D6.2 - Integrated Pilot Systems and Pilot Operations

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Definitions

Acronym	Definition
AAI	authentication authorization infrastructure
AI	Artificial Intelligence
AML	Anti Money Laundering
API	Application Programming Interface
AWS	Amazon Web Services
BOI	Bank of Ireland
BPFI	Banking and Payments Federation Ireland
CD	Continuous Development
CDTI	Technological Development and Innovation Centre (from Spanish “Centro para el Desarrollo Tecnológico y la Innovación)
CI	Continuous Integration
CSV	Comma Separated Value files
DAEM	Dimos Athinaion Epicheirisi Michanografisis
EBSI	European blockchain services infrastructure
ESG	Environmental, Social and Governance
ETL	Extract, Transform, Load
EU	European Union
FAME	Federated decentralized trusted dAta Marketplace for Embedded finance
FAQ	Frequently Asked Questions
FDAC	Federated Data Assets Catalogue
FFGA	FAME Federation Governance Application
FGB	FAME Governance Board
FML	Federated Machine Learning
GDPR	General Data Protection Regulation
ID	Identity
IP	Internet Protocol
IT	Information Technology
JRC	Jrc Capital Management Consultancy and Research Gmbh
JSON	JavaScript Object Notation
KYC	Know Your Customer
LLM	Large language model
LSTM	Long Short-Term Memory
MC	MC SHARED SERVICES SA
ML	Machine Learning
MOH	Motor Oil (Hellas) Diilistiria Korinthou A.E.

NGEU	Next Generation EU
NOVO	Novomatix Idiotiki Kefalaiouchiki Etaireia
NUIG	National University Of Ireland Galway
REST	Representational State Transfer
RF	Radio Frequency
RFM	Recency, Frequency, and Monetary
SHA	Secure Hash Algorithm
SMOTE	Synthetic Minority Over-sampling Technique
SSI	Server Side Includes
TLS	Transport Layer Security
UC	Use Case
UI	User Interface
URL	Uniform Resource Locator
UUID	Universally Unique Identifier
XAI	Explainable Artificial Intelligence

Other acronyms and abbreviations not present in the table, are introduced in the text along with their definitions.

Executive Summary

This deliverable, **D6.2 – Integrated Pilot Systems and Pilot Operations**, completes the work of Work Package 6 (WP6) by reporting the technical implementation, demonstration, and operational results of the seven FAME pilots. The primary goal of this phase was to **validate FAME's technical solutions** and demonstrate their feasibility in real-life scenarios, focusing heavily on the integration and usage of the FAME Data Marketplace.

The successful implementation hinged on integrating the pilots with FAME's core components:

- **FAME Federation Module:** Served as the governance layer, ensuring trust, regulatory compliance, and data sovereignty. It manages structured onboarding, applies a peer-review and voting mechanism for new members, and enforces policies to ensure all pilot data and services operate within EU values.

- **FAME Marketplace Dashboard:** Provided the operational environment for the pilots to expose their results. Key features included the **Publish** function, used to index generated assets (e.g., models, datasets), and the **Asset Policy Manager**, which enabled pilots to manage access rules and monetization strategies (e.g., pricing, business models).

The following table provides an overview of each pilot, including their description and result.

Table 1: Pilots' Overview

Pilot #	Title and Description	Results
Pilot #1 (FaMLy)	**Financial Recommendation Engine for Families:** Explored FAME's capabilities to create customer profiles and risk models for payment solutions (Buy Now Pay Later).	**Result:** Developed a preliminary risk scoring model and achieved significantly improved customer segmentation by refining datasets (from pilot1_old_dataset to pilot1_new_dataset_model_v1), validating FAME's support for sophisticated AI/ML analytics.
Pilot #2 (Citizen Wallet)	**Embedding Finance Services in a Personalized Citizen Wallet:** Expanded urban mobility (parking) services into a citizen wallet, integrating external transport data.	**Result:** Successfully implemented personalized **Park & Ride loyalty programs** and discounts based on citizen profiling, and extended payments to cover bus tickets and parking fines, proving FAME's utility for multi-service Embedded Finance (EmFi).
Pilot #3 (Collaborative Intelligence)	**Personalized Collaborative Intelligence for Enhancing EmFi Services:** Focused on aggregating and consolidating data across financial institutions to gain insights for processes like onboarding and credit risk.	**Integration:** Integrated AI/ML solutions specified in WP5 and made available in the marketplace to support the use cases.

Pilot #4 (EU Funds)	**The EU Funds Application Process Made Easy:** Aimed at providing financial institutions with an up-to-date, accurate view of public grants and funding opportunities.	**Integration:** Involved publishing a validated monthly snapshot of public-grants data as an asset to the FAME Marketplace for consumption by institutions and direct **API consumption** by banks.
Pilot #5 (ESG Scorecard)	**ESG Scorecard Ranking & Sustainable Portfolio Optimization:** Delivered a transparent toolset for sustainable finance, combining ESG scoring with multi-parameter portfolio optimization.	**Result:** The pilot is **fully operational** within FAME, offering results as both pre-computed data assets and a **Platform-as-a-Service (PaaS)** model that allows investors to customize parameters using an optimization engine enhanced by generative AI.
Pilot #6 (Climatic Predictions)	**Embedding Climatic Predictions in Property Insurance Products:** Focused on using environmental data to create more accurate and personalized insurance products.	**Integration:** Involved making relevant data and models accessible for creating personalized insurance products.
Pilot #7 (Data Quality/ Value)	**Assessing the Quality and Monetary Value of Data Assets:** Focused on establishing a system for systematic quality assessment and rational pricing.	**Integration:** Crucial to the marketplace functionality, ensuring all data assets, particularly those produced by other pilots, are assessed for quality and correctly valued for trading.

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1 Introduction

1.1 Purpose of the document

This deliverable, **D6.2 – Integrated Pilot Systems and Pilot Operations**, provides a comprehensive overview of the implementation, integration, and operational aspects of the pilot activities carried out within the scope of Work Package 6 (WP6). The document aims to detail the end-to-end process followed to design, deploy, and evaluate the integrated pilot systems across the pilot sites.

The goal of the pilot phase is to validate the technical solutions, demonstrate their feasibility in real-life scenarios, and assess their performance under operational conditions. This includes the integration of different system components, coordination among stakeholders, and adherence to defined use cases and functional requirements.

1.2 Insights from other Tasks and Deliverables

This deliverable (D6.2) relates to deliverable D2.1 – *"Requirements Analysis, Specifications and Co-Creation"*, developed in Task 2.1, which provided the requirements and specifications necessary for the pilots' execution plan. It also relates to deliverable D2.4 – *"Integrated FAME Data Marketplace II"*, and D2.6 –"*Technical Specifications and Platform Architecture II"* developed in WP2, which provided the specifications and design necessary for the pilots' to integrate in the Marketplace.

It is also connected with WP5 (Work Package 5), particularly concerning the deliverables "D5.3 - Trusted and Explainable AI Techniques. II" and "D5.4 - Energy Efficient Analytics Toolbox. II". These deliverables involve the specification, implementation, and marketplace availability of AI/ML solutions designed to support the relevant use cases. Within WP6, D6.2 builds directly on D6.1 *"Use Cases Specification and Pilot Sites Preparation I"*, serving as the foundation for the implementation and execution of the pilots. This deliverable is closely linked with Task 6.2, Task 6.3, and Task 6.4, which ensure the step-by-step integration and operation of each pilot.

Furthermore, D6.2 provides input for D6.3 – *"Techno-Economic Evaluation and Stakeholders' Feedback"*, where Task 6.5 will assess the overall pilots' process and its impact during the project. The first outcomes of stakeholder engagement activities, initiated by the pilots, are also reflected in this document, together with the plan for the upcoming period.

1.3 Structure

The deliverable is structured as follows:

- **Chapter 1 – Introduction** presents the purpose and the layout of the deliverable.
- **Chapter 2 – Overview of Common Actions** provides a description of the shared components and processes implemented across the pilots, with a focus on the use of the **FAME Federation** and the **FAME Marketplace**.
- **Chapter 3 – Pilot Demonstrators** presents the implementation and results of each individual pilot. For each pilot, the following structure is adopted:
    - **3.x.1 – Pilot Description and Demonstrations**: an overview of the pilot's objectives, context, and key demonstration activities;
    - **3.x.2 – Pilot Integration. Setup and Scenarios**: a description of the system integration, technical setup, and the scenarios addressed;
    - **3.x.3 – Status of Deployment. Visuals and Screenshots**: a snapshot of the current deployment status, illustrated through images and relevant visual material.
- **Chapter 4 – Conclusions** summarizes the key findings, lessons learned, and recommendations for future improvements and large-scale deployment.

2 Overview of Common Actions

FAME is a data space which conceptually is divided into two distinct components: the management of the data space and the provision of value-added services.

The first component, the **Federation module**, is rooted in the necessity of trust. It aims to bolster confidence in the data and services being provided through a unique peer-review mechanism. Specifically, a new participant must not only accept FAME's legal and usage rules, but their application is also put to a vote by their peers (the other Marketplace members). The request is currently approved by a majority of the voters, ensuring the federation maintains high confidence in the utility and integrity of the furnished data and services.

Consequently, the solution is structured into the **Federation** application which is responsible for overseeing members' admission and the **FAME Marketplace** itself.

The Marketplace has been implemented via web application that provides a user-friendly dashboard where users belonging to federated organizations can list and sell assets. FAME facilitates this provisioning with both asset search capabilities and an initial mechanism for setting the asset's value. Crucially, free browsing of data assets in the marketplace is also available, allowing all users to access the FAME's 'shop window' of available assets.

The implementation uses **cutting-edge technologies**. While the full details including use cases, user journeys, and technologies are documented in Deliverable D2.6, this brief introduction is needed to clearly outline how pilot project utilize the FAME services and, ultimately, how data assets are made available within the ecosystem.

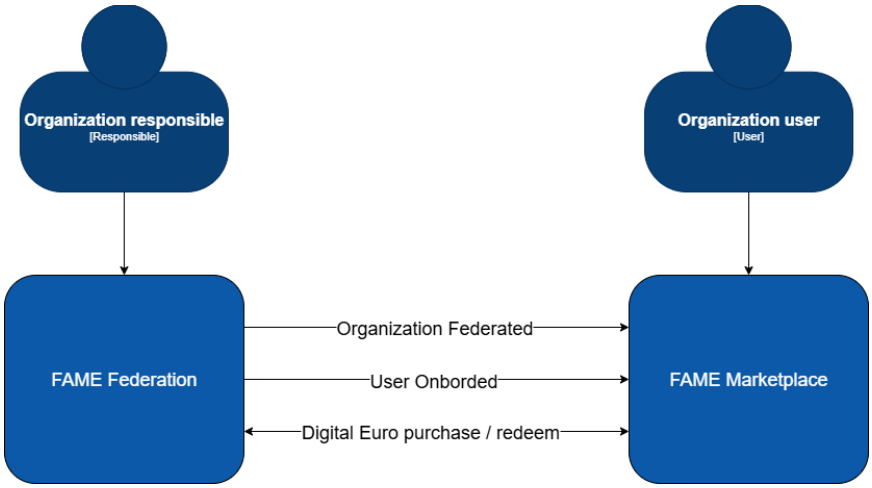


Figure 1: Interaction between FAME Federation and FAME Marketplace

2.1 FAME Federation Application

The FAME Federation module serves as the core of the federative and governance system within the FAME Platform. Its main goal is to coordinate the access, onboarding, consensus, oversight, and management of federation members, ensuring full alignment with the founding values of the European Union such as privacy, self-determination, openness, security, and fair competition. In an increasingly interconnected digital landscape governed by regulations like the GDPR, Data Governance Act, Data Act, and AI Act, federated management of access and identities has become essential to guarantee secure, transparent, and compliant collaborations in data value chains.

Central Role of FAME Federation

FAME Federation acts as a structured, regulated entry point for every organization or user seeking to join the federation. Architected as a governance and regulatory layer, it is completely distinct from other platform services (marketplace, operational dashboard, analytical modules) and provides the foundation for the transparent and trustworthy operation of the entire FAME ecosystem.
Its main functions include:

1. Structured and validated onboarding of users and organizations.
2. Verification of credentials, identities, and delegations.
3. Definition and control of policies, including consensus criteria and voting mechanisms for strategic and operational decisions.
4. Oversight of membership admissions and life cycles within the federation.
5. Offboarding, suspension, and audit mechanisms in response to violations or changes in federation criteria.
6. Purchase and redeem of FAME Marketplace token with fiat currency (Digital Euro)

Specific Objectives

1. **Fostering a Trusted and Compliant Community**
   The primary objective of the Federation module is to ensure that the federation consists exclusively of users, organizations, companies, and institutions that share values of transparency, regulatory compliance, and security. The module implements a multi-stage onboarding/approval process, comprising ex-ante checks (pre-screening, document collection, validation), review by the governance board ("FGB"), and formal acceptance based on predefined transparent criteria.

2. **Managing Sovereignty and Privacy**
   The module ensures that members retain sovereignty over their digital identities using decentralized technologies (e.g., Decentralized Identifiers, Self-Sovereign Identity), thereby mitigating risks of proprietary lock-in, abuse, or violations of personal data. The use of identity wallets and next-generation authentication is integral to the federative logic, aligning the module with European principles and regulatory change (eIDAS 2.0, Digital Euro, EBSI).

3. **Definition of Consensus and Collaborative Policy**
   FAME Federation integrates a robust policy-making system based on FGB representing all federated members with voting rights. Every proposal, rule change, member onboarding, or strategic decision is discussed through regulated workflows (proposal submission, electronic voting, quorum), ensuring democratic participation and transparency. This process limits abuse and strengthens the system's resistance to monopolistic influence.

4. **Traceability, Audit, and Accountability**
   Every onboarding, consensus, role change, or offboarding action is recorded and maintained in auditable logs, following principles of security by design and accountability. In cases of policy violations, the Federation module enables suspension or removal of members, blocking their access to federated services. This increases the ecosystem's robustness and reputation.

5. **Ease of Integration and Scalability**
   The Federation module is designed for scalability (capable of accommodating single users, complex organizations, consortia, external marketplaces) and integration via API interfaces and services compatible with other platform components. Its microservices approach allows dynamic adaptation to technical, regulatory, and business changes.

Process Description in the FAME Federation Module

The federated onboarding process is divided into several phases:

- **Pre-Onboarding and Application:** Prospective members access a dedicated portal (FFGA – FAME Federation Governance Application), read and accept the policies, enter the required information and supporting documentation, and provide DIDs (Decentralized Identifiers) where available.
- **Board Evaluation and Voting:** Requests are forwarded to the FGB, which assesses their eligibility based on reputation, legal, technical, and value criteria. Voting passes by majority, with defined quorums according to the decision category.
- **Notification and Onboarding:** The user is notified of the outcome; upon acceptance, receives federated credentials (usually through SSI wallet or delegated onboarding), thereby acquiring access to federated ecosystem functionalities.

The module also covers:

- **Management of updatable policies:** Through submission, amendment, and majority approval, the federation can evolve its rules based on feedback, market dynamics, and regulatory shifts.
- **Offboarding mechanisms:** Governance may revoke, suspend, and log every exclusion decision, ensuring clarity and unambiguous records.
- **Convertion of FAME Marketplace tokens with fiat currency:** Integrated into the FAME Federation member management, it provides the basic mechanisms purchase and redeem fiat Euro (in particular, the forthcoming Digital Euro D€) to FAME Tokens used in the Marketplace.

Distinctive Qualities

- **Regulated and Transparent Approach:** Transparency is supported by policy publication, timely notifications to members, regular reporting, and accessible documentation.
- **Alignment with Europe's Best Practices and Regulations:** The whole federative infrastructure is built on best practices recommended by the latest European regulations on data sharing, data sovereignty, privacy, and open data.
- **Mechanisms for Feedback and Continuous Improvement:** Surveys, suggestion boxes, mentorship, and workshops enable ongoing process enhancement and policy updates.

2.2 FAME Marketplace Dashboard

The users of federated organizations can access and operate in the FAME marketplace, through a dashboard to a unified web-based environment to access, publish, explore, and manage data assets. The FAME Data Marketplace (i.e., the core technological component of the FAME Federated Data Space) is designed with accessibility, modularity, and user guidance in mind. The FAME Marketplace design and implementation is described in various deliverables and in D2.6. Here is a brief recap of functionalities needed to understand the integration with other applications in particular from the pilots.

As a **federated data exchange**, FAME Marketplace functions as a **multisided Data Marketplace** for the financial sector. It connects providers and consumers of various digital assets, including datasets, algorithms, and tutorials.

Its core purpose is to facilitate the development of applications in a way that aligns with **European values and regulations**, emphasizing data sovereignty, privacy, and security.

Key features of FAME dashboard include:

- **Secure and Trustworthy Interactions:** FAME ensures that all federated entities are identifiable and that data exchange minimizes risks related to uncertain provenance or security. Interactions are designed to be sovereign, private, and trustworthy.
- **Advanced Tools:** The platform uses state-of-the-art, secure, and computationally efficient tools to reduce the cost of developing and deploying applications.
- **Broad User Base:** FAME is used by a diverse range of organizations, including FinTech and InsurTech companies, private citizens, and public institutions, to discover and trade specialized assets.
- **Real-world Applications:** Its use cases are varied and valuable, from banks securely sharing customer risk profiles without violating privacy to creating personalized insurance products using environmental data.

Purpose and Functionalities

The FAME Dashboard is a comprehensive, web-based platform designed to help users access, publish, explore, and manage data assets within the FAME Data Marketplace. It is built for ease of use, guidance, and accessibility.

User Interface and Core Functionalities

The Platform's homepage provides a high-level overview, with a central search bar to find assets and a menu for navigating key pages like **Profile**, **Helpdesk**, and **Publish**. A sticky menu on the right offers quick access to core widgets, including the FAME **Learning Centre**. The platform also features an accessibility icon for customizing visual settings.

Key User-Specific Pages

- **About Us:** This page details how to join FAME, outlines its core components, and showcases success stories. It provides step-by-step guides for onboarding, trading, and publishing assets.
- **Helpdesk:** Users can find a comprehensive FAQ section covering topics like federation and transactions. It also provides contact information for support and links to FAME's social media.
- **Login:** This page uses a QR code-based authentication system with a mobile identity wallet (Sphereon Wallet) for secure login.
- **Profile:** Accessible only to logged-in users, this page displays user information, including ID, role, and affiliated institution. It also shows blockchain account details and allows for new account enrollment.

Data Asset Management and Trading

- **Publish:** This feature, available to logged-in users, guides them through the process of indexing new assets. It requires connecting a digital wallet, allowing users to manage their blockchain private keys. FAME Marketplace uses the open source METAMASK Wallet to complete the detailed forms with information about the assets.
- **Data Assets Catalogue (FDAC):** This is the main directory of all available data assets. Users can filter results by name, type, and date. Non-logged-in users can only view assets with a “public” access policy.
- **Asset Details & Offering Details:** When a user selects an asset from the catalogue, they can view its detailed information, including descriptions, associated offerings, pricing, and business models.

- The **Offering Details** page allows users to initiate a purchase transaction.
- **Asset Policy Manager:** This tool allows users to set specific access policies (public, restricted, confidential) on their published assets by defining rules and conditional logic.

Additional Features

- **Learning Centre:** This section offers a catalogue of courses with filters for easy discovery. Each course provides detailed information, including chapter structure and metadata like cost and language.
- **Terms and Conditions:** This page provides a clear, hierarchical overview of the marketplace's rules, covering scope, definitions, access requirements, and user rights.

3 Pilots Demonstrators

In the pilot documentation below, Pilots #1, #2, #4, and #7 reference WP5 (Work Package 5). The specific details on how WP5 is used are documented in Deliverable 5.3 ("D5.3 - Trusted and Explainable AI Techniques. II") and Deliverable 5.4 ("D5.4 - Energy Efficient Analytics Toolbox. II"). These deliverables outline the AI/ML solutions that are specified, implemented, and made available in the marketplace to support the respective use cases.

3.1 Pilot #1 FaMLy – A powerful financial recommendation engine for families

3.1.1 Pilot description and demonstrations

3.1.1.1 General description

Pilot 1 of the FAME project, entitled FaMLy – A powerful financial recommendation engine for families, aims to explore the capabilities of the FAME Platform to develop personalized financial recommendation solutions and innovative consumer interfaces. Led by Sonae MC through its financial services sub-holding Universo, this pilot integrates artificial intelligence, machine learning, and advanced analytics to create customer profiles, recommendation engines, and risk models associated with credit and payment solutions using WP5 analytics

Through this pilot, Sonae MC and Universo are testing the utility of the FAME Federation and Data Marketplace, particularly the integration and commercialization of data assets generated internally and in collaboration with external partners. The overarching goal is to deliver relevant financial and commercial recommendations, expand access to instalment-based payment solutions (Buy Now Pay Later), and enhance customer experience. At the same time, the pilot contributes to validating the concept of a federated data marketplace, promoting sovereignty, anonymization, and monetization of data in full compliance with regulatory and security requirements.

3.1.1.2 Use Cases

Use case 1: Recommendation engine for families

This use case, developed under the Universo brand, primarily aimed at testing FAME's analytical capabilities by leveraging Universo's customer data and expertise. The starting scope included the creation of a recommendation engine for financial and partner products, the development of customer profiles, and the design of a machine learning model for instalment risk.

The data exploration and modelling enabled the identification of relevant features for customer segmentation, as well as the testing of Explainable AI (XAI) methods to validate and interpret model outputs. Key expected outcomes included:

- Extraction of actionable consumer insights from Universo transactional and behavioral data.
- Validation of FAME's capacity to support recommendation models and consumer profiling.
- Initial testing of how data assets and outputs could be commercialized within the federated marketplace.

