SERVICE AND VALUE MODEL

The implementation of COP-PILOT within Cluster 4 represents a critical advancement in data-driven, federated innovation across multiple fields, blending IoT, artificial intelligence, machine learning, and within a sovereign computing continuum. By utilizing advanced data management and governance frameworks aligned with GAIA-X principles and the Network-as-Code approach, COP-PILOT assures compliant, interoperable, and secure data exchange across multifarious use cases without exposure to transatlantic GDPR challenges (SCHREMS II).

The cluster's comprehensive applications contain smart water management in agriculture, healthcare waste optimization, winery process enhancement, and energy-aware agricultural scheduling. For farmers and winery operators, COP-PILOT enables predictive maintenance, improved yields, and data-guided irrigation. Process owners and manufacturers profit from reduced downtime, AI-driven efficiency gains, and optimized equipment utilization. Healthcare and supply chain stakeholders achieve better cost reductions and sensor fleet management through IoT recycling and reuse. Environmental regulators benefit from tangible sustainability metrics, including lower resource consumption and reduced waste.

Finally, COP-PILOT in Cluster 4 exhibits how sovereign data governance and federated intelligence can together facilitate digital sovereignty, socio-economic value creation, and sustainability, and set a benchmark for cross-domain and responsible technological ecosystems.

Use Case 4.1: Recycling, Maintenance and Logistics of IoT Sensors

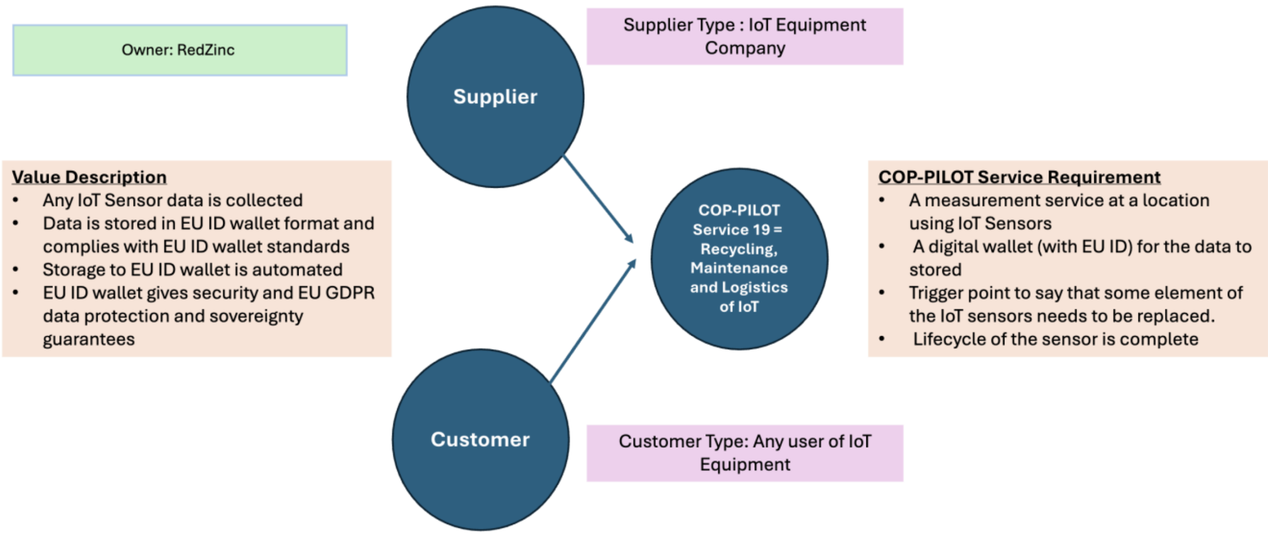

Figure 1.22: Service model for use case 4.1 (Service A) – Recycling, Maintenance and Logistics of IoT

