D3.4 – BEYOND Integrated Platform – Alpha, Mock-ups Release

Grant Agreement n°	**957020**
Project Acronym	**BEYOND**
Project Title	**A reference big data platform implementation and AI analytics toolkit toward innovative data sharing-driven energy service ecosystems for the building sector and beyond**
Starting Date	01/12/2020
Duration	36
EU Project Officer	Stavros STAMATOUKOS
Project Coordinator	UBITECH
Consortium Partners	VTT, FVH, CIRCE, Suite5, IGM, KONCAR, ARTELYS, MYTILINEOS, CUERVA, BELIT, URBENER, BEOELEK,
Project Website	beyond-h2020.eu
Cordis	https://cordis.europa.eu/project/id/957020

This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 957020.

Deliverable No.	**D3.4**
Deliverable Title	**BEYOND Integrated Platform – Alpha, Mock-ups Release**
Work Package	WP3 - End-to-end Interoperable Big Data Management Platform
WP Leader	SUITE5
Due Date	31/01/2022
Actual Date of submission	01/02/2022
Version	V1.00
Status	Final
Dissemination Level	Public
Authors	Suite5
Reviewers	UBITECH IGM

Disclaimer: *The present report reflects only the authors' view. The European Commission is not responsible for any use that may be made of the information it contains.*

Version	Modification(s)	Date	Author(s)
0.10	First ToC	17/09/2021	Suite5
0.20	Draft Chapter 1,2	12/10/2021	Suite5
0.30	Draft Chapter 2,3	15/11/2021	Suite5
0.40	Updated Chapter 3,4	21/12/2021	Suite5
0.50	Updated Chapter 5,6	10/01/2022	Suite5
0.60	Updated mock-ups as per partners' feedback	21/01/2022	Suite5
0.70	Final Draft version ready for peer review	27/01/2022	Suite5
0.80	Final Version addressing peer review comments	31/01/2022	Suite5
1.00	Final Version submitted to EC	01/02/2022	Suite5

EXECUTIVE SUMMARY

Deliverable "D3.4 - BEYOND Integrated Platform – Alpha, Mock-ups Release" is the document describing the output of the activities performed in the context of "T3.5 Platform and Services Bundles Continuous Integration and Open APIs Delivery" which resulted in the Alpha release of the BEYOND integrated platform.

As such, this deliverable presents an indicative set of mock-ups which depict the envisioned frontend environment, enabling users to understand the envisaged operation of the platform.

The alpha release of the BEYOND Integrated Platform is based on the feedback received from the partners during the various meetings and incorporates any further comments received on their initial version. As such this deliverable sets the foundations for the upcoming integration activities of WP3 and WP4 towards the delivery of the beta release of the BEYOND Integrated Platform in M16 of the project's implementation.

More specifically, this deliverable presents the different operations that might be executed within the BEYOND Platform and which are related to the platform's:

- data collections services available through the Data Check-In feature enabling users to upload and store their data assets in the platform, in an appropriate form
- data analytics services available through the Data Analytics feature, where users can design and execute analytic workflows on the data assets they own, and which are stored in the platform.
- data sharing and trading services available through the Marketplace feature, enabling Asset Providers to share/sell their data assets to interested Asset Consumers/Brokers.
- data searching services available through the Data Assets feature, enabling users to run queries on the data assets they own, and which reside in the platform and acquire the corresponding results through the provided API.

Table of Contents

LIST OF FIGURES

List of Abbreviations

Abbreviation	Full text
APIs	Application Programming Interface
BEYOND	A reference big data platform implementation and AI analytics toolkit toward innovative data sharing-driven energy service ecosystems for the building sector and beyond
DEM	Data Exploration Module
DTM	Data Trading Module
Dx.y	Deliverable x.y
DoA	Description of Action
ETH	Ethereum
FTP	File Transfer Protocol
SEC	Security Components
Mx	Month x (of BEYOND project)
PDSL	Polyglot Data Storage Layer
Tx.y	Task x.y
UC	Use Case(s)
UI	User Interface
WPx	Work Package x

1. INTRODUCTION

1.1 Scope and objectives

The deliverable at hand, entitled "D3.4 - BEYOND Integrated Platform – Alpha, Mock-ups Release" reports the initial activities carried out in the context of "T3.5 Platform and Services Bundles Continuous Integration and Open APIs Delivery", which focuses on the continuous integration of the different data-driven services bundles and components developed the context of WP3 and WP4 activities into the final BEYOND platform.