Use case 2: Consumer interfaces and instalment risk modelling

This use case focused on improving the Universo Flex instalment payment solution by generating detailed customer profiles and developing a risk scoring model. Traditionally, Universo Flex required customers to use credit cards with blocked amounts, which limited adoption and created friction in

the user experience. The pilot applied machine learning techniques to onboarding and transactional data (e.g., customer demographics) to build more accurate risk models. Key expected outcomes included:

- Creation of enriched customer profiles combining demographic, transactional, and behavioral features.
- Development of a preliminary risk scoring model capable of supporting broader access to instalment payments, including the potential use of debit cards without blocking full purchase amounts.
- Identification of opportunities to optimize onboarding flows and improve customer conversion through interface testing.

3.1.2 Pilot Integration. Set-up and scenarios

3.1.2.1 Architecture

The diagram below illustrates the overall structure of pilot 1, including the systems involved, data flows, and key interactions between components:

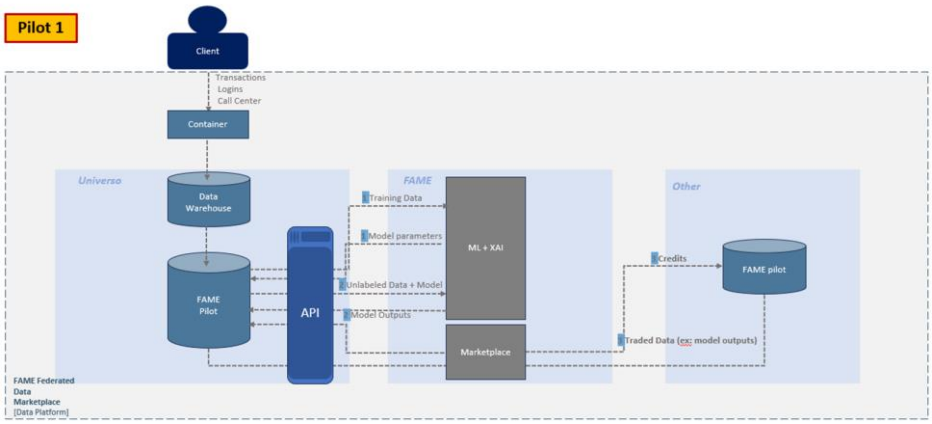


Figure 2: Pilot #1 structure

3.1.2.2 Datasets

Internal Sources

For the purposes of pilot 1, data access relied exclusively on Universo's internal datasets, shared in a controlled manner to support the development of recommendation models and risk scoring. These datasets constituted the only internal system of relevance during the pilot.

External Sources

- For Use Case 1 (Recommendation Engine), no external datasets were accessed, as the focus remained on insights derived from Universo's internal data.
- For Use Case 2 (Instalment Risk Modelling), it was expected that relevant datasets available through the FAME Platform, shared by other pilots or via the Federated Data Assets Catalogue (FDAC, could be leveraged to enrich training. However, no external datasets of value were available during the execution period.

3.1.2.3 Key outputs

Use case 1: Recommendation engine for families

During the pilot execution, different datasets and modelling approaches were tested to assess the potential of FAME's analytical tools in extracting consumer insights from Universo's data.

Initial Dataset (pilot1_old_dataset)

- The first dataset tested did not provide meaningful insights into customer behavior.
- Data granularity and distribution limited the ability to derive actionable outputs, particularly for customer segmentation.

Refined Dataset (pilot1_new_dataset_model_v1)

- A new dataset was created with more bins per feature, resulting in significantly improved output.
- The refined data enabled more continuous distributions, allowing for clearer differentiation between customer profiles.
- The analysis revealed that customers with higher transaction frequency and lower recency contributed more monetary value, an effect not captured in the initial dataset.
- Data quality and feature engineering were critical to producing valuable insights.

Evidence

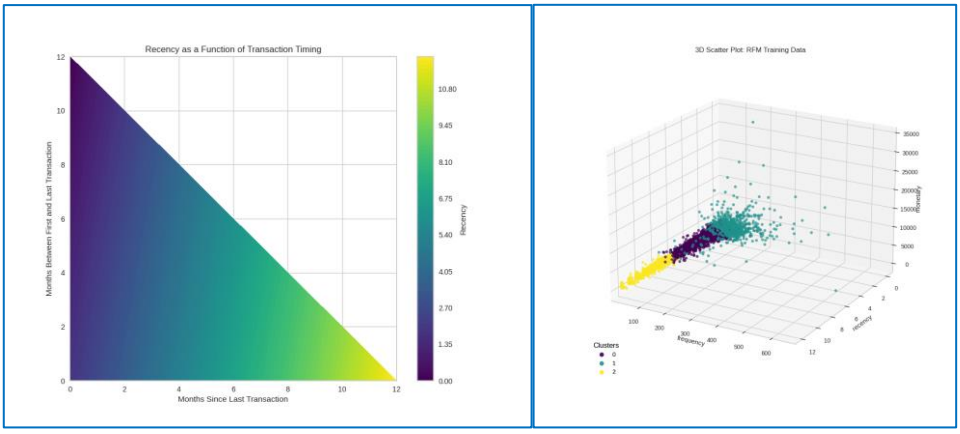


Figure 3: Evidence from pilot #1 UC1

Use case 2: Consumer interfaces and instalment risk modelling

The implementation of the pilot 1 UC2 model was completed. The model faced two main limitations: a strong imbalance in the dataset, with very few positive cases, and weak correlations between features and the target variable, which restricted its predictive power.

Modelling Experiments

- Several models were tested, including Random Forest, Gradient Boosting, Voting Classifiers (combining multiple models), and TabNet (a neural network for tabular data).
- TabNet achieved the best performance among the tested approaches.
- Class imbalance was addressed using SMOTE strategies and customized class weighting.
- Feature engineering efforts were applied, combining existing features to test correlation improvements.
- Features with over 70% missing values or no variation were removed to reduce noise.

Evidence:

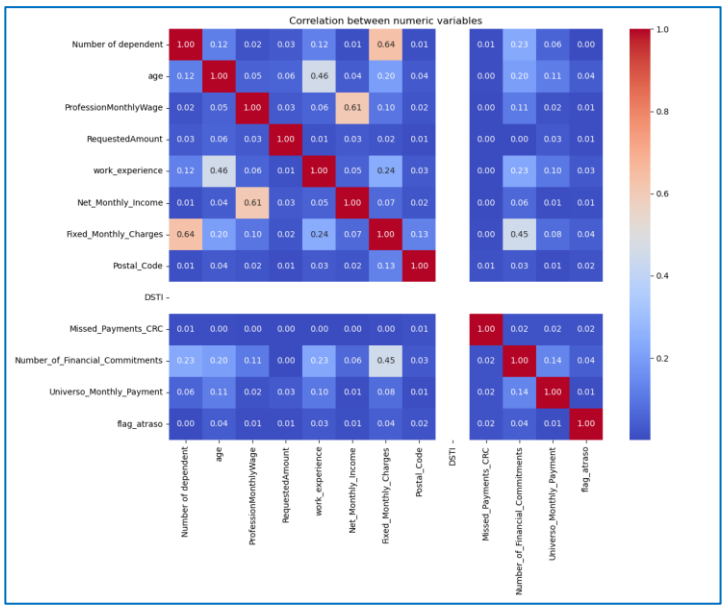


Figure 4: Evidence from pilot #1 UC2

3.1.3 Status of deployment. Visuals and screenshots.

3.1.3.1 Current status

At the present stage, the pilot has moved from model experimentation to stakeholder validation and marketplace preparation:

- **Stakeholder engagement**: Dedicated workshops are being conducted across both Sonae MC and Universo. These sessions collect structured feedback from business teams, data owners, and decision-makers, with a focus on the applicability of the recommendation and risk models, as well as the perceived value of federating data assets through FAME. Initial feedback has been positive, especially regarding the potential for improving customer insights and enabling more accurate segmentation.

Figure 5: Workshop with Sonae MC, R&D and Innovation team [23-09-2025]

- **Dataset preparation**: Two datasets are currently being curated for introduction into the FAME Marketplace. The preparation includes ensuring compliance with privacy and data protection requirements, applying anonymization where needed, and structuring the assets so they can be discoverable and monetizable through the FDAC. This step represents a critical milestone, as it operationalizes the pilot's contributions beyond internal testing and into the federated ecosystem.
- **Organizational alignment**: Internally, Sonae MC and Universo teams are aligning around the governance and usage policies for these datasets, defining which data will be made accessible, under what terms, and how the marketplace integration will be managed.

3.2 Pilot#2 : Embedding Finance Services in a Personalized Citizen Wallet

3.2.1 Pilot description and demonstrations

3.2.1.1 General description

Since 2019 DAEM (the City of Athens IT company) and its technology partner NOVO have re-branded the popular smart parking app of the city (myAthensPass). The new app enables drivers to buy parking time quickly, easily, and conveniently. It also enables motorists to find their exact location, to select their desired parking duration, to extend their parking time remotely, to access information about how much they need to pay, and to reserve parking time in advance. Relevant payment transactions can be carried out via NOVO's app, which serves as a mini citizen wallet. DAEM is also collecting large amounts of data about citizens' parking activity, including their payments. DAEM and NOVO are interested in using the collected data for offering more citizen-centered financial services and for extending the paradigm in additional services (e.g., transport, medical needs).

Two use cases were defined:

- Use Case #1: Personalized Payment and Loyalty Programs for Smart Parking
- Use Case #2: Extended Payments Across Multiple Services

3.2.1.2 Use Cases description

Use Case 1

In this use case, we aim to create a comprehensive EmFi profile for citizens by utilizing existing parking data (e.g., payment frequency, timeliness, and parking duration and location), along with behavioral insights from other NOVO app services. We will complement this with external data related to public transportation traffic. This robust profile will serve as the foundation for generating a wide array of personalized, citizen-centered offers and recommendations such as "Park & Ride" options.

These recommendations will offer citizens incentives such as discounts on bulk parking ticket purchases, reduced fares for using public transportation, or suggestions for utilizing eco-friendly public transportation options, thus promoting sustainable urban mobility. To make customer profiling and recommendation provision possible, different types of citizen data will be securely traded through our Marketplace and shared with DAEM/NOVO, contingent on each citizen's consent to include their data in the Marketplace. Furthermore, it is imperative that public transportation traffic data be made accessible to the FAME Platform to enable seamless processing.

Use Case 2

This use case aims to expand NOVO's citizen wallet to encompass a wider array of services, including transportation services and fine payments. This will empower citizens to conveniently fund their citizen wallet using their credit/debit cards and subsequently utilize these credits for various services. Moreover, within their wallet, citizens will have the option to purchase discounted e-tickets for public transportation by leveraging the Park & Ride loyalty scheme offered by UC 1. Similar to the previous scenario, there will be an exchange of citizens' behavioral data among the developers, facilitating the provision of cross-service offers.

3.2.2 Pilot Integration. Setup and scenarios

3.2.2.1 Architecture

For the pilot implementation we adopted a four-layer architecture as shown in Figure 6: Pilot #2 architecture. From right to left, the first layer is the data layer. This layer includes all data that is necessary for analytics execution. Most of them are the existing Parking transactions from the myAthensPass application. It consists of two subsets: a) Actual Parking transactions/ticket activation and b) Wallet transactions. Actual Parking transactions sub-dataset deals with parking slots' utilization through myAthensPass application. It is a time series-based dataset that includes: userID, parking location data, duration time/date, amount etc. On the other hand, wallet transactions deal with money transaction data such as: UserID, time/date, amount. Additionally, external data is used, especially for the execution of route planer analytics service. These data are acquired from OASA (transport for Athens), including bus routes, bus stops, and bus timetables in Athens.

The next layer is the analytics one. The main components are citizen profiler, route planner, and internal analytics. All these analytics are exposed as asset services through FAME.

The core layer is the service layer (Back office) where EmFi services are implemented. For the purpose of the use cases, 4 EmFi services are defined: a) Park & Ride, Loyalty program, Discount, and Dynamic pricing scheme that are described in the next paragraph. Additionally, to this layer, a management service is defined which is responsible to provide to the municipal employees' analytics for the parking areas. All above are exposed as service assets through the FAME platform.

Finally, the last layer is the user Interface (Frontend). This consists of two components: a) the citizen wallet and b) the Parking Management Dashboard. Both are responsible for the interaction with end users. Especially the citizen wallet is designed, on the one hand, to support all developed EmFi services and on the other hand, to support future EmFi services.

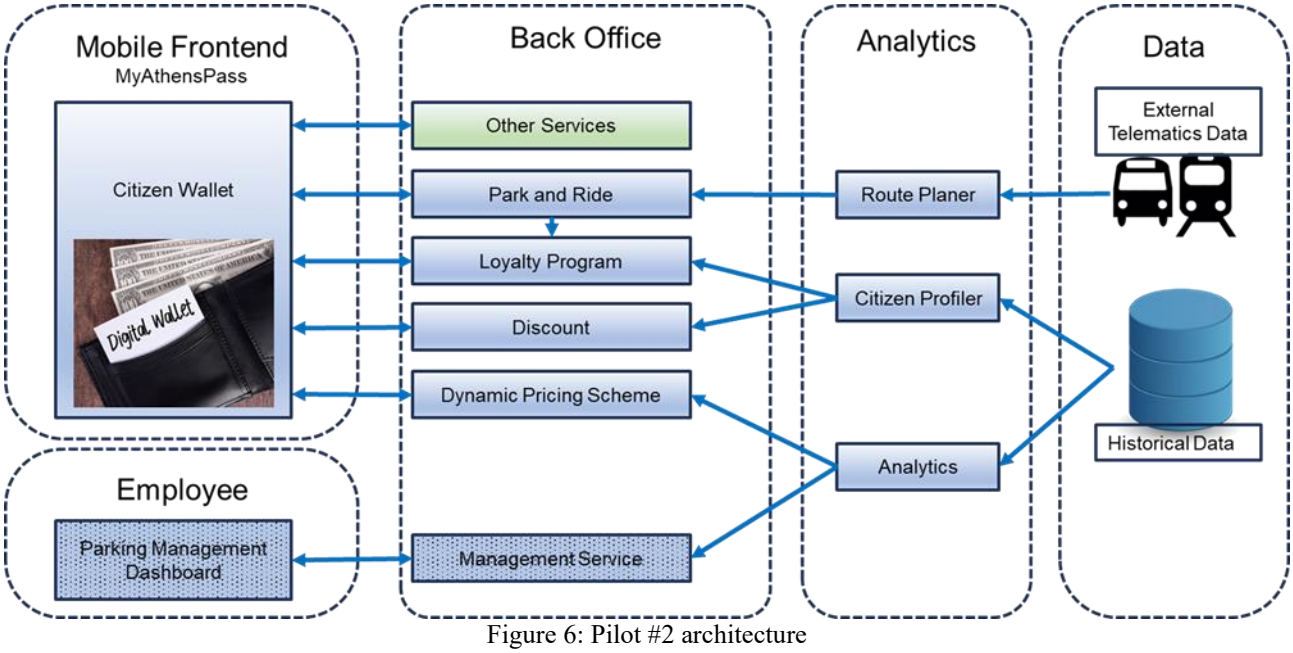


Figure 6: Pilot #2 architecture

3.2.2.2 Components

In this paragraph we provide a short description of the defined components and their functionality.

Analytics layer

Route planner: Route planner is an algorithm that suggests alternative routes of moving between a starting point (A) and a destination point (B) using public transportation instead of using the car. The algorithm is trained with OASA[1] open available data (Bus stations, Bus routes, bus timelines) and given the existing location (start point A) and the destination one (B) suggests an intermediate location (Ci) for parking the car and taking public transportation for final destination (B).

Citizen profiler: The Citizen Profiler is an analytics service that generates parking profiles across three dimensions:

- frequency of parking usage,
- locality of selected parking areas,
- actual parking duration.

The profiler is trained using historical data from the "Parking Transaction dataset" sourced from the myAthensPass application / Novoville Parking Platform under the scope of WP5.

Internal Analytics: The Internal Analytics component focuses on extracting insights from the integrated parking and wallet transaction datasets to support the definition and operation of the EmFi services. It includes statistical analysis, trend detection, and monitoring functions that allow the identification of usage patterns, peak demand periods, and revenue flows. Furthermore, it provides the necessary input for implementing the dynamic pricing scheme and the loyalty/discount programs, by correlating user behavior with parking availability and financial transactions. Outputs from Internal Analytics are exposed as service assets within the FAME Platform and are further consumed by the Backoffice services (management service, EmFi services).

Service layer (Backoffice)

Park and Ride: The Park & Ride Service component enhances myAthensPass app experience by allowing users to purchase bus tickets directly from their wallet. It provides routes from point A to point B and rewards users with discounts and loyalty points for using public transportation, promoting efficient and eco-friendly commuting in Athens.

Loyalty Program: The Loyalty Program component rewards users for frequent bus usage by offering free parking hours. It utilizes data from Park & Ride to gather insights from wallet transactions related to bus ticket purchases. As users ride more, they accumulate points that can be redeemed for complimentary parking, encouraging public transit use while enhancing the overall commuting experience.

Discount: This service offers personalized discounts to citizens based on their parking habits. Users who frequently purchase parking time through the myAthensPass app will receive tailored discounts reflecting their usage patterns. The citizen profiler is utilized to calculate these personalized discounts effectively.

Dynamic Pricing scheme: The Dynamic Pricing Component supports flexible pricing for parking areas based on demand during predefined time periods throughout the day. By analyzing real-time data and usage patterns, it dynamically adjusts parking rates to optimize occupancy and maximize revenue. This adaptive pricing strategy encourages efficient use of available spaces while providing users with cost-effective options that reflect real-time demand fluctuations. Additionally, it enhances overall parking management by ensuring that high-demand areas are effectively monitored and utilized.

[1] https://www.oasa.gr/en/

Frontend layer

Parking management service and Dashboard: The Management Component is a visualization tool that presents parking data to Municipal employees and city officials, offering insights into the utilization of parking areas. This information helps optimize the management and control of parking spaces, improving efficiency and enhancing overall parking operations.

The Management Component offers:

Data Visualization: Displays parking data for municipal employees, enhancing decision-making.
Density Map: Highlights parking usage patterns across various parking areas.
Optimized Control: Recommends which areas should be monitored more frequently by municipal police.
Dynamic Adjustments: Provides almost real-time recommendations throughout the day based on parking demand.

Citizen wallet: The Digital Wallet component facilitates digital payments and offers personalized EmFi services to citizens. This component enhances user convenience by streamlining transactions while providing tailored financial solutions to meet individual needs.

- Process debit and credit card transactions
- Maintain transaction history
- Facilitate different ticket purchases for parking and bus services

3.2.2.3 Integration

Integration with WP5 analytics

Within WP5, the Citizen Profiler component was developed as an analytics service designed to generate parking behavior profiles based on historical transaction data from the myAthensPass application. Using an RFM (Recency, Frequency, Monetary) modeling approach and clustering techniques, the profiler segments users across three main dimensions: frequency of parking usage, locality of selected parking areas, and actual parking duration. This enables the identification of distinct user groups and mobility habits, providing valuable input for the design of personalized services such as the loyalty program, dynamic pricing, and discount schemes. The clustering results are illustrated in Figure 7: Pilot #2 Citizen profiling cluster, where citizens are grouped according to their parking behavior patterns.

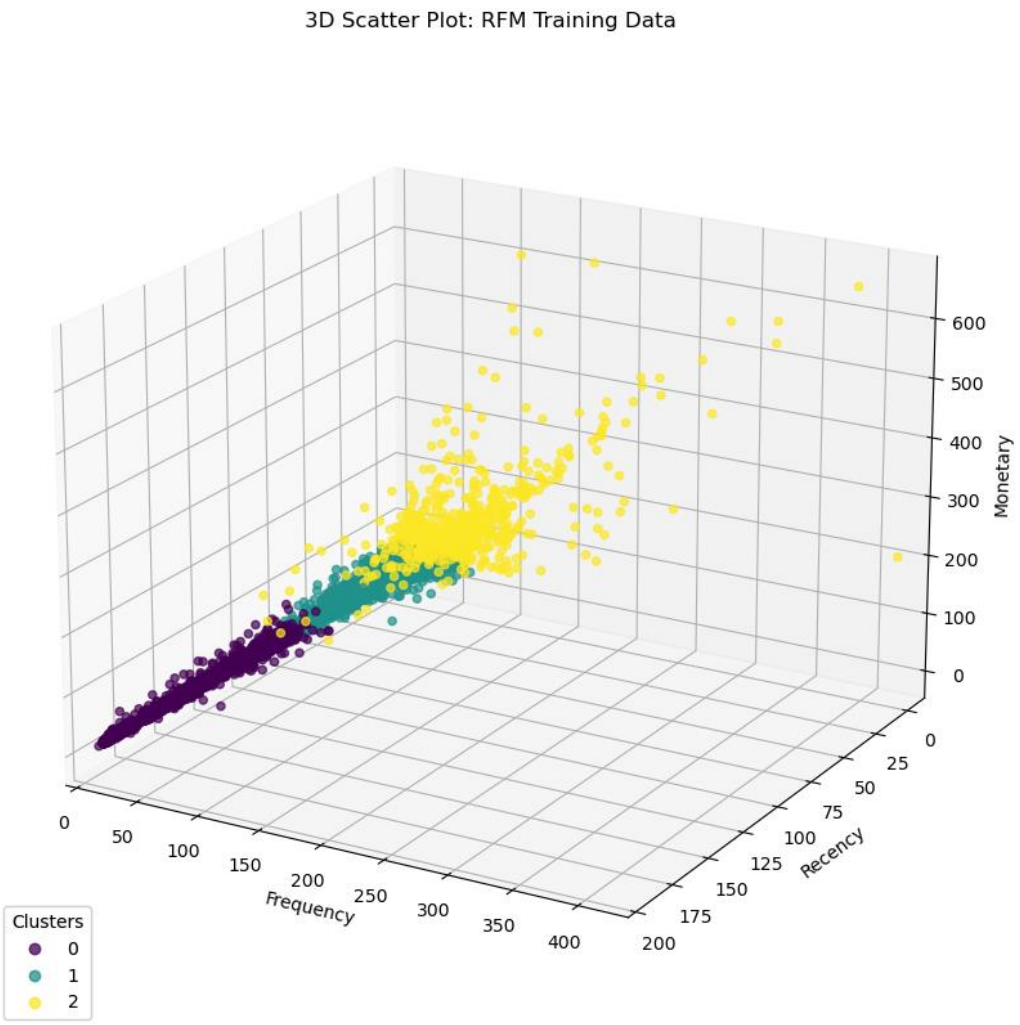


Figure 7: Pilot #2 Citizen profiling cluster

Integration with FAME platform

Figure 8: Pilot #2 – FAME Integration depicts the interaction between pilot system and architecture. Both partners in this pilot will validate the proposed pilot solution and the FAME platform functionality. NOVO acts as data provider, which defines and indexes assets to the FDAC. DAEM user enters the FAME platform and buys an asset (enables one of the available EmFi services that are

exposed as assets). This asset is enabled to the Backoffice system and end users (citizens or visitors that use the mobile app) can use this service.