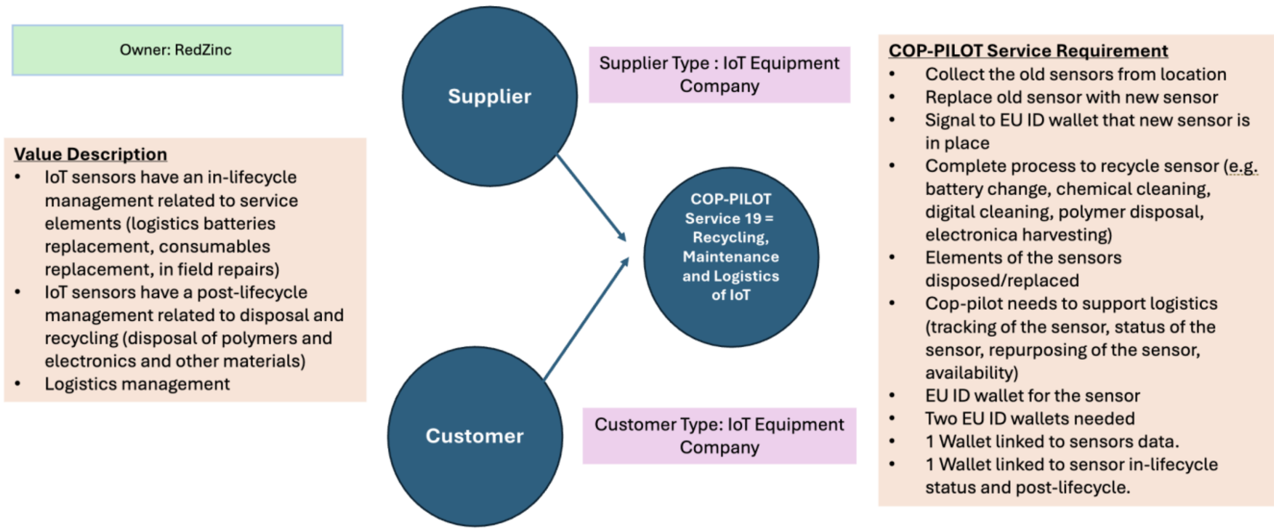

Figure 1.23: Service model for use case 4.1 (Service B) – Recycling, Maintenance and Logistics of IoT