Under this context, the main scope of D3.4 is to report on the early outcomes of T3.5 activities by M14 of the project's implementation; presenting the Alpha release of the integrated BEYOND Cloud based platform through a series of functional mock-ups depicting its overall frontend environment thus enabling readers to understand the envisioned operations pertaining to the various services offered by the BEYOND Platform which include:

- data collections services offered through the **Data Check-In** feature and facilitated by the BEYOND Platform's Data Ingestion Services, described in D3.3.
- data analytics services offered through the **Data Analytics** feature and facilitated by the BEYOND Platform's Isolated Data Analytics Containers described in D4.1 [5].
- data sharing and trading services offered through the **Marketplace** feature and facilitated by the BEYOND Platform's Data Trading Module described in D4.1 [5].
- data searching services offered through the **Data Assets** feature and facilitated by the BEYOND Platform's Data Exploration Module described in D4.1. [5].

The chosen user interface (UI) and the functionalities presented through the delivered mock-ups, are based on the BEYOND stakeholders functional and non-functional requirements defined in D2.6 [3], aligned with the backend data-driven services bundles needs (as described in D3.3 [4] and D4.1 [5]), while their final version presented here is built also on the feedback received from the partners upon reviewing draft mock-ups.
In alignment with the DoA, the BEYOND Integrated Platform will be delivered in three distinct releases through the project's duration, building on the outcome of the present deliverable (i.e., D3.4. – Alpha, Mockups release): in M16 (beta release – D3.5), in M20 (Release 1.00 – D3.7) and in M32 (Release 2.00 – D3.8). As such the current deliverable provides significant input and guidance to the upcoming integration activities of WP3 and WP4 towards the delivery of the beta release of the BEYOND Integrated Platform in M16 of the project's implementation.

1.2 Relation to other tasks/deliverables

The present deliverable documents the activities performed in T3.5 and its main scope is to deliver the alpha version of the BEYOND Integrated Platform. Towards this direction, D3.4 receives input from the following BEYOND tasks and associated deliverables:

- T2.1 - Definition of Business Scenarios, Use Cases and Elicitation of user & business requirements; where the updated technical requirements and the Use Cases (UCs) of the BEYOND project are defined and documented in D2.2.
- T2.5 - Detailed architecture design, protocols, and interfaces specifications for Big Data-enabled Energy Services; where in D2.6 the initial design specifications for the services bundles forming the BEYOND integrated platform are documented.
- T3.3 - Platform Backbone Infrastructure, On-Premise and Secure Experimentation Playground Data Containers and Core Services Development.
- T3.4 - Data Assets Security, Encryption and Privacy Mechanisms.
- T4.1 Big Data Analytics Workbench and Jobs Execution Engines.

The outcome of the activities performed in D3.4 will be also used as input in the following BEYOND tasks/deliverables and work packages:

- T3.5 - Platform and Services Bundles Continuous Integration and Open APIs; where the Data Analytics, Sharing & Matchmaking Services Bundles will form part of the BEYOND system integration activities towards the delivery of the first release of the BEYOND big data platform.
- D3.5 - BEYOND Integrated Platform & Open APIs – Beta Release, which will be built on the outcomes of this deliverable.
- D4.3 –BEYOND Data Analytics, Sharing & Matchmaking Services Bundles – Release 1.00, which will be based on the feedback received on this alpha release (D3.4) and will include enhancements and updates.

1.3 Structure of the document

In order to address all the aspects relevant to the scope of D3.4, the remaining of this document has been structured as follows:

- Chapter 2 presents the envisioned view of the integrated BEYOND Platform as well as the envisioned authorization/registration process, the platform's Home menu and the Settings menu.
- Chapter 3 describes the envisioned data check-in operation, showcasing how a data asset provider can successfully upload his/her data assets into the BEYOND platform.
- Chapter 4 describes the envisioned data analytics operation offered through the BEYOND Platforms' Isolated Data Analytics Containers.
- Chapter 5 describes the envisioned data asset sharing/trading operation delivered through the BEYOND Platforms' Data Trading Module.
- Chapter 6 describes the envisioned data searching operation, delivered through the BEYOND Platforms' Data Exploration Module.
- Finally in chapter 7 the conclusions of this document are provided.

2. Integrated BEYOND Platform – Generic functionalities

2.1 Registration & Authorization

When the users launch the BEYOND Platform, without being already signed-in from a previous session, they are directed to the Login screen (see Figure 1). As the users already have an account, they just enter the requested fields (username and password) in order to be authenticated and logged-in to BEYOND platform.