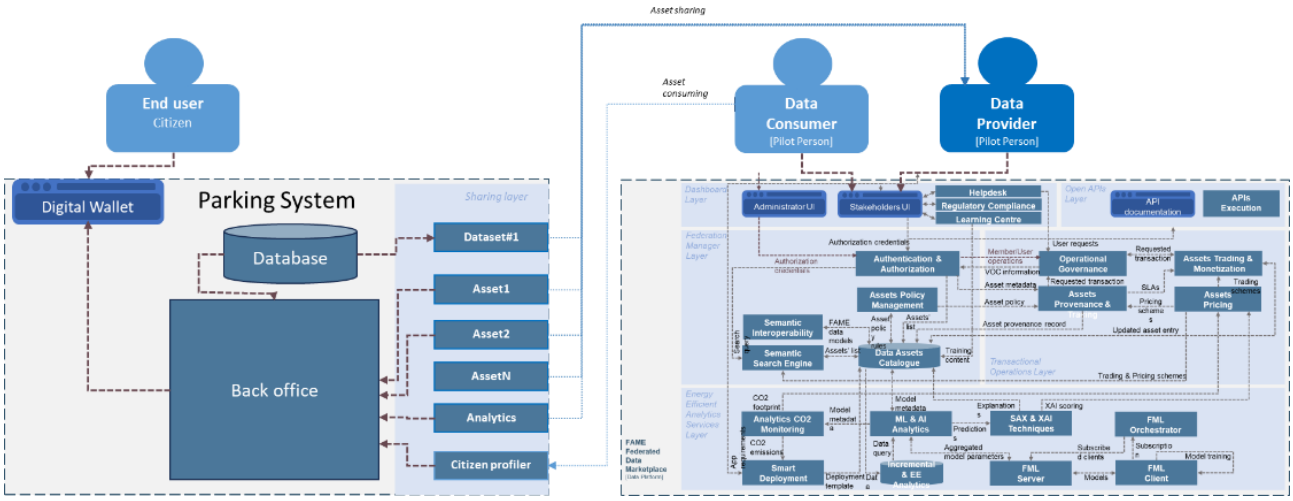


Figure 8: Pilot #2 – FAME Integration

Deployed assets to the FAME platform: Three types of assets are defined in our pilots: a) datasets b) analytics and c) EmFi services.

Assets deployed to FAME (Figure 9: Available pilot #2 assets to the FAME marketplace):

- Park and Ride (EmFi Service)
- Loyalty Program (EmFi Service)
- Discount (EmFi Service)
- Management Service (Service for municipal Employees)
- Dynamic Pricing Scheme (EmFi Service)
- Digital Wallet (Service for citizens)
- Parking transaction dataset (data)
- OASA dataset (data)

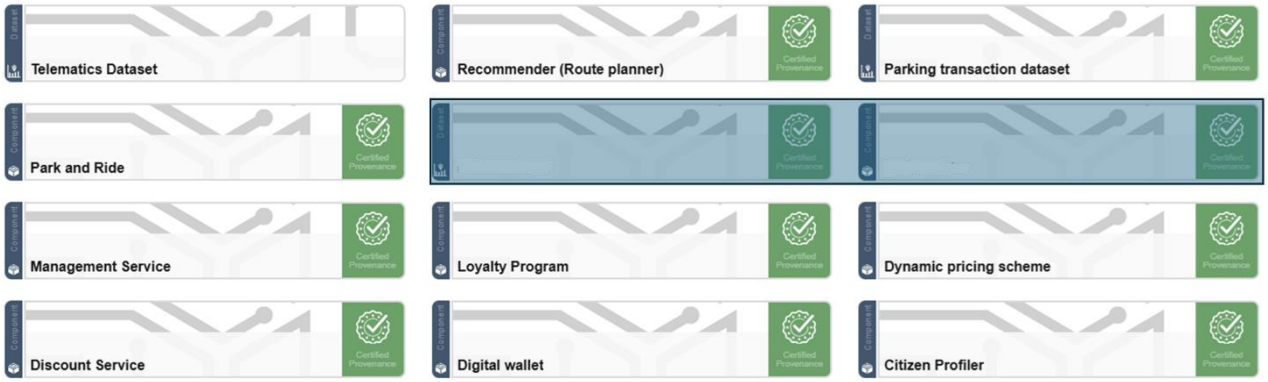


Figure 9: Available pilot #2 assets to the FAME marketplace

3.2.2.4 Scenarios

To validate the proposed solution and its integration with the FAME Platform, three representative scenarios were defined:

1. Citizen interaction – navigation to the new citizen wallet and access to the provided services.
2. Municipal management – usage of the management interface by municipal employees and officials.

3. Service acquisition – DAEM procures a new service through the FAME Marketplace from NOVO and activates it within the citizen wallet.

Citizen wallet and EmFi services usage:

This scenario demonstrates how a citizen interacts with the digital wallet:

1. The citizen downloads the app
2. The citizen logs into the app and accesses the citizen wallet
3. Through the main menu navigates to the available EmFi services
4. Selects an EmFi service and uses this service

Navigation to the new management interface:

In this scenario Municipal employees interact with the management interface (Backoffice) to access real-time data about parking activity.

1. The Municipal employee/official opens the management interface (web browser)
2. Logins using authorized credentials
3. Navigates through the main menu to the dashboard
4. Access real time data about parking and enforcement activity

DAEM subscribes to a new EmFi service from NOVO through the FAME Platform:

This scenario demonstrates how a new EmFi service is introduced and utilized through the FAME Platform involving three key stakeholders: NOVO as the asset provider, DAEM as the asset consumer and finally a citizen as the end user.

- DAEM uses NOVO back-office system for parking management
- Citizens / Visitors can download the app for free, access the citizen wallet and purchase parking time/bus tickets
- NOVO offers new EmFi services through FAME Platform
    - NOVO person logins to the FAME Platform as data provider
    - NOVO person creates a new asset to the FAME Platform.
    - The asset is linked with the new EmFi service
- Municipal user wants to enable a new EmFi for the municipal citizens / visitors through digital wallet
- Municipal user buys this service through FAME Platform
    - DAEM user logins to the FAME Platform as data consumer
    - DAEM user searches for available EmFi services
    - DAEM user selects and buys the EmFi service of interest
- The new EmFi service is enabled to the digital wallet
- Citizen / Visitor opens the digital wallet
- Citizen / Visitor can see and use the new EmFi service
- Citizen / Visitor uses the new EmFi service

3.2.3 Status of deployment. Visuals and screenshots.

3.2.3.1 Deployment

The deployment of the new solution is structured around three key elements:

- **Backoffice**: This is the central module that enables the entire system. Hosted on the NOVO cloud it supports all subcomponents and provides DAEM users with access to the management console/dashboard. Through this interface municipal users can activate/deactivate EmFi services for citizens and monitor parking activity in real time.
- **NOVO service layer**: All EmFi services are exposed as services via NOVO infrastructure. When a municipality wishes to enable one of these services, it subscribes to it through the

platform. Once the subscription is activated, the service is activated into the Backoffice and becomes available in the management console. All these services are offered through the FAME Platform. Part of this layer are all other services that are available as assets. Furthermore, this layer serves as the integration point with the FAME Platform.

- **Mobile app**: The citizen-facing mobile application builds upon the existing myAthensPass app, enhanced with new features. Citizens and visitors can download and install it on their devices to access the digital wallet and related functionalities. Whenever DAEM enables a new EmFi service, it automatically becomes visible in the app's main menu, ensuring seamless access for end users.

3.2.3.2 Screenshots from the developed system

Backoffice

Parking management dashboard: Figures (Figure 10, Figure 11, Figure 12 and Figure 13) below provide a detailed view of the Parking Management Dashboard. The Parking Management Dashboard serves as the primary Backoffice tool for municipal employees and decision makers, providing a comprehensive overview of parking and mobility activity. It consolidates parking transactions from the myAthensPass application with wallet transactions, enabling transparent monitoring of revenue flows and user behavior. Additionally, it integrates enforcement data, offering a heatmap visualization of fines and enforcement activity to support targeted and more efficient control measures. Beyond parking, the dashboard incorporates combined mobility data (e.g., interconnections with public transportation usage) to provide a holistic view of urban mobility patterns, facilitating data-driven decision making and optimized policy design for sustainable city management.

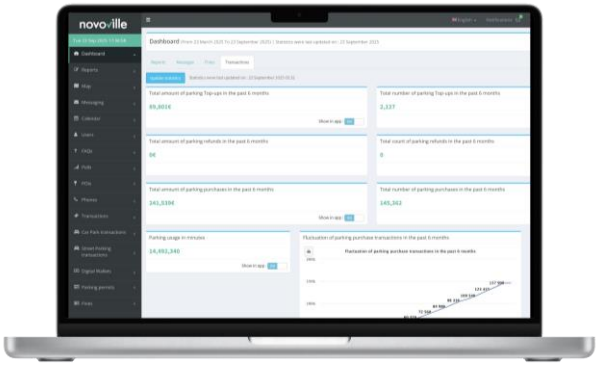


Figure 10: Parking transactions

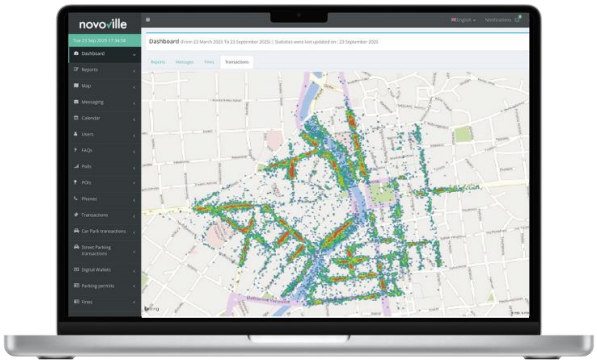


Figure 11: Enforcement heatmap

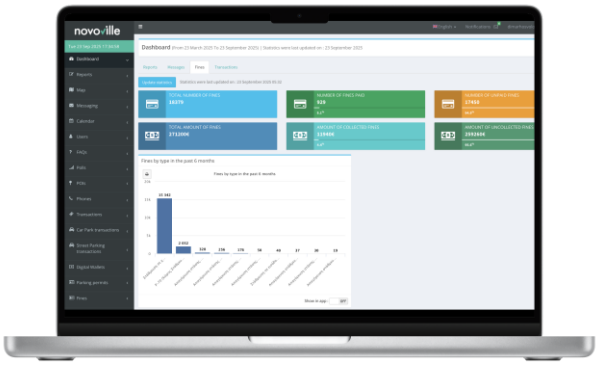


Figure 12: Fines & enforcement activity

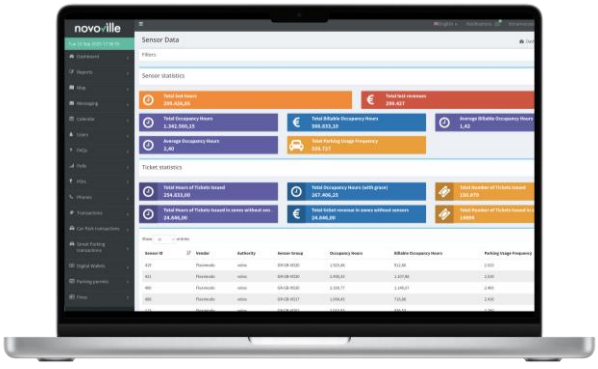


Figure 13: Combined mobility data

Management dashboard for e-wallets: The figure below depicts a summarization of all users' e-wallet transactions

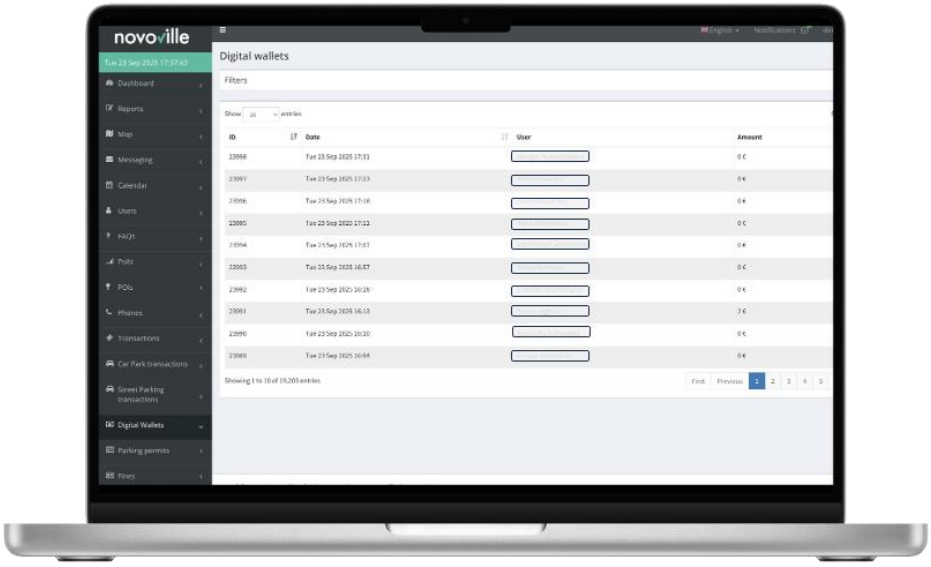


Figure 14: E-wallets management dashboard

Mobile app

General view and transactions: The first set of mobile app figures depict the navigation menu through the provided functionality (Figure 15) and the e-wallet details (Figure 16 and Figure 17), such as remaining amount and transactions history.

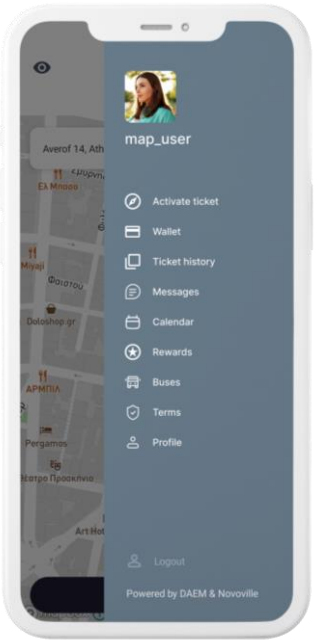


Figure 15: Navigation menu

Figure 16: Wallet top-up

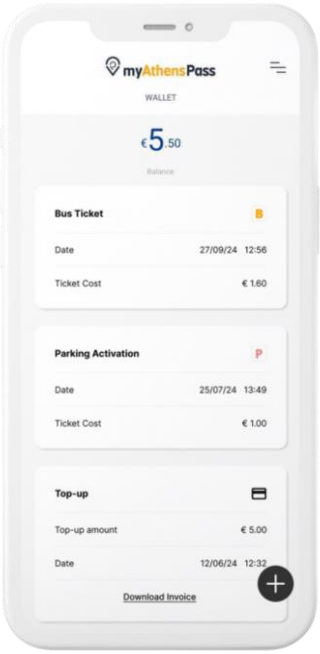


Figure 17: Wallet transactions (P&R)

Locate parking and purchase time slot: Figure 18 and Figure 19 depict the parking ticket issuance. Figure 1818 depicts the selection of the parking position and Figure 19 19 depicts the selection of the duration, the vehicle details and finally the parking cost.

Figure 18: Parking Location

Figure 19: Activate Parking Session

Park and Ride: Figures below depict the Park & Ride service. Initially citizens define the starting point and the destination. The app suggests an alternative route by bus. To the next, as shown in Figure 2121, citizens activate the parking slot and buy a ticket for public transportation. Finally, the e-ticket is stored in the mobile app (Figure 2222).

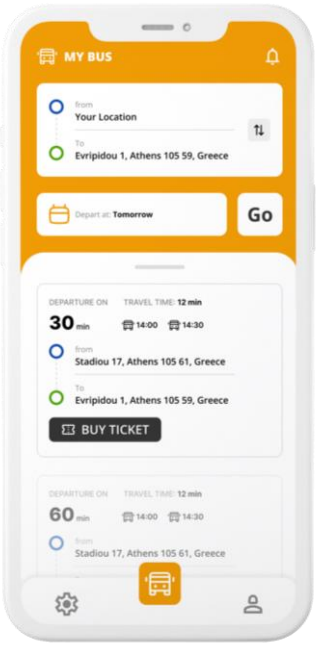


Figure 20: Bus routing

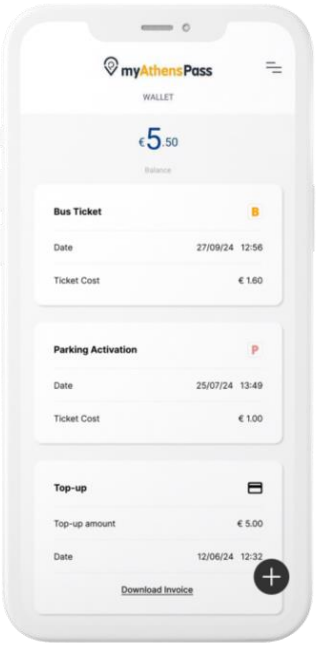


Figure 21: Wallet transactions (P&R)

Figure 22: Bus ticket

Loyalty and discount program: The Loyalty Program has been designed on top of the outcomes of WP5, where the Citizen Profiler component was defined and analyzed. The profiler provides a detailed understanding of citizens' parking habits across three dimensions:

- frequency of parking usage,
- locality of selected parking areas
- actual duration of parking usage.

It is trained on historical data from the myAthensPass application, which are available as the *"Parking Transaction dataset"* asset. Building on these insights, a personalized payment and loyalty scheme was developed. The program (Figure 2323) offers targeted incentives based on parking behavior, such as discounts (e.g., top-up of 10 EUR and receive 1 EUR/1 hour parking time for free). In addition, intermodal mobility is promoted by rewarding frequent public transport users with free parking time credited directly to their digital wallet (Figure 24).

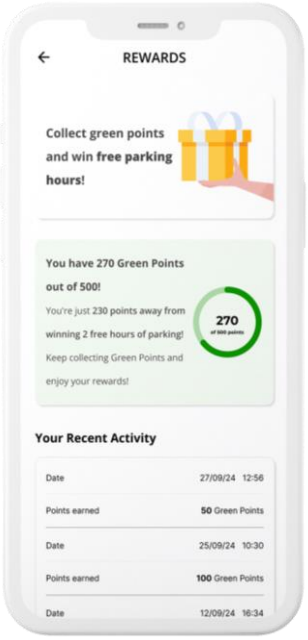


Figure 23: Loyalty & Rewards

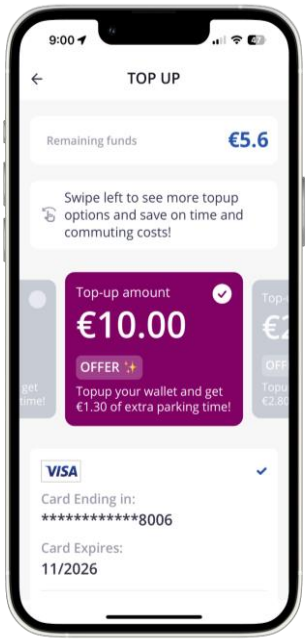


Figure 24: Loyalty & Discounts

Additional payments: The wallet also supports additional payments for municipal services, ensuring flexibility and convenience for citizens. In particular, parking fines can be settled directly through the application by entering the electronic payment reference code (RF) or violation number, with the transaction processed seamlessly within the digital wallet (Figure 25).

Figure 25: Fine payment

3.3 Pilot#3 : Personalized Collaborative Intelligence for Enhancing EmFi Services

3.3.1 Pilot description and demonstrations

Personalized Collaborative Intelligence for Enhancing EmFi Services

In the era of Open Banking, payment providers have significant opportunities to gain value-added information about their services and their customers based on the aggregation, consolidation and sharing of data across institutions and organizations. The consolidation of analytics across financial organizations enables them to gain timely and accurate insights for processes like onboarding, services personalization, and credit risk scoring.