Use case 4.2: Water Utilisation Efficiency

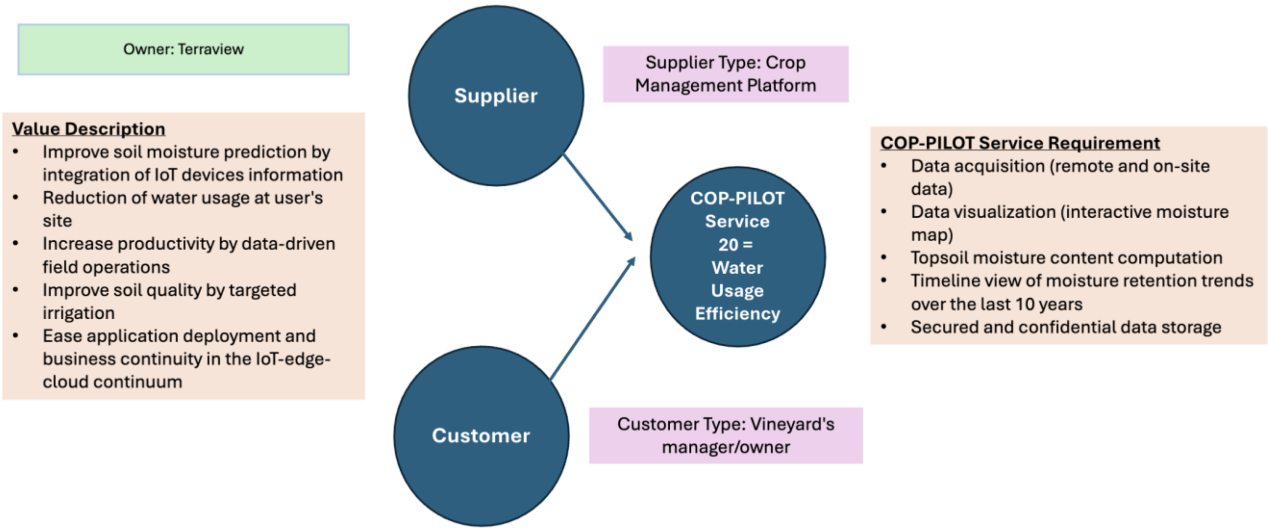

Figure 1.24: Service model for use case 4.2 – Water Utilisation Efficiency

Use case 4.3: Sustainable Optimised Winery Production Lines

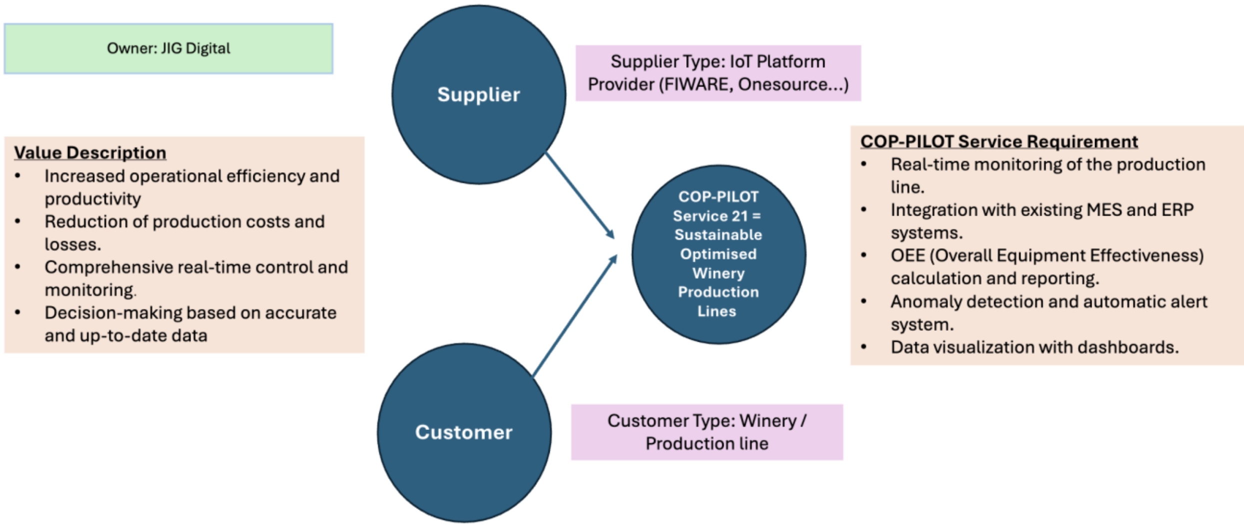

Figure 1.25: Service model for use case 4.3 – Sustainable Optimized Winery Production Lines

Use case 4.4: AI Driven Green Energy Vineyard Management

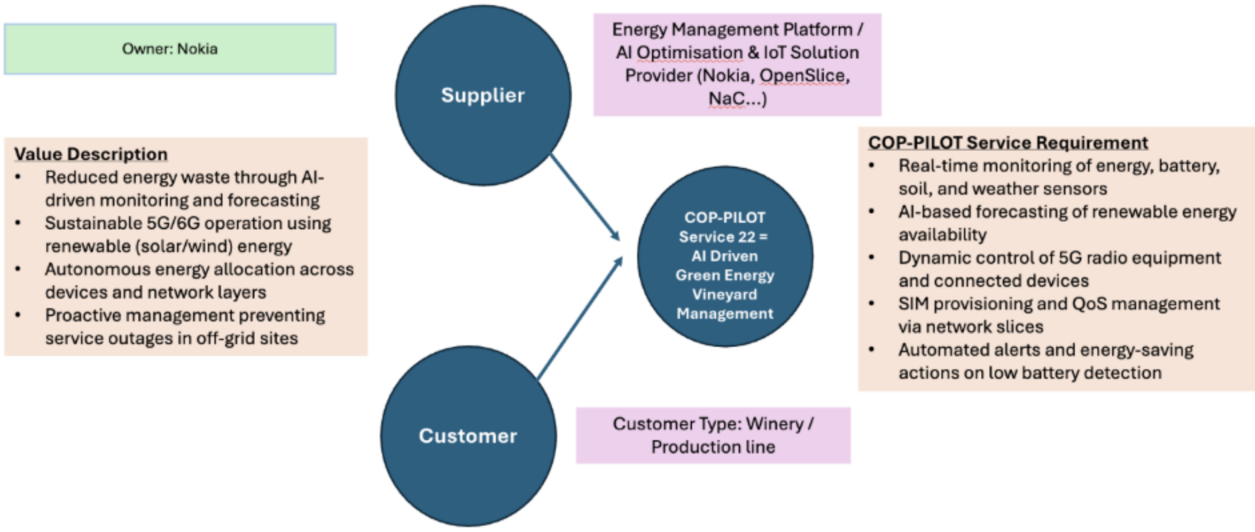

Figure 1.26: Service model for use case 4.4 – Sustainable Optimized Winery Production Lines