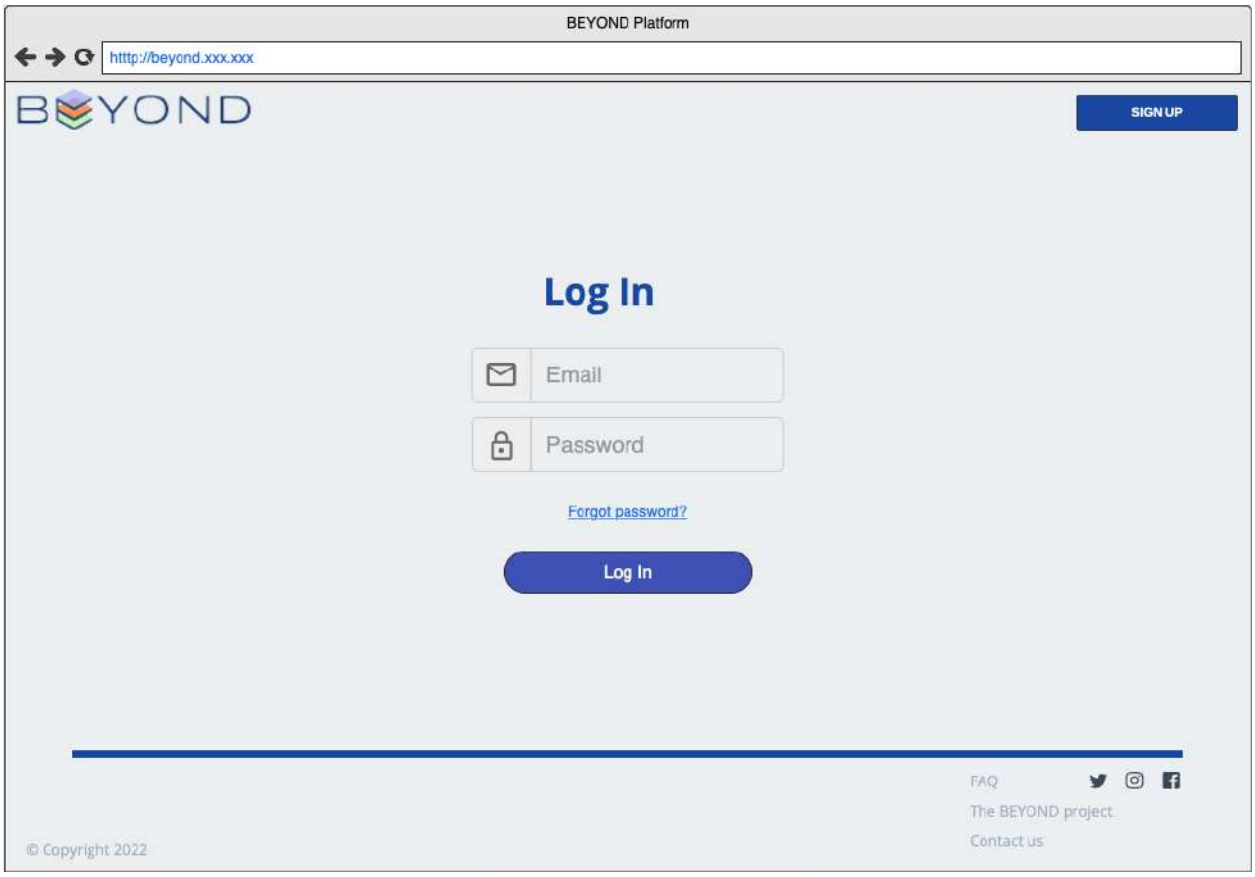

FIGURE 1 LOG-IN

If the user has not sign-up before, he/she can click on the respective button to register to the BEYOND Platform. Password recovery is also provided through the log-in page.

2.2 Home Menu

Once successfully logged-in, the user will be directed to the BEYOND Platform's main page (Figure 2). Here the BEYOND platform's main scope is provided, along with links to the BEYOND project's main website and its social media accounts. As shown in Figure 2 by clicking on the hamburger icon (top left) the "Home" menu (dropdown) is activated so that users can select the service of-interest to them.