Concept & Description:

This pilot will demonstrate how the federation of customer data from different sources can increase the accuracy of embedded payments solution by enabling a facts-as-a-service paradigm. Specifically, the pilot will integrate, link, and analyze data from different organizations (i.e., payment providers, banks, EmFi providers) within the FAME Marketplace.

Two UCs will be implemented:

- UC1 – Pay Facts-as-a-Service for Embedded Payments: This use case will produce new data assets that will be sold as "facts" to embedded finance services providers through the FAME marketplace. The FAME analytical tools (XAI, Energy Efficient Analytics, FML) will be used over datasets from multiple payment providers (incl. BOI, BPFI), as well as alternative data sets (e.g., news, blogs, social media). EmFi providers will be able to locate these insights, pay for them and use them to develop their own services. The FAME Marketplace will ensure that data from the various services are consolidated and accessible (FDAC) and fair priced through blockchain smart contracts.
- UC2 – Anti Money Laundering (AML) as a Service: This use case will implement an AML service based on the identification of potential links to fraudulent payments or other criminal activities. The service will be made available to EmFi application developers and services providers in order to facilitate their AML checks.

Stakeholders' Roles: (i) Data providers: BOI and BPFI will provide payments data in the FAME Marketplace, while NUIG will leverage FAME tools to develop value added analytical insights for facts-as-a-service and AML; (ii) Data-Driven Application Developers: NUIG will have the role of application developer as well, through using data assets in simple EmFi applications like credit risk scoring and recommendations for customers. Various pricing/trading models will be tested for the data providers/developers' interactions.

Data Assets: Multi-million (>1M) Customer payments of BOI, including customer-to-customer relationships and millions of customer account data to experiment and generate decentralized payments data sets; Millions of profiles and events from alternative data sources for embedded payments.

3.3.2 Pilot Integration. Setup and scenarios

Summary of progress during the period

This report aims to provide a short summary of the recent activities involving the development of pilot 3. So far what has been done in this task can be summarized as below:

- The AAI security infrastructure for the final product is in place.

- The final product prototype has been designed and executed.
- The survey questionnaires from all related parties has been distributed, gathered, and analyzed.
- Based on survey questionnaire results, we modify the final product prototype.
- Data pertaining to the KYC of BPFI has been gathered and being analyzed.
- The test of the final product by focused group has been initiated and is being processed.

It is pertinent to emphasize on the point that pilot 3 in its current format provides a smart outline of investors'/client's journey from the beginning of the investment to the outcome results in a smart easy friendly manner. The tool provides a secure and manageable platform for service providers and clients on an online basis. This online feature of the tool provides ease of access to the information necessary to deliver on UC1 and UC2.

Pilot 3 is integrated with the FAME AAI security infrastructure to provide secure portal access and ensure the protection of user data. This integration enforces strong authentication and authorization controls, preventing any form of unauthorized access.

Pilot 3 C4 Component diagram is given below.

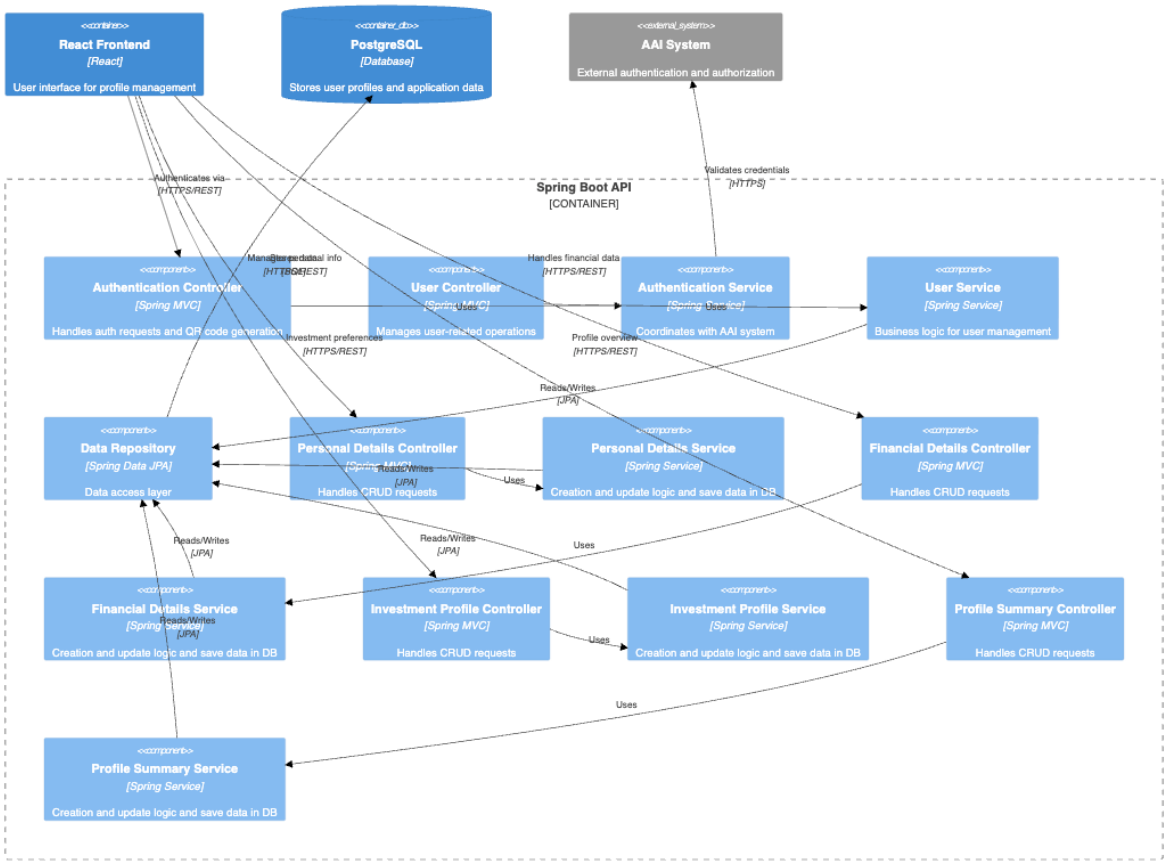


Figure 26: Pilot #3 C4 Component diagram

3.3.3 Status of deployment. Visuals and screenshots.

3.3.3.1 Current Status

The system is deployed within the Amazon Web Services (AWS) cloud environment. The API layer and user interface (UI) are hosted in a containerized infrastructure, enabling efficient scaling, isolation of services, and streamlined deployment workflows. The database tier is provisioned through Amazon Relational Database Service (RDS) with PostgreSQL as the database engine. As a fully managed service, RDS handles routine operational tasks such as automated backups, patch management, and high availability, thereby improving reliability and reducing administrative overhead.

3.3.3.2 Visual Screenshots

The most important recent activities involve upgrading and updating the final product prototype. The security infostructure based on AAI has been delivered in full and we are moving towards executing it.

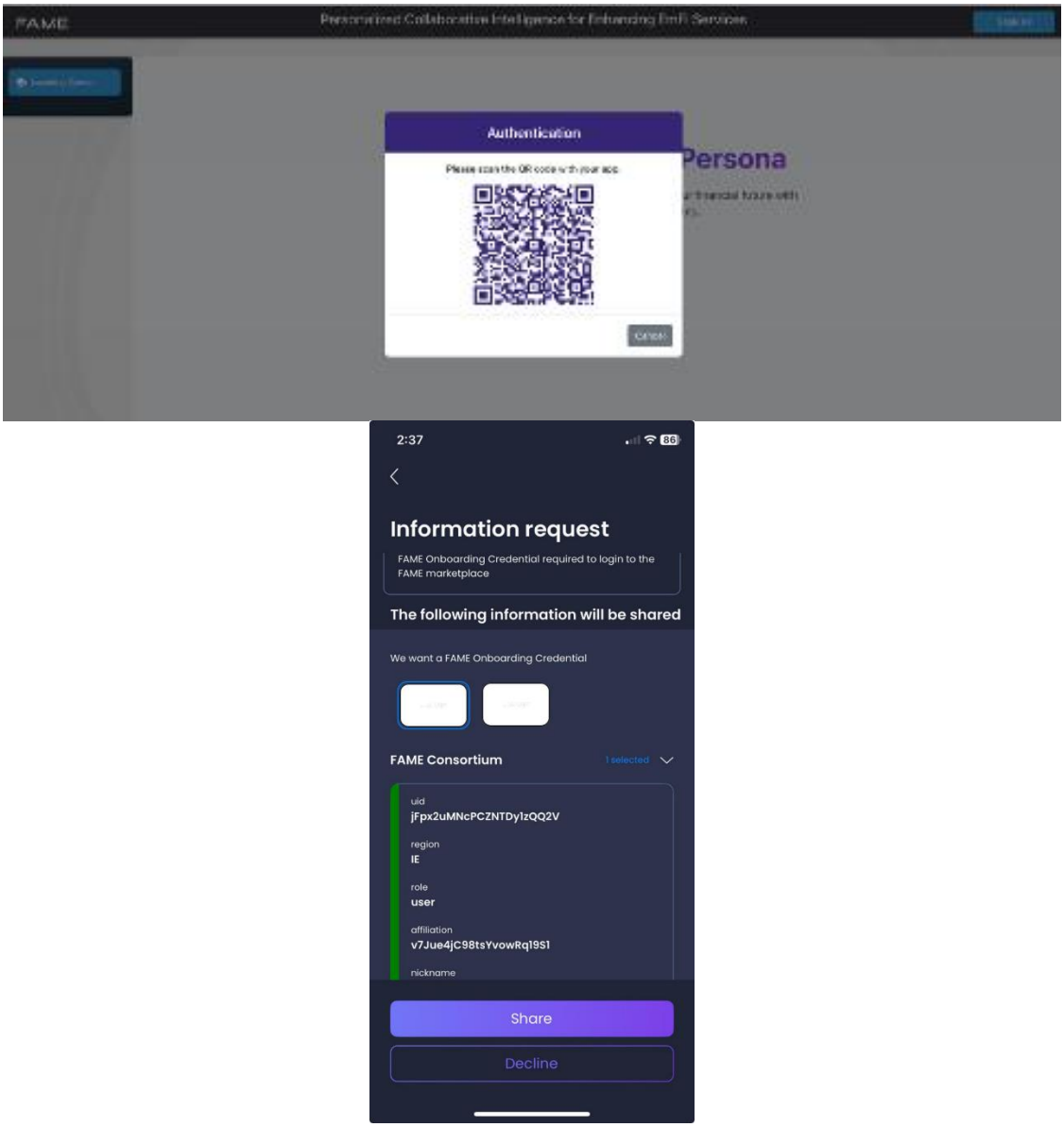


Figure 27: Login

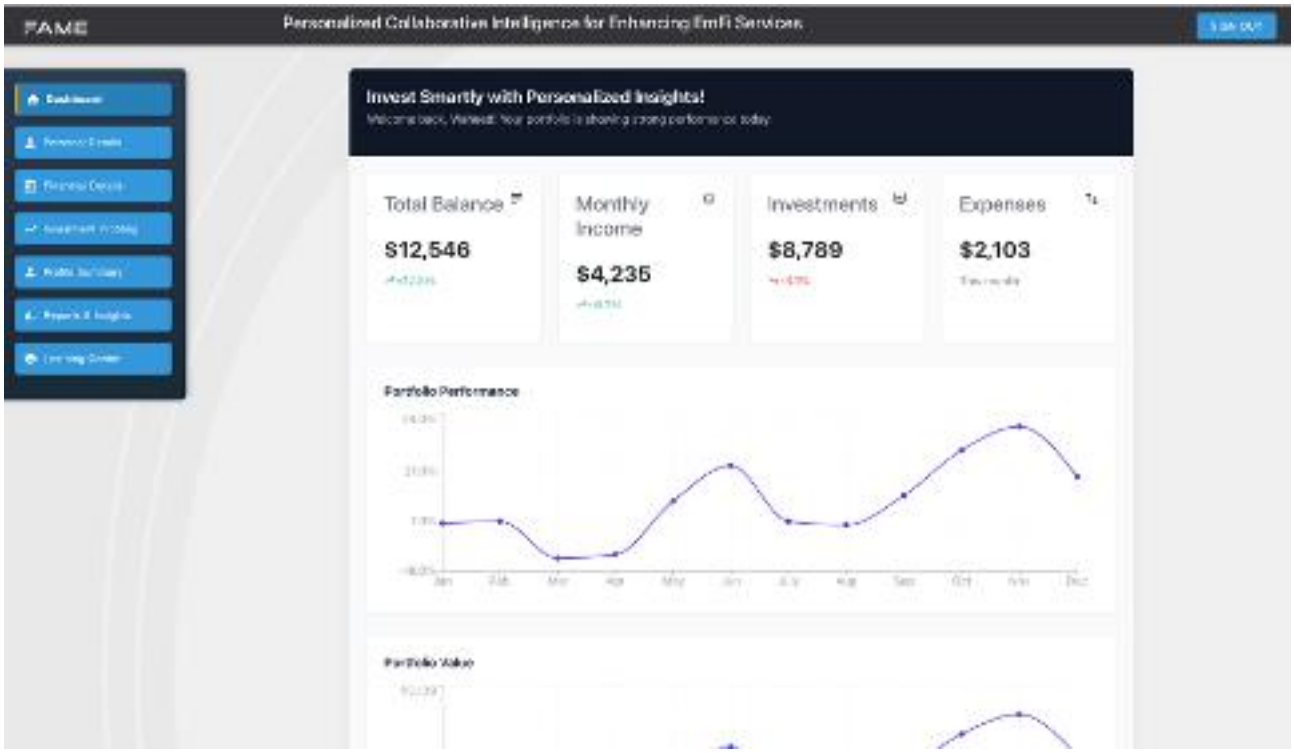


Figure 28: Dashboard

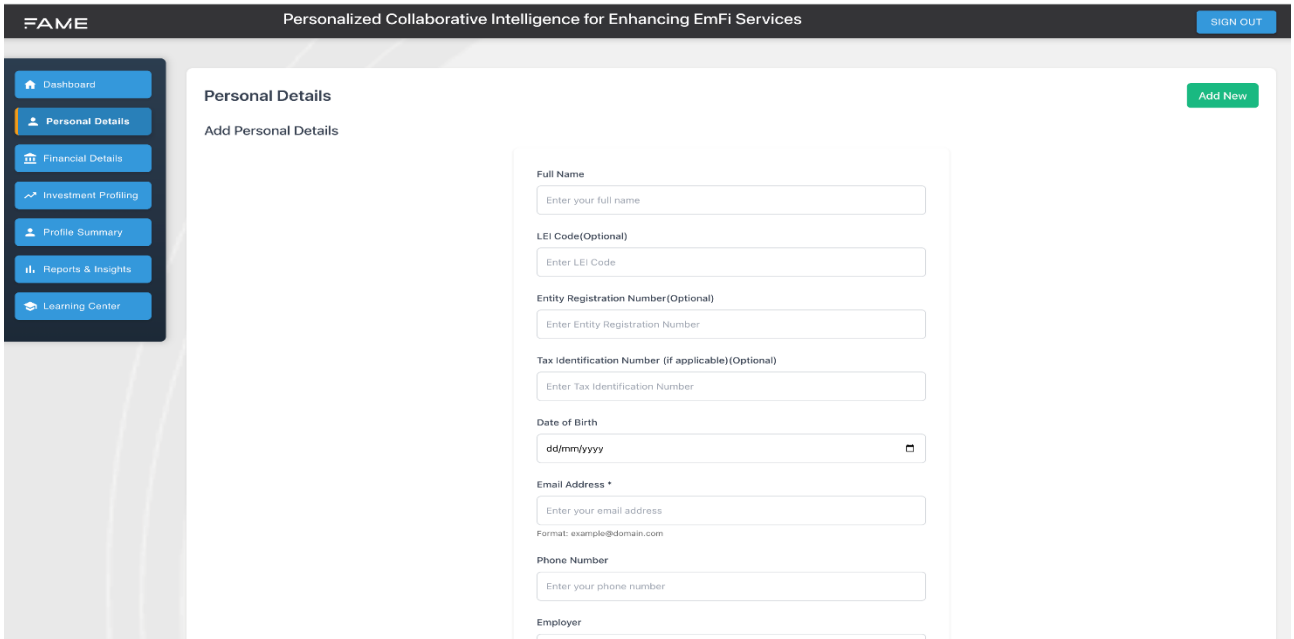


Figure 29: Personal Details 1

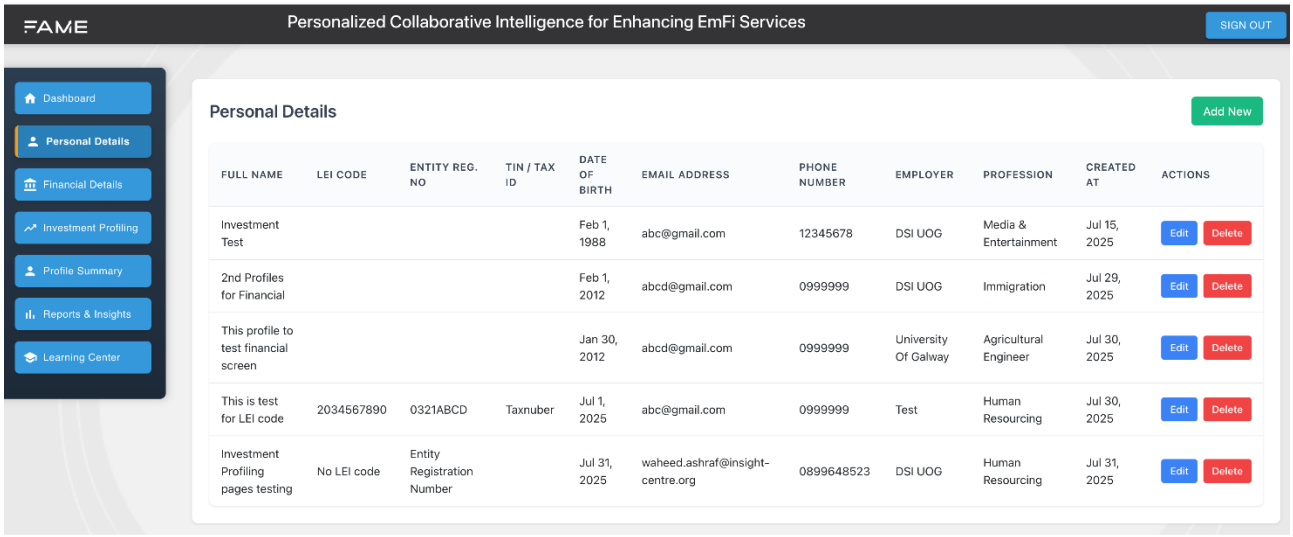


Figure 30: Personal Details 2

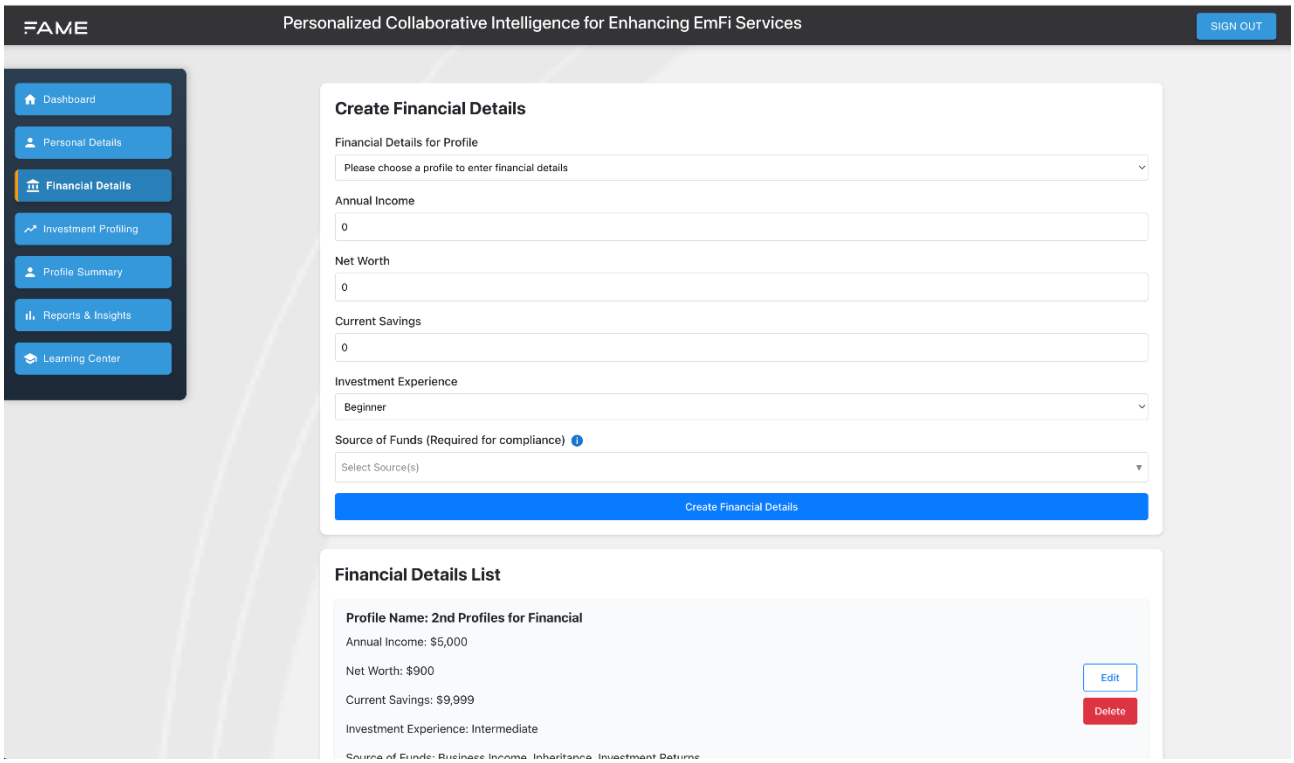


Figure 31: Financial Details

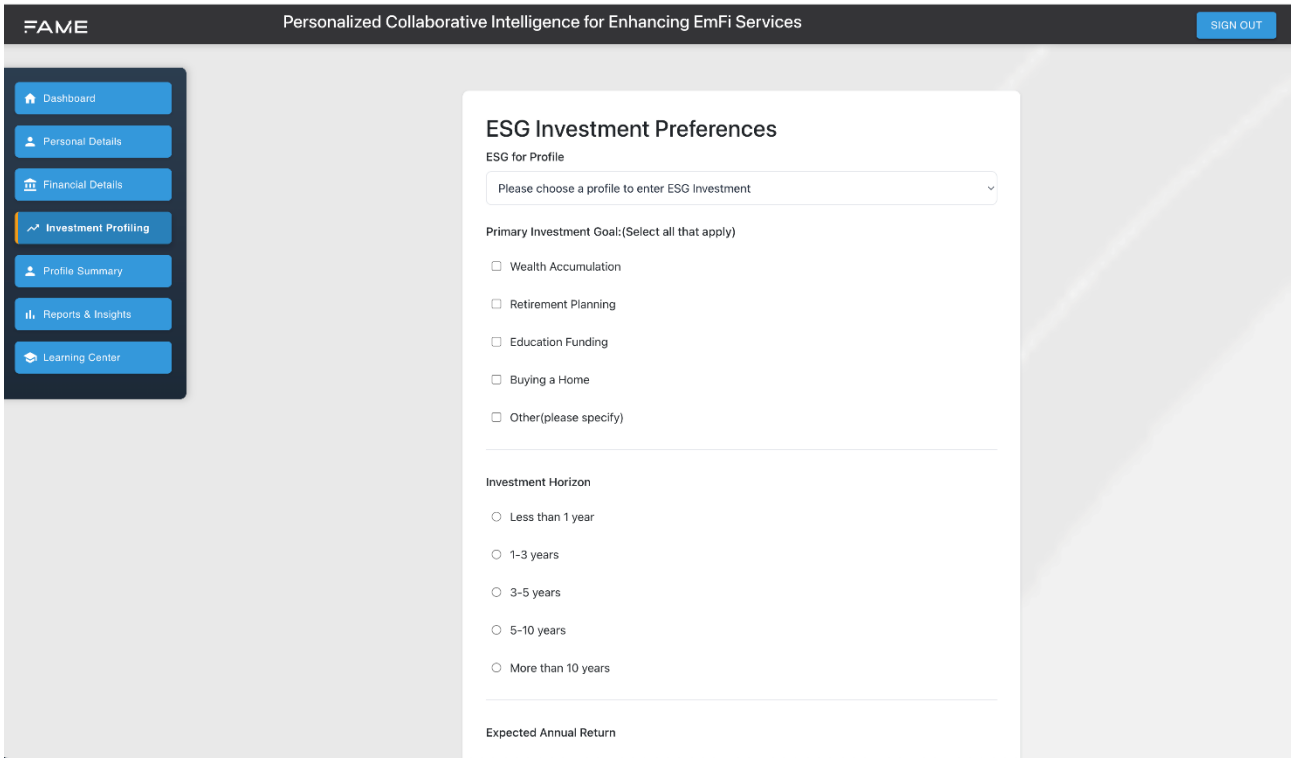
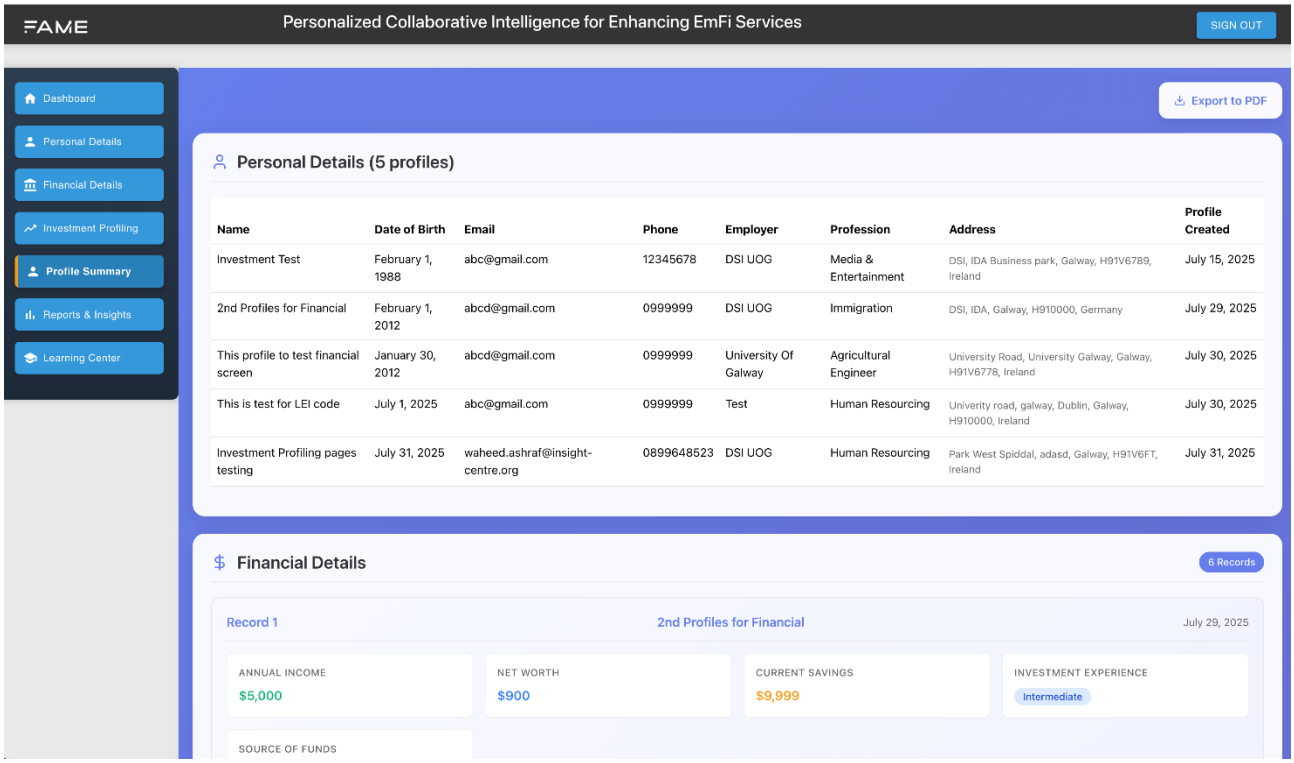


Figure 32: Investment Profiling



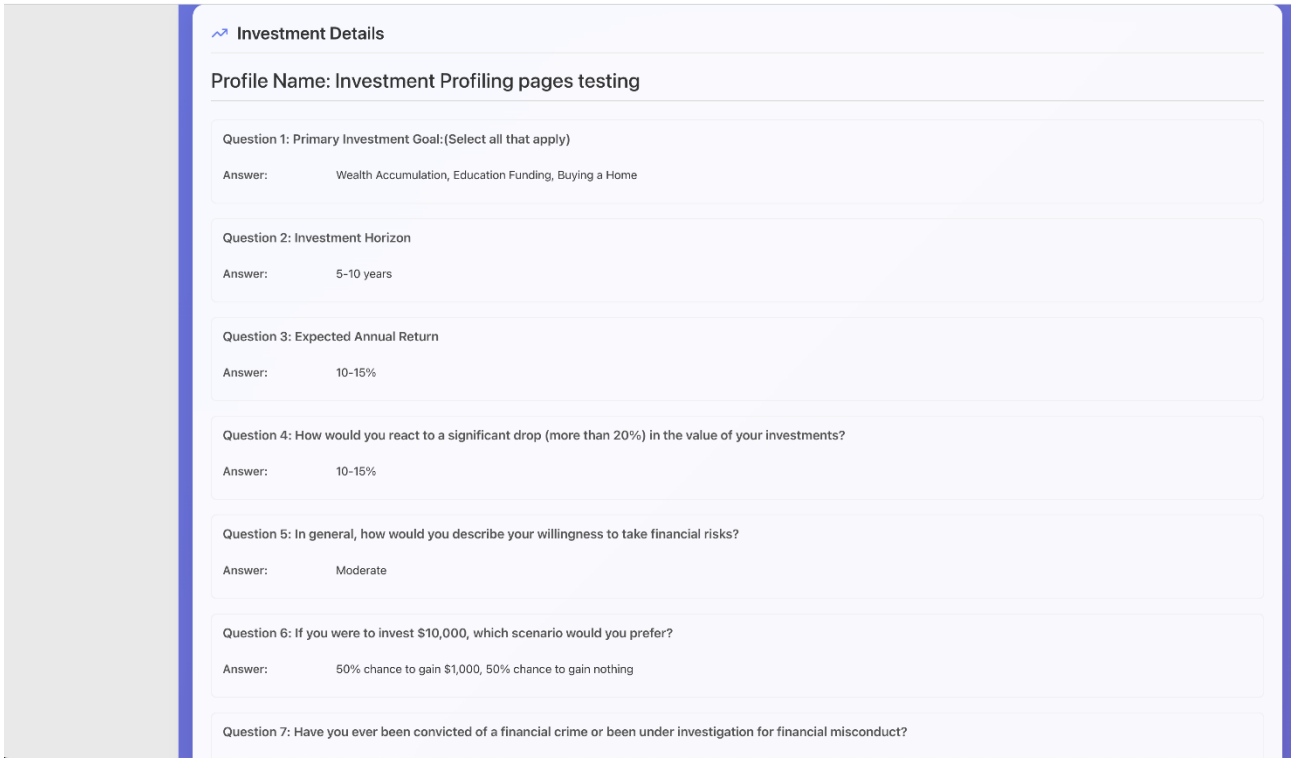


Figure 33: Profile Summary

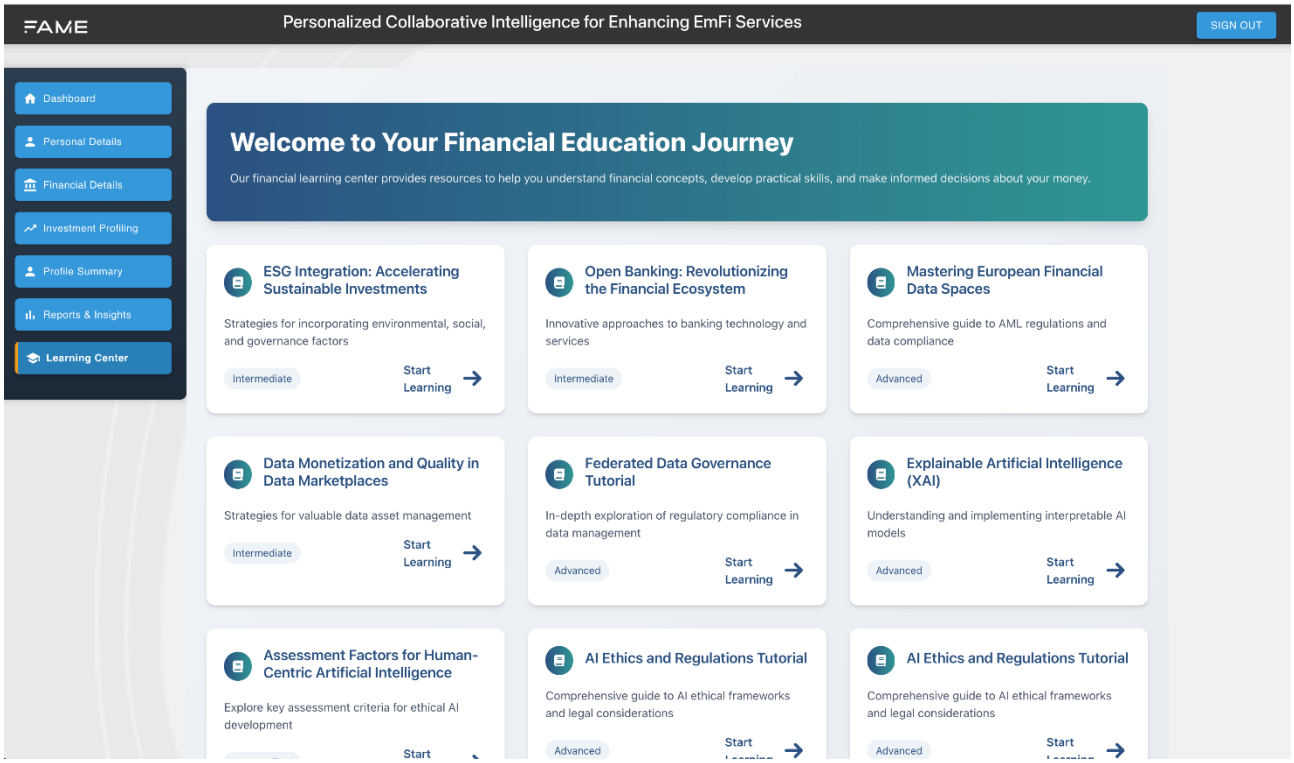


Figure 34: Learning Center

3.4 Pilot#4 : The EU Funds Application Process Made Easy

This section summarizes pilot 4's description and use cases, integration setup, operating scenarios, and current deployment status for FAME.

3.4.1 Pilot description and demonstrations

The advent of the Next Generation EU (NGEU) funds has led to an increase in public grants and therefore a unique opportunity to finance the twin transition of businesses. However, to benefit from the public funds, companies must be prepared to meet the financial requirements and provide additional funding. In many cases, there is no pre-financing: companies must make the entire investment before receiving any payments.

Pilot 4 is a data-driven initiative designed to enhance access to bank co-financing for small and medium-sized enterprises (SMEs) by streamlining the process of securing public grants and financing. The pilot aims to reduce the time-to-funding for SMEs by generating structured financial recommendations based on publicly available grant data. These recommendations assist both SMEs and banks by providing tailored financing advice that aligns with the economic and financial milestones of funded projects. Additionally, the system accounts for the guarantees, warranties, and loans required to meet the funding prerequisites of public grants, thereby facilitating smoother financing for these projects.

The use case of pilot 4 demonstrates how a business can be developed around strategically collected and processed data assets, particularly for the benefit of financial institutions such as banks and private investors. By detecting companies that have recently received public aid and may need complementary financial products (pre-financing, loans, warranties, etc.), banks can play a more proactive role to speed up time-to-funding.

3.4.2 Pilot Integration. Setup and scenarios

3.4.2.1 Architecture / Stack

Pilot 4 is implemented as a FastAPI REST backend that encapsulates the business logic for financial rules and AI-driven recommendations. Data is persisted in MySQL and processed with SQLAlchemy (async) and Pandas for calculations and transformations. The system integrates with the CDTI REST API and the WP5 semantic extractors to obtain and enrich source data. All components are containerized with Docker and communicate over an internal bridge network to ensure isolation, reproducibility, and straightforward deployment.

3.4.2.2 Integration Flow

Pilot 4 ingests source data from the CDTI Public API and applies enrichment rules obtained from WP5-IA. A monthly ETL process consolidates, validates, and transforms the inputs, producing historized database snapshots. From these snapshots, the system generates the distribution asset in CSV, XLSX, and JSON formats. The asset is exposed through the pilot 4 API for programmatic access and is prepared for publication in the FAME Marketplace.

3.4.2.3 Operational Setup

The solution runs as a containerized Azure Function/API backed by a managed MySQL database. A monthly cron scheduler orchestrates the ETL with retry logic, centralized logging, and email alerts for run outcomes. Security is enforced via Bearer-token authentication and TLS. A lightweight CI/CD pipeline builds the image, executes quick tests, and deploys to the target environment.

3.4.2.4 Exposed Endpoints

The table below lists the exposed endpoints.

Table 2: Exposed endpoints

Endpoint	Purpose
`/extraccion_datos`	Trigger data extraction from external sources (CDTI/WP5).
`/analizar_cdti`	Apply business rules and analytics over extracted CDTI data.
`/descargar_json`	Download the generated asset in JSON format.
`/descargar_excel`	Download the generated asset in XLSX format.
`/descargar_csv`	Download the generated asset in CSV format.

3.4.2.5 Integration Scenarios

1. **FAME Marketplace push of the monthly asset for institutional consumption.** Pilot 4 publishes the validated monthly snapshot (CSV/XLSX/JSON) to the FAME Marketplace. Institutions consume the asset through the Marketplace workflow and ingest it into their DWH/lake for internal scoring and portfolio analytics.
2. **AI-assisted document data extraction via WP5 endpoints.** The system calls WP5 semantic extractors to obtain normalized data (amounts, dates, types, programs). Pilot 4 merges these outputs with CDTI data and applies financial rules. Results are stored in the database.
3. **Direct API consumption by banks or public institutions.** Authorized clients query the pilot 4 API for up-to-date public-grants data. Primary uses include prospecting, risk pre-assessment, and precise information inputs.

3.4.3 Status of deployment. Visuals and screenshots.

3.4.3.1 Current Status

The API is currently running in a local, dockerized environment. The monthly ETL executes correctly and passes its validation checks, producing consistent outputs. The database persists historized data snapshots for each cycle, ensuring traceability over time. The FAME Marketplace listing remains pending; the asset entry must be created and the publication workflow validated before release.

3.4.3.2 Pending for FAME General Assembly

The next steps to reach before the upcoming FAME General Assembly in Madrid are: deploy to Azure production, create the Marketplace listing and complete the final Marketplace integration, finish testing with the WP5 endpoints and perform end-to-end validation, and run a pilot with a representative sample of users from the target institutions.

3.4.3.3 Visuals and Screenshots

Figure 35 demonstrates the POST Method – WP5 data extraction API (Swagger/Postman view):

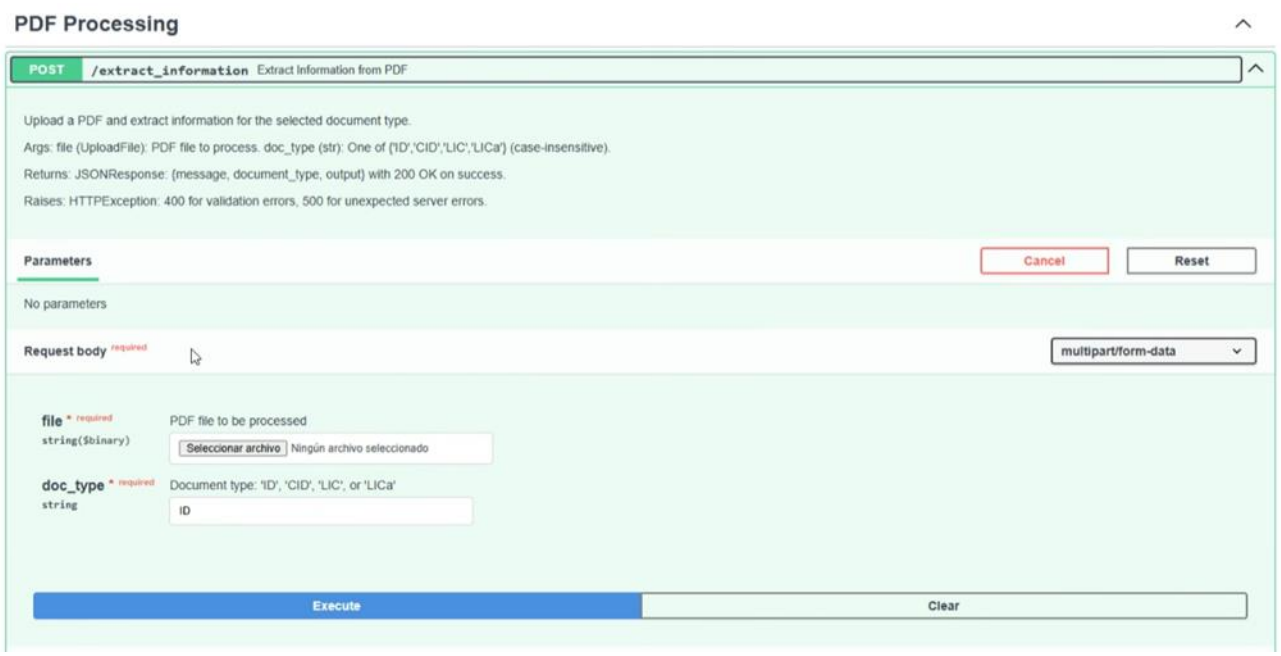


Figure 35: POST Method – WP5 data extraction API (Swagger/Postman view)

Figure 36 shows the response received from WP5 after querying a document (JSON excerpt):

Figure 36: Response received from WP5 after querying a document (JSON excerpt)

Figure 37 depicts endpoints for integration, data extraction, analysis, and downloads:

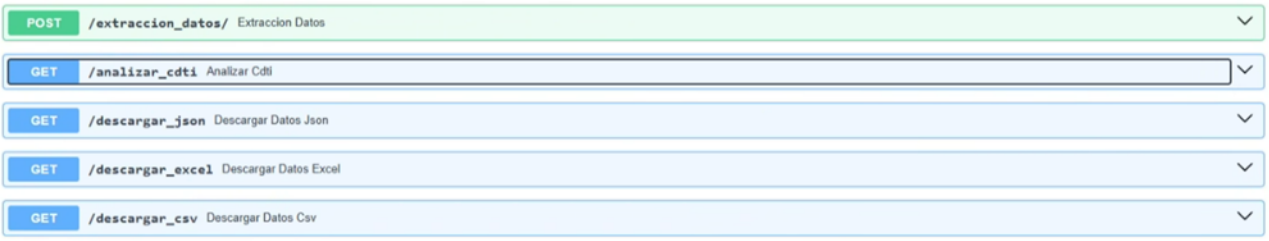


Figure 37: Endpoints for integration, data extraction, analysis, and downloads

Figure 38 shows the principal endpoint for data analysis:

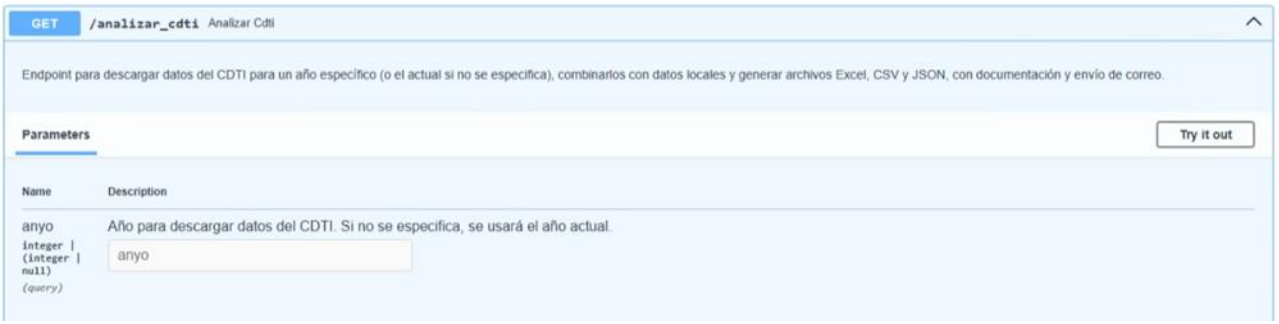


Figure 38: Principal endpoint for data analysis

3.5 Pilot#5 : ESG Scorecard Ranking & Sustainable Portfolio Optimization

3.5.1 Pilot description and demonstrations

The pilot 5 demonstrates how the consortium's fintech partners JRC and KM Cube jointly leverage the FAME Marketplace to deliver an integrated toolset for sustainable finance. The primary objective is to address gaps in transparency, comparability, and optimization within ESG investments by introducing a transparent, data-driven, and investor-centric solution.

The pilot combines ESG scoring with portfolio optimization:

ESG Scoring & Reporting: The platform aggregates ESG scores from pre-selected stock universes and generates portfolio-level sustainability metrics. Monthly recommendation tables are produced based on transparent optimization methodology, allowing investors and stakeholders to assess performance in a consistent and comprehensible manner.

Portfolio Optimization with Investor Profiling: The system provides functionality for building tailored ESG portfolios aligned with individual investor preferences through a **multi-parameter optimization framework.**

The platform offers two approaches to preference specification:

1. **Pre-defined Investor Archetypes:** Nine standard profiles combining risk tolerance (Conservative, Balanced, Aggressive) with ESG commitment levels (Traditional, Sustainable/ESG-Aware, Conscious/Impact), creating archetypes such as “Conservative Sustainable,” “Aggressive Impact,” or “Balanced ESG-Aware.”
2. **Custom Preference Configuration:** Users can define their own parameters directly through the user interface, specifying:
1. **Risk constraints** (volatility caps and concentration limits)
2. **ESG penalty weights** (λ_esg) – controlling the trade-off between ESG alignment and performance
3. **Performance signal integration** (λ_ms) – incorporating financial performance indicators.

The optimization engine constructs portfolios using these configurable parameters, allowing users to implement their preferred financial metrics and ESG data sources. Portfolios can be compared with synthetic portfolios or internationally recognized ESG benchmarks within the FAME Marketplace, providing benchmarking and knowledge exchange opportunities.

Educational Integration: Training modules guide users on methodology interpretation and usage, while introductory ESG courses provide broader educational support for understanding sustainable investing principles.

3.5.2 Pilot Integration. Setup and scenarios

The pilot has been integrated into the FAME Marketplace through three functional layers: data, analytics, and application.

Data Layer: The pilot utilizes market information, ESG scores, synthetic portfolio datasets, and curated metadata available in FDAC. Synthetic client profiles provide further depth for testing while ensuring anonymization and data sovereignty.

Analytics Layer: The optimization framework has been deployed with configurable parameters including:

1. **ESG penalty weights (λ_esg):** Control the trade-off between ESG alignment and portfolio performance
2. **Performance signal weights (λ_ms):** Integrate financial performance indicators into portfolio construction
3. **Risk constraints (vol_cap):** Define maximum volatility tolerance and concentration limits

The framework incorporates MarketSenseAI, a generative AI-powered tool for stock selection that analyzes market trends, financial news, company fundamentals, and macroeconomic factors to generate investment signals. The system also employs regression techniques and explainable AI methods for ESG scoring and portfolio construction.

Application Layer: Results are delivered through two channels:

- **Interactive web application:** Dashboards and portals with visualization tools, accompanied by documentation and training resources
- **FAME Marketplace data assets:** Users can access ESG scores, portfolio recommendations, and optimization results by purchasing the corresponding data assets from the FAME Marketplace.

The user interface provides both pre-defined investor archetypes and custom parameter configuration options.

Setup Environment: The setup was conducted in a secure pilot environment within the FAME Marketplace. Synthetic datasets were generated to reflect realistic investment scenarios, and anonymized data were used for calibration. The ESG reporting platform was deployed alongside recommendation tables, and the optimization engine was implemented with configurable parameter settings for risk tolerance, ESG emphasis, and performance signal integration. The tools were subsequently calibrated against global benchmarks, with iterative testing carried out in collaboration with consortium stakeholders to ensure usability and robustness.

User Scenarios:

1. **Individual Retail Investors:** Investors with smaller portfolios can select from nine pre-defined investor archetypes (e.g., “Conservative Sustainable,” “Balanced ESG-Aware”) or customize parameters through the UI to view ESG performance scores and receive portfolio recommendations tailored to their risk tolerance and ESG preferences.
2. **Institutional Asset Managers:** Professional investors can use the optimization engine to construct customized portfolios with specific parameter configurations, benchmark them against other global ESG references, and explore different risk-ESG trade-off scenarios. Access to underlying data and signals is available through FAME Marketplace asset acquisition.
3. **FAME Marketplace Stakeholders:** Participants can benefit from educational materials and training sessions, which provide both an introduction to ESG portfolio optimization methodologies and guidance on using the developed tools for broader assessment and decision-making across different financial contexts.

3.5.3 Status of deployment. Visuals and screenshots.

3.5.3.1 Deployment

The Pilot is fully operational within the FAME Marketplace infrastructure. The deployment model is based on the Marketplace’s authorization framework, which employs a token-based system to manage access. This approach ensures that users and applications do not directly integrate data but are instead granted secure, controlled, and traceable access through tokens. The framework guarantees

compliance with governance rules while safeguarding data sovereignty and establishing trust across all transactions.

The pilot is delivered through two distinct service models.

The first delivery model provides pre-computed results, made available as data assets in FDAC. These assets include ESG scores and sustainability metrics for stock universes, portfolio optimization results tailored to nine predefined investor archetypes – ranging from "Conservative Sustainable" to "Aggressive Impact" – and monthly recommendation tables with portfolio allocations derived from the project's optimization methodology.

The second delivery model follows a Platform-as-a-Service approach. This model allows investors to go beyond standard archetypes by defining their own parameters for portfolio optimization. Users may specify variables and parameters such as the degree of ESG emphasis (e.g., λ_esg for ESG emphasis), the weight of performance signals (e.g. λ_ms for performance signal integration), or risk constraints (e.g. vol_cap for risk constraints). Based on these inputs, the optimization engine generates personalized portfolio allocations in real time, with direct access provided via the Marketplace's interface.

The pilot also incorporates an ESG scoring and reporting layer, which aggregates market data, ESG scores, and curated metadata to calculate weighted portfolio sustainability scores. These are visualized in dashboards and presented alongside recommendation tables that are updated periodically. In parallel, the optimization engine integrates advanced methodologies with generative AI to enhance stock selection. This enables the system to process financial news, company fundamentals, market signals, and macroeconomic factors, offering dynamic insights and continuous portfolio refinement. Users may further benchmark their portfolios against synthetic or institutional reference portfolios available within the FAME Marketplace, creating opportunities for comparison and knowledge exchange.

Through this deployment model, the pilot delivers a comprehensive and transparent environment for ESG investment analysis and decision-making, serving the needs of both retail and professional investors.

3.5.3.2 Screenshots from the developed system

The following screenshots illustrate the main functionalities of the pilot tools and demonstrate how authorized data from the FAME Marketplace is transformed into practical insights for investors. They capture key steps in the reporting and optimization processes, showing the user journey from profile creation to final portfolio allocations.

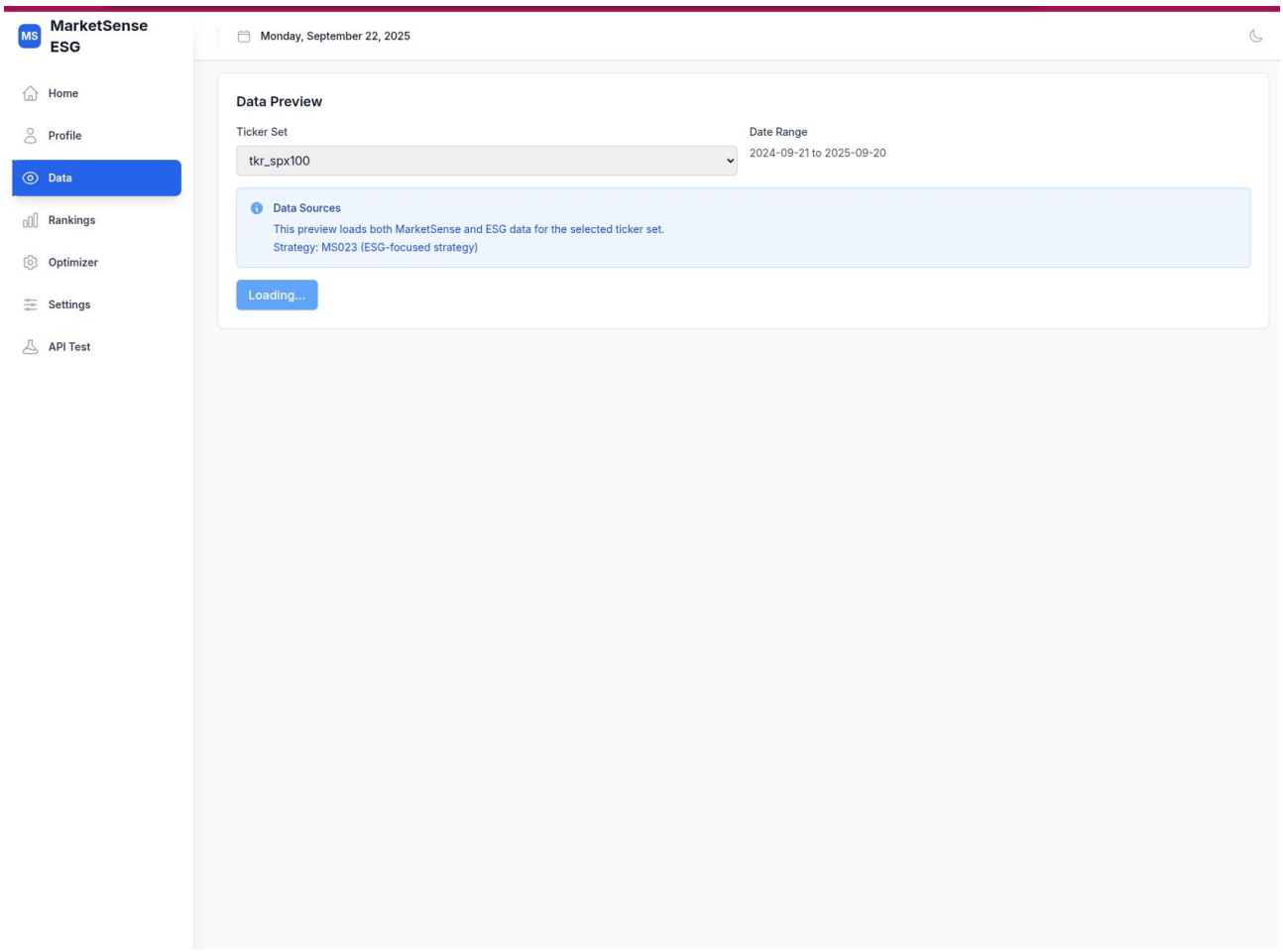


Figure 39: FAME Marketplace's authorization framework using a token-based system

The questionnaire represents the entry point for investors, enabling them to either select from nine predefined archetypes or define a personalized investment profile. It collects information about risk tolerance, ESG sensitivity, and financial objectives, which form the foundation for both reporting and optimization services.

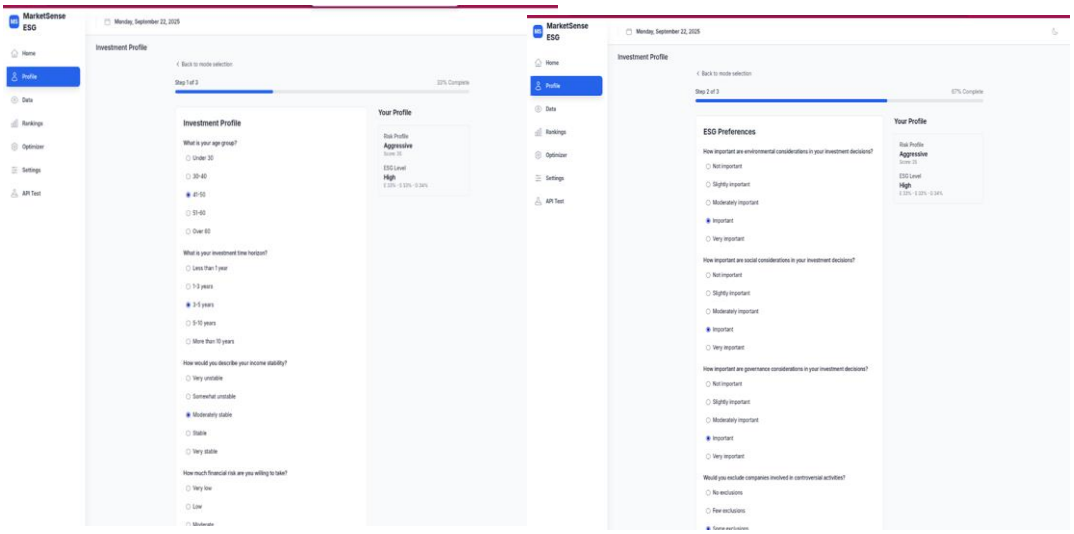


Figure 40: Questionnaire Defining Investment Profile and Portfolio Preferences

ESG Scoring & Reporting: The reporting dashboard consolidates market data, ESG scores, and metadata into weighted sustainability scores. This interface provides investors with a clear view of the ESG performance of their portfolios and tracks their evolution across different reporting periods.

The design ensures transparency and allows stakeholders to assess portfolio sustainability in an accessible manner.

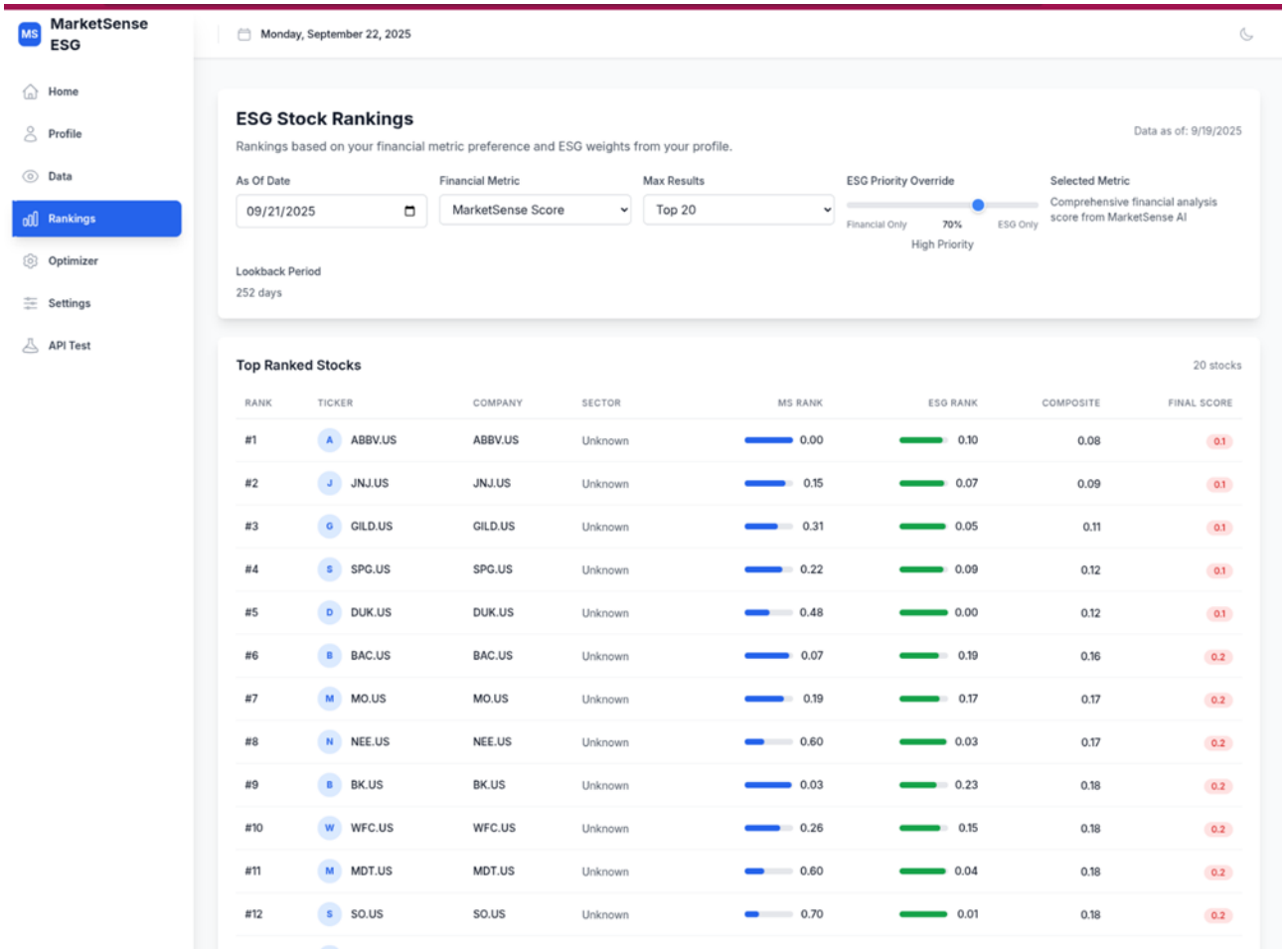


Figure 41: ESG Online Reporting dashboard displaying aggregated sustainability scores.

Portfolio Optimization: The optimization engine incorporates MarketSenseAI. The recommendation table is published periodically, on a monthly or quarterly basis, and provides actionable portfolio suggestions derived from the project's transparent optimization recipe. It highlights recommended allocations, associated ESG scores, and serves as a reference point for decision-making within the FAME Marketplace.

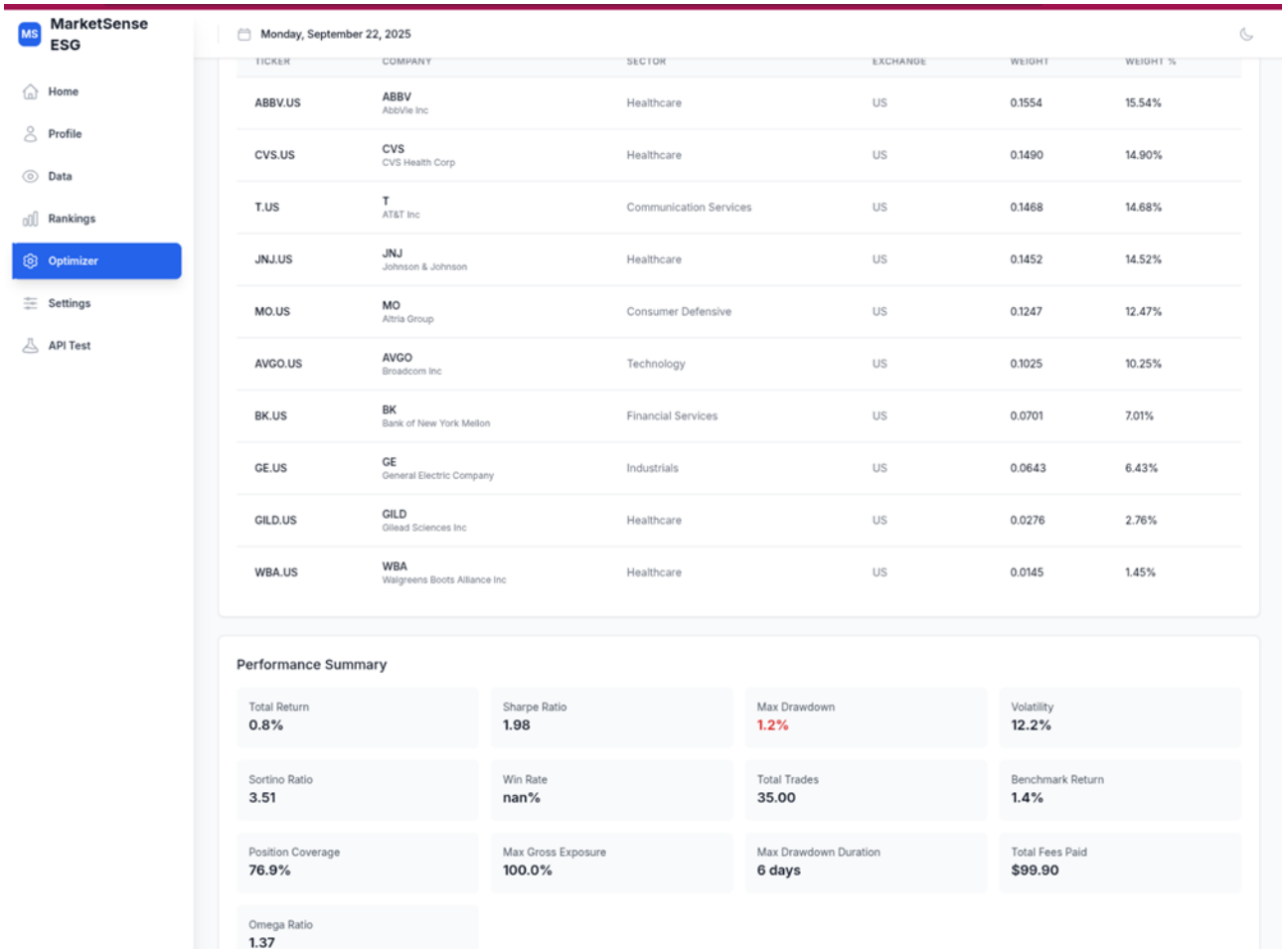


Figure 42: ESG Online Optimizer dashboard displaying Performance Summary

This dashboard provides a comprehensive summary of portfolio performance. It integrates risk and returns analysis with ESG scoring, giving investors a multidimensional view of their portfolio. The performance summary allows users to evaluate the balance between financial returns and sustainability impact in real time.

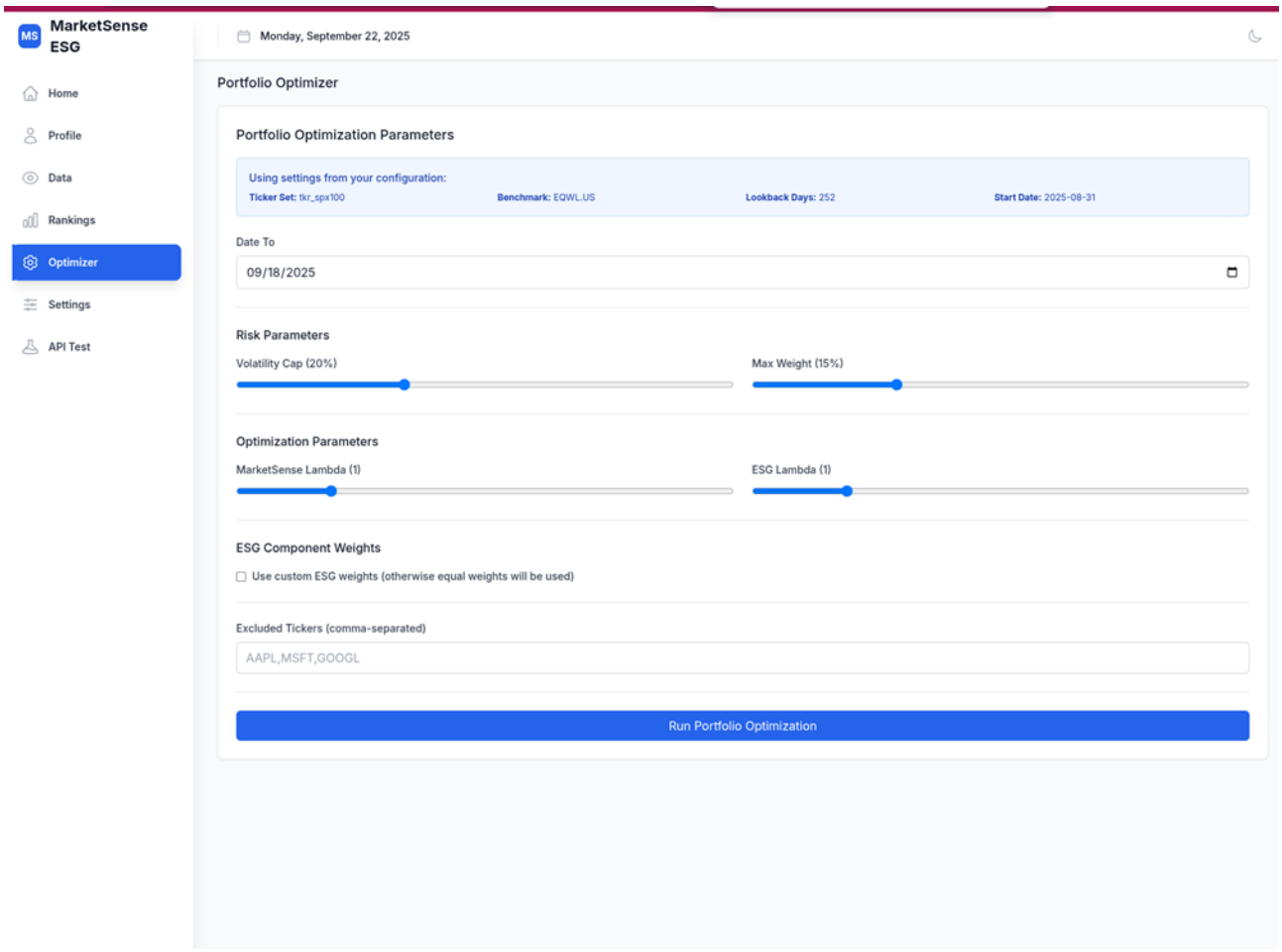


Figure 43: Optimization engine interface showing user-defined parameters allocation

Following the performance summary, the optimization engine leverages advanced algorithms to refine asset allocation based on user-defined parameters and real-time market insights. This process is enhanced by a generative AI-powered tool for stock selection. It assesses market trends, financial news, and macroeconomic indicators, providing a dynamic approach to portfolio's enhancement.

The developed system provides a structured and intuitive interface that supports both standard and customized ESG investment workflows. Its main features include:

- **Investor Profile Selection:** Users choose from nine pre-defined archetypes or defined custom parameters (service mode). These archetypes represent typical strategies with different combinations of risk appetite and ESG sensitivity. For investors who prefer a tailored approach, the service mode allows them to define custom parameters, including investment objectives, tolerance to risk, and weighting preferences for ESG factors.
- **Dashboard Visualization:** ESG score aggregations, portfolio compositions, and performance metrics. Visualization tools allow users to follow the evolution of their portfolio's sustainability scores alongside traditional financial metrics such as return and volatility. These dashboards ensure transparency and provide a consolidated overview of both financial and ESG dimensions.
- **Optimization Controls:** Interactive interfaces for adjusting risk tolerance, ESG emphasis, and signal weights. These adjustments provide the ability to test different investment scenarios and observe in real time the trade-offs between performance and sustainability. Such interactivity not only supports decision-making but also encourages users to explore the underlying dynamics of portfolio optimization.

- **ESG Scoring and optimization visualization:** The system integrates ESG scoring with optimization outputs into dynamic visualizations. These visual tools display the sustainability profile of the portfolio, its allocation across sectors and asset classes, and the direct effects of user-defined parameters. Comparisons of benchmark or synthetic portfolios available in the FAME Marketplace can also be generated, allowing users to contextualize their results and adopt best practices.

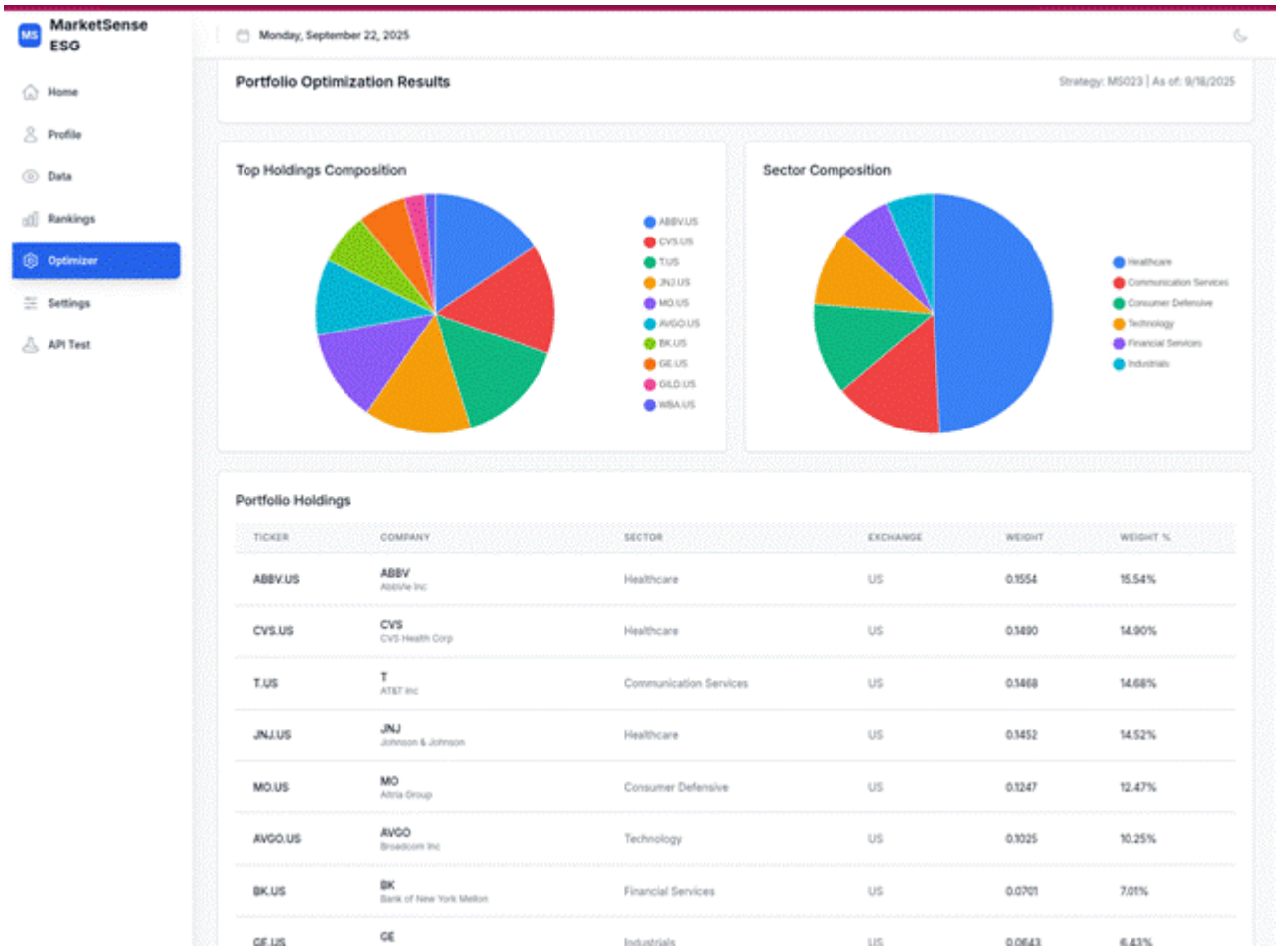


Figure 44: Optimization engine interface showing user-defined resulting allocations.

3.6 Pilot#6 : Embedding Climatic Predictions in Property Insurance Products

3.6.1 Pilot description and demonstrations

The overarching goal of this pilot is to demonstrate how climate model simulations of future meteorological conditions can be embedded in property insurance products. This involves processing these climate model simulations and extracting climate information that is directly relevant to the real estate and insurance industry. The resulting value-added data assets are provided through the FAME Marketplace, and their utility is demonstrated in three different use cases:

UC1 – Climate-aware Real Estate Pricing:

Climate risk impact on real estate valuation can take various forms. Exposure to flood-, wildfire-, or storm-related damages can drive up costs for insurance policies and have adverse effects on the occupants' sense of security, while exposure to extreme heat or poor air quality negatively affects the well-being of people and can render living in exposed areas less desirable. In this use case, we focused on extreme heat risk, which a substantial part of listed homes in the US is exposed to. House price data over California (USA) were obtained, and a hedonic regression model was fitted that explains the median house value over a grid cell through factors like population density, median income, and ocean proximity. An extreme heat index was developed and integrated into this model, explaining variations in median house values due to exposure to extreme heat. We then calculated the same heat index based on bias-corrected surface temperature simulations by several regional climate models, which allows us to compare projected future exposure to extreme heat of all inhabited areas in California with present exposure. Through the hedonic regression model, we can then draw conclusions about shifts in house values in that region.

UC2 – VaR of an Insurers' Portfolio:

The second use case deals with climate risk impacts on the value at risk (VaR) of a portfolio of assets held by insurers. A challenge with this goal, as formulated in the FAME proposal, is that data on the composition of a specific insurer's assets and the value of these assets is not readily available. We therefore investigated instead possible climate risk impacts on the stock price of insurance companies themselves, focusing on eight major players in the European insurance market with high exposure to property, infrastructure, and commercial insurance. As for climate risks affecting the profitability of insurance companies, we focused on storms and floods, which are the two types of weather-related disasters causing the largest insured losses in Europe. Specifically for storms, a meteorological loss index proposed in the scientific literature as a proxy for storm-related damages was calculated from the output of several regional climate models and aggregated to seven subregions within Europe: Northern Europe, Eastern Europe, Southeastern Europe, Southern Europe, Southwestern Europe, Western Europe, and Central Europe. By comparing these climate model simulation-based storm loss indices during a recent historic with future time periods, we can draw conclusions about how the frequency and/or intensity of storm-related losses will change in subregion.

The link between disaster-related losses and the VaR of insurance stocks was studied using data on the actual losses recorded for each European country in the wake of a major storm or flooding event. Those losses were spatially aggregated to the European level, temporally de-clustered, and used in both an exploratory analysis and a model-based approach where stock returns within 7 days after a major storm/flood event were regressed on an index representing the general European market and variables indicating the occurrence of a disaster. Neither of these two approaches, however, showed a clear and unequivocal link between natural disasters and insurance stock volatility. While some major disasters are followed by a drop in the price of certain insurance stocks, the signal is inconsistent and not statistically significant. This is in line with other studies in literature, which find a significant link only for some regions and some types of disasters, but it leads us to conclude that a robust projection of climate-related changes in VaR cannot be obtained with the data at hand.

UC3 – Climate-aware Analysis of Alternative Portfolios:

The idea of the third use case was to develop a tool for insurance companies to identify how to restructure their portfolio in order to be less susceptible to climate risks. Given the negative outcome of UC2, which could not identify a statistically robust connection between weather-related disasters and (insurance) stock prices, alternative approaches first had to be explored to define a climate risk signal with a quantifiable impact on the stock market. Specifically, we attempt to derive a climate risk index through textual analysis of newspapers and social media, following scholarly articles on economics suggesting that climate related information can help explain differences in the performance of stocks with different exposure to climate risk. If we can confirm that such a signal exists, we will include it in a factor model which can then help optimize the performance of a stock portfolio based on news-based climate risk information. This work is still ongoing at the time of writing this report. If our research efforts are successful, a historic news-based climate risk series and algorithms to calculate these series from future newspaper articles will be provided on the FAME Marketplace.

3.6.2 Pilot Integration. Setup and scenarios

The previous section gives a brief overview of the research activities in pilot 6. A more detailed description of the results in UC1 and UC2 (and later this year, UC3) is given in the form of two white papers which can be accessed through the FAME Marketplace. The following data assets coming out of pilot 6 are provided through the FAME Marketplace:

UC1: 5 csv-files (corresponding to 5 different climate models) with climate model-based simulations of past and future extreme heat indices for all inhibited areas in California, allowing users to perform analyses like that discussed in our white paper on UC1 and illustrated below.

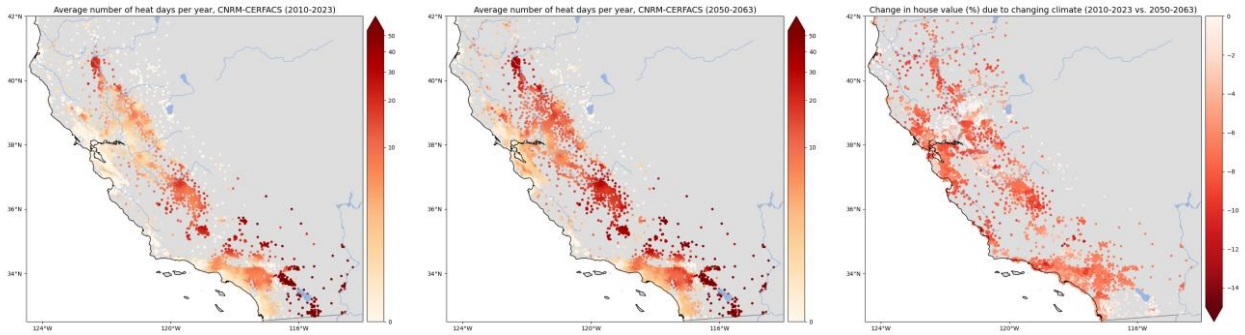


Figure 45: Extreme heat indices simulated by one of the climate models for a future period (2050-2063) and a reference period (2010-2023) and resulting implications on median house value predicted by our hedonic regression model

UC2: 3 csv-files (corresponding to 3 different climate models) with climate model-based simulations of past and future storm loss indices for different parts of Europe, allowing users to perform analyses like that discussed in our white paper on UC2 and illustrated below.

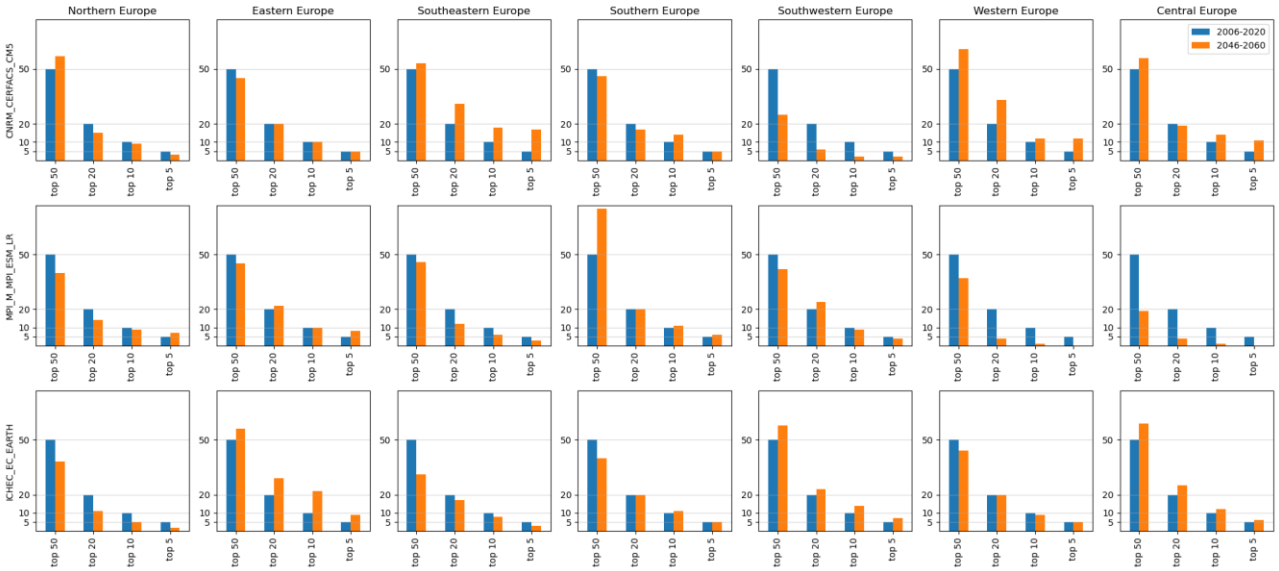


Figure 46: Projected changes in the regional loss index distributions by three different climate models for future (2046-2060) vs reference (2006-2020) period

3.6.3 Status of deployment. Visuals and screenshots

The climatic prediction datasets and related assets generated within this pilot are hosted through the FAME Data Hosting Portal, which constitutes the secure infrastructure layer of the ecosystem. The portal is a fully operational, production-ready multi-tenant platform that enables federated organizations to upload, manage, and distribute data assets in compliance with European data protection regulations.

The deployment has been carried out on a containerized Python environment, running a Flask-based web application (v3.1.1) with database management via Flask-Migrate and SQLite backend. All assets are stored using a UUID-based mechanism that ensures both unpredictability of access tokens and integrity of the hosted files. Each organization operates in complete isolation, with dedicated administrator credentials, private dashboards, and independent management of their data assets.

For this pilot, the climatic prediction datasets are exposed as secure downloadable assets, each linked to a unique cryptographically generated slug in the format /file/<uuid>. All access attempts are comprehensively logged through the platform's auditing system, which records IP address, timestamp, and user agent details, thereby ensuring full traceability.

The user interface of the hosting portal complements these functionalities by providing a professional landing page with ecosystem information and real-time statistics, while each federated organization accesses a private dashboard. Within this dashboard, administrators can monitor storage utilization, number of active secure URLs, download activity, and asset-specific metadata including file integrity checksums (SHA-256).

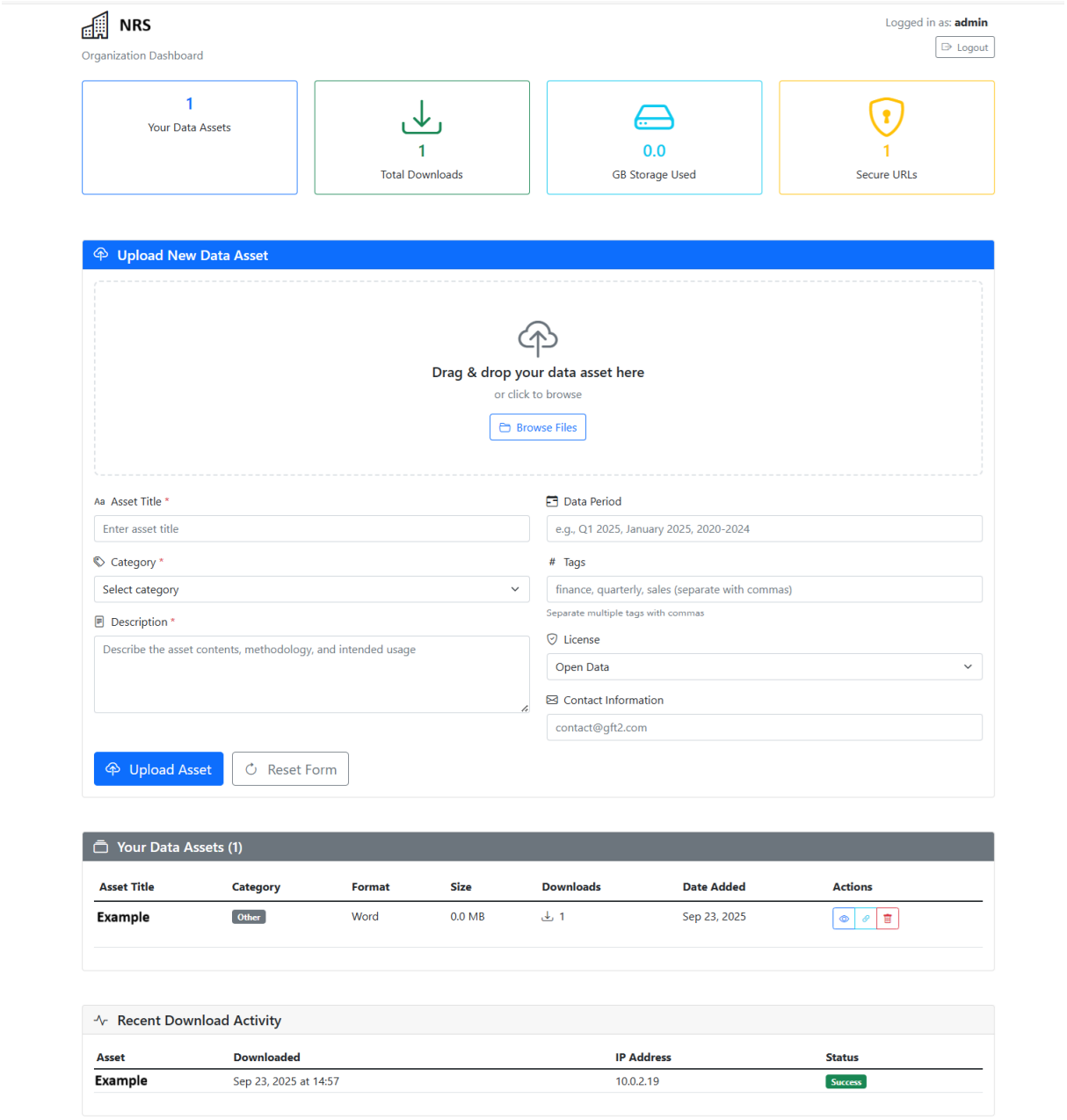


Figure 47: Screenshots of the dashboard illustrate the drag-and-drop upload interface, the asset management table with copy-to-clipboard URL functionality, and the detailed download activity logs

At the present stage, the system is in active operation with multiple organizations, including the integration of the Embedding Climatic Predictions datasets. This ensures that the climatic models and derived indices used in the insurance-related use cases are discoverable, securely stored, and distributable through the FAME Marketplace. The hosting service effectively separates the commercial interaction layer of the marketplace from the technical data delivery infrastructure, thereby providing a robust and scalable deployment environment for this pilot.

3.7 Pilot#7 : Assessing the Quality and Monetary Value of Data Assets

3.7.1 Pilot description and demonstrations

Pilot 7, led by Motor Oil Hellas (MOH), focuses on assessing the quality and monetary value of industrial data assets within a refinery environment. The pilot demonstrates how the FAME Platform can transform complex industrial sensor data into actionable insights for predictive maintenance and process optimization, while establishing frameworks for data asset pricing and trading.

The pilot has successfully implemented two primary use cases.

Use Case 1: Quality Assessment and Pricing of Industrial Data Assets

This use case focused on developing systematic methodologies for evaluating industrial data quality across multiple dimensions. The implementation encompassed three primary categories of data assets. The first category consisted of raw sensor datasets, which included direct measurements from industrial sensors such as temperature, pressure, vibration, and axial displacement readings. These datasets represented the foundational data layer, capturing real-time operational conditions across multiple compressor groups within the refinery. The quality assessment framework evaluated these datasets based on completeness, accuracy, temporal consistency, and contextual relevance.

The second category comprised pre-processed and labeled datasets. These enhanced data assets had undergone cleansing, filtering, and annotation, with domain expertise applied to enrich the raw data with contextual information, anomaly flags, and operational state labels. The preprocessing pipeline included data validation, outlier detection, and the application of industrial knowledge to create more interpretable and actionable datasets.

The third category included predictive models and algorithms, which were machine learning models trained on refinery data and represented the highest tier of data assets. These models encompassed anomaly detection, forecasting algorithms, and predictive maintenance systems that encapsulated both data and algorithmic knowledge. Quality assessment for these assets focused on model performance metrics, generalizability, and practical applicability across different industrial contexts. A comprehensive quality scoring framework was implemented in the pilot, assigning quantitative measures to each data asset type. This framework considered factors such as data volume, completeness ratios, locality and context specificity, variety of data sources, and demonstrated usage in industrial applications. The scoring system enabled comparative evaluation of different data assets and supported the development of pricing schemes that correlated with actual asset value and utility.

Use Case 2: Data Analysis and Production of Value-Added Assets using FAME Tools

The second use case demonstrated the transformation of raw industrial data into value-added assets through the application of FAME analytical tools and techniques. This process involved several sophisticated analytical pipelines. An advanced analytics pipeline was established, integrating machine learning models, explainable AI techniques, and time-series analytics to extract actionable insights from sensor data. The pipeline processed high-frequency sensor readings, applied temporal pattern recognition, and generated predictive analytics that supported maintenance decision-making.

Explainable AI techniques were implemented to provide transparency in model predictions and recommendations. This included the development of explanation frameworks that helped maintenance engineers understand why certain alerts were generated or specific recommendations were made, thereby increasing trust and adoption of AI-driven systems. Federated learning capabilities were also developed, enabling knowledge sharing without exposing sensitive operational data. This approach allowed MOH to participate in collaborative learning initiatives while maintaining data sovereignty and regulatory compliance.

3.7.2 Pilot Integration. Setup and scenarios

Pilot 7's architecture ensured seamless yet secure integration with FAME's Marketplace. This design enabled efficient collaboration, data protection, and compliance with sector-specific requirements throughout the pilot's lifecycle.

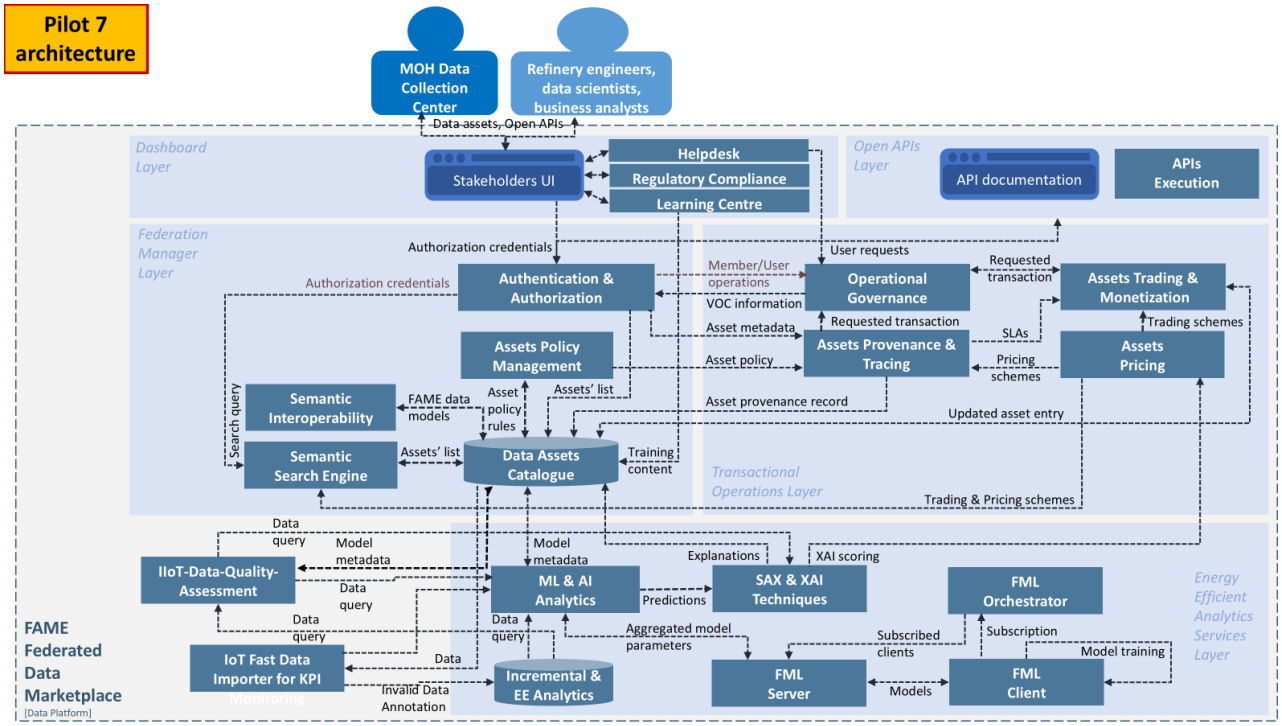


Figure 48: Pilot #7 Architecture

- Federation Manager Layer: This layer managed secure asset sharing and access controls, ensuring compliance with sector regulations and maintaining MOH's operational boundaries.
- FDAC Integration: Assets were indexed with detailed metadata and graded for quality, enabling efficient discovery and fair trading.
- Analytics as a Service: MOH's processed data flowed into FAME's analytics layer for continuous machine learning model training, XAI processing, and incremental analytics, supporting predictive and explainable insights.

The core deployment relied on a secure DCS-to-Historian data flow, augmented by APIs that exposed assets to FAME. The pilot leveraged federated learning to improve models while protecting privacy and contributed industrial sensor data for broader collaborative analytics. Scenarios included the creation of predictive maintenance pipelines and participation in federated modeling with robust privacy guarantees. Marketplace operations were enabled through automated, quality-based pricing and trading functions.

Key challenges addressed included harmonizing industrial data formats, implementing layered security, and compliance measures, and supporting ongoing user training and feedback loops.

3.7.3 Status of deployment. Visuals and screenshots.

Pilot 7 has reached full operational deployment at the MOH refinery. All primary components, including the IIoT Data Quality Assessment Service with upgraded interface and LLM-based assessment, anomaly detection models, LSTM forecasting, federated learning integration, and interactive dashboards are now active and validated.

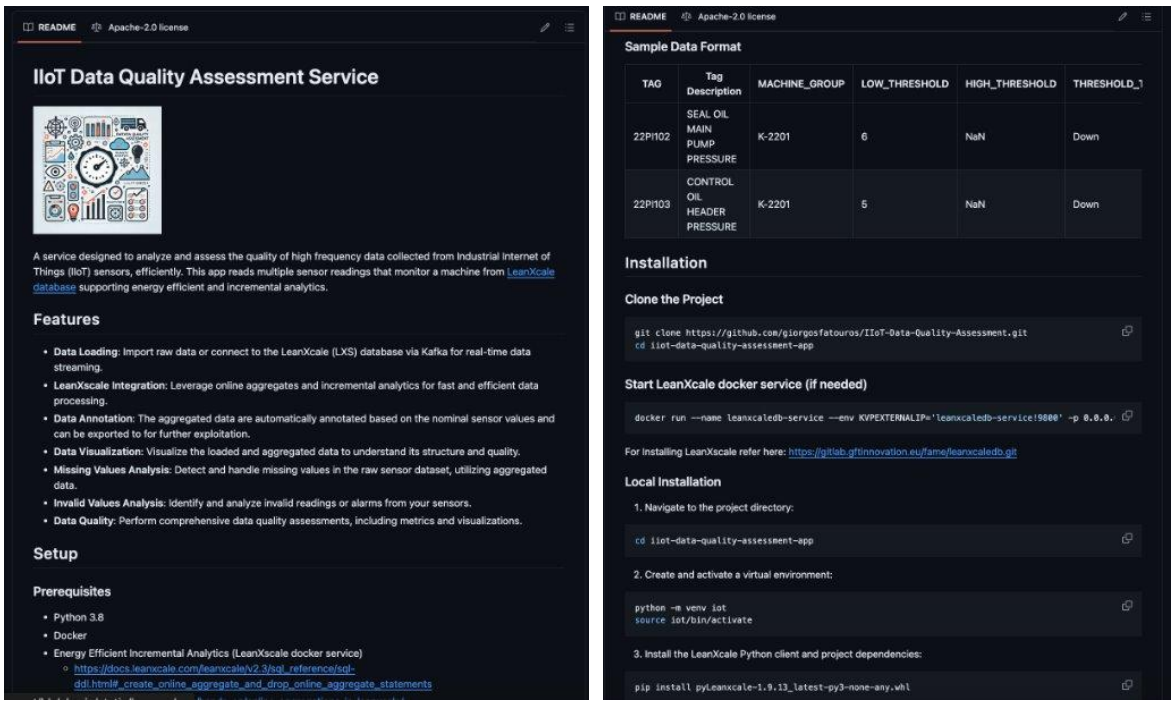


Figure 49: Data Quality Assessment Service for IIoT data using FAME's assets

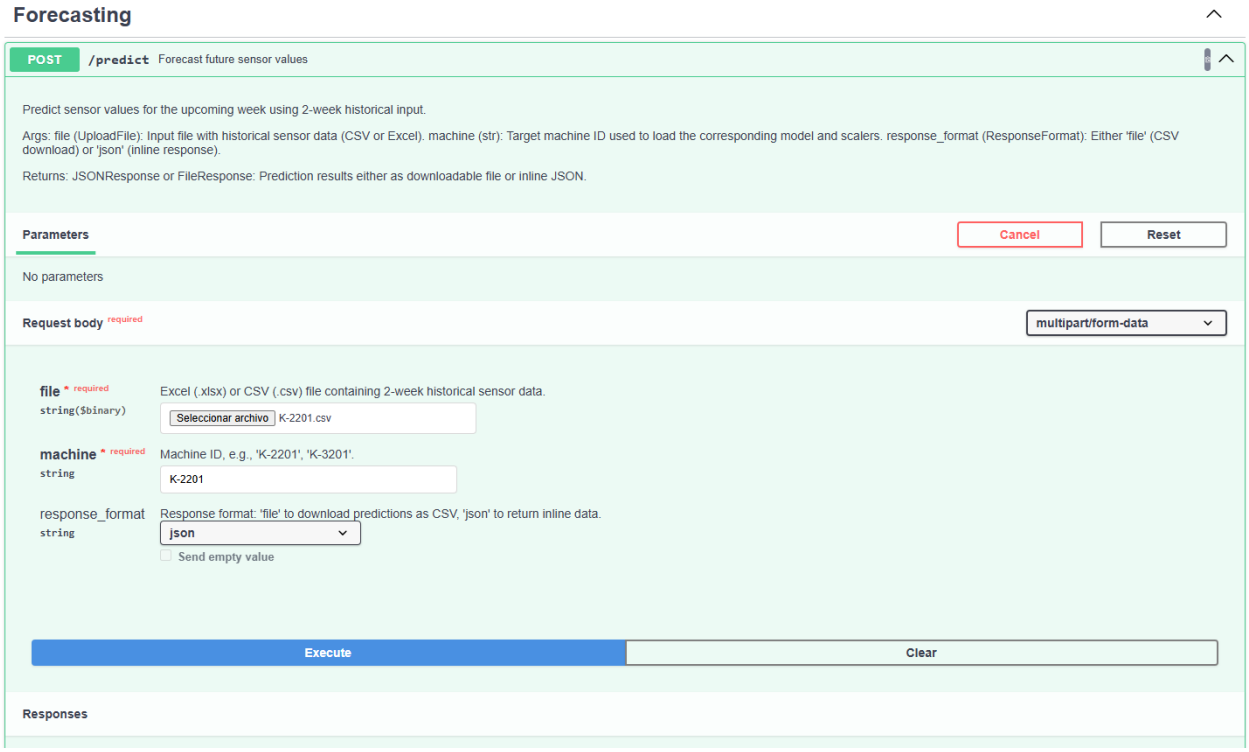


Figure 50: Forecasting model API

The analytics pipeline processes over two million sensor readings daily, providing automated quality scoring, anomaly detection, and maintenance forecasts for all monitored compressors, while the FAME Platform integration has led to the indexing of twenty pilot assets in the Marketplace. Stakeholder workshops have been conducted, enabling training, feedback integration, and ongoing support.

Raw sensor data proceeds from compressors through the control system, historian database, and secure APIs before passing to the FAME data store and analytics layer. Quality scores, forecasting output, and anomaly detection results are extracted and published to the marketplace. The business impact is shown by a reduction in unplanned downtime, broad dissemination of training materials, and high stakeholder satisfaction.

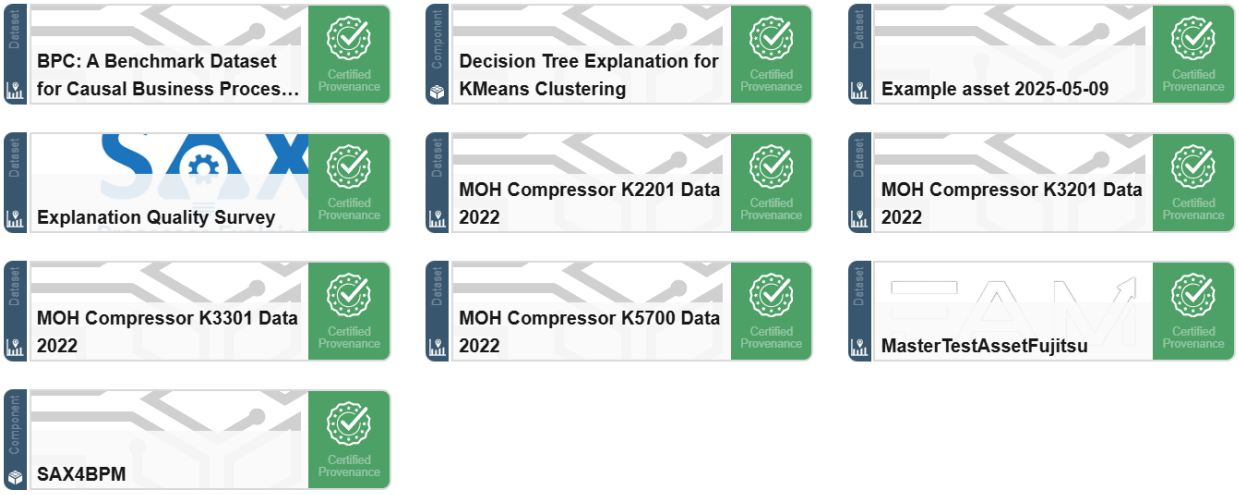


Figure 51: FAME data assets including MOH data assets

Deployment challenges were addressed through secure API implementation for compliance, smart data sampling and incremental analytics for real-time processing, continuous federated model updates to maintain accuracy, and comprehensive operator training to ensure adoption. Adapting incremental analytics proved essential for handling the refinery's high-frequency data streams, while XAI built necessary trust among operators and regulators. Federated learning supports collaborative improvement without compromising sensitive information, and systematic quality assessment enables rational pricing and trading of data assets. Phased deployment, early engagement, and robust training ensure broad system acceptance. Monetization strategies based on quality, enhanced analytics value, and collaborative modeling establish the digital foundation for ongoing industry-wide improvements. The experience confirms the FAME Platform's viability for industrial data-driven transformation, with clear lessons for technical, operational, and business best practices going forward.

4 Conclusions

The comprehensive implementation and operation of the seven FAME pilots confirm that the FAME Data Space has successfully moved beyond theoretical design to become a validated, operational ecosystem.

The integration across all pilots successfully validated the core architecture:

1. **Trust and Sovereignty are Secured:** The FAME Federation Module proved capable of acting as a structured, regulated entry point, ensuring all integrated pilot assets and participants operate under strict governance and compliance rules, thereby guaranteeing data sovereignty and mitigating risks associated with untrustworthy data provenance.

2. **Asset Commercialization is Feasible:** The FAME Marketplace Dashboard demonstrated its utility as the operational hub, enabling pilots to transform their internal R&D – ranging from AI recommendation engines (pilot 1) and EmFi loyalty schemes (pilot 2) to complex optimization tools (pilot 5) – into monetizable, tradeable data assets and services.

3. **Real-Life Business Impact is Achieved:** The demonstrable results, such as the improved segmentation for financial risk (pilot 1), the operational EmFi services for citizens (pilot 2), and the fully-deployed sustainable portfolio optimization tool (pilot 5), unequivocally validate the technical feasibility and the business potential of FAME to support next-generation, data-driven solutions in the financial sector and beyond.

All the pilots are real-world application and services that confirmed that the FAME Data Space provides a robust, compliant, and commercially viable platform, ready to serve as the foundation for a federated data economy.

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