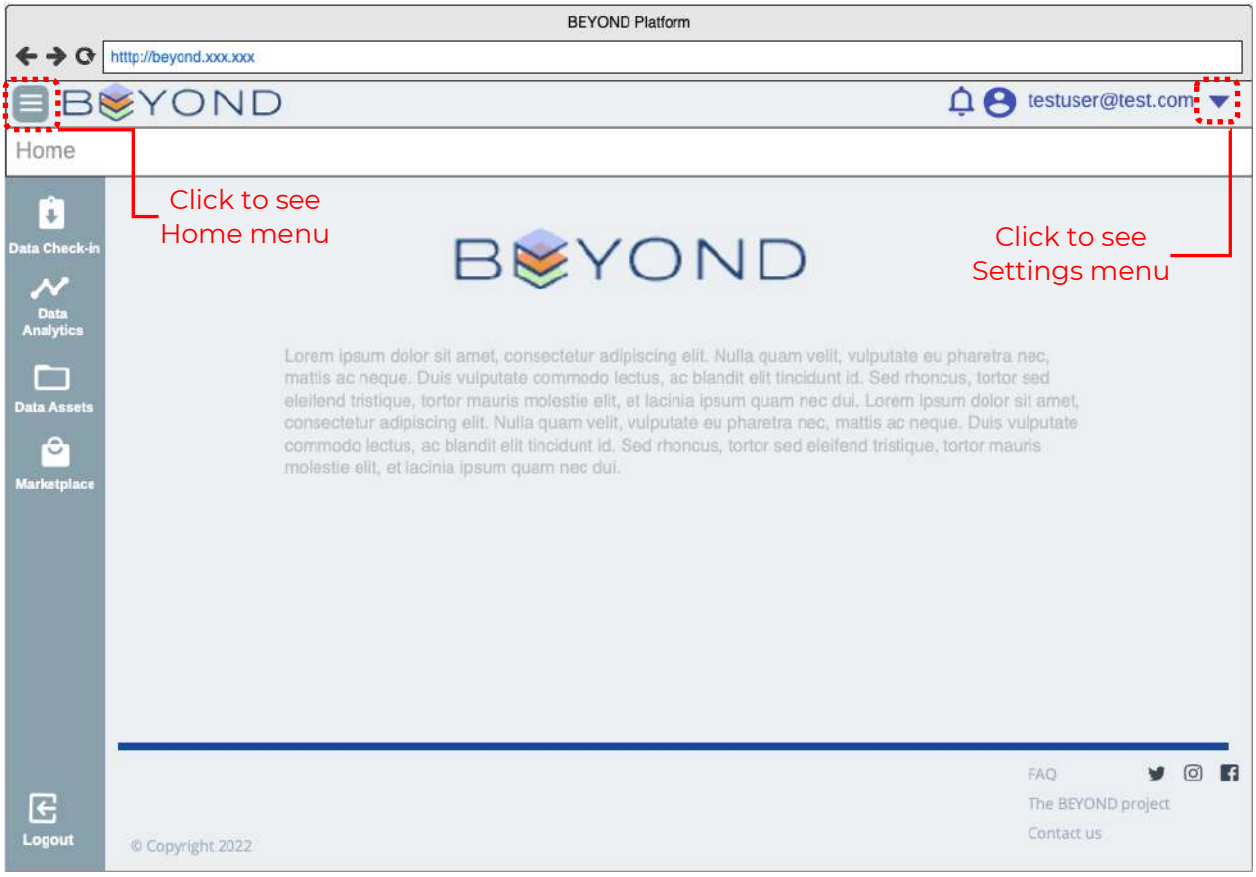

FIGURE 2 MAIN PAGE – HOME & SETTINGS MENU

As shown above, the BEYOND platform's "Home" menu offers to its users four key functionalities and which are briefly described here:

- **Data Check-in**, representing the main entry point for users to upload their data assets to the BEYOND Platform, incorporating further services (such as data mapping, anonymisation, cleaning and encryption) so that the data assets are successfully stored in the platform in an appropriate form.
- **Data Analytics**, offering to its users a variety of tools for designing and executing analytics on their data assets and receiving the corresponding analysis results
- **Data Assets**, where users can search and discover data assets that might be of interest to them.

- **Marketplace,** offering to the platform's users data sharing and trading functionalities.

Lastly, a "Log-out" button is provided at the bottom of the "Home" menu, so that users can disconnect from the platform at any time

2.3 View/Edit Organisation Profile

On the settings menu, if the user clicks on the "Organisation Profile" he/she is directed to the respective page (if authorised), where the basic details (legal name, address, type, etc.) of their organizations are shown (Figure 3) and can be edited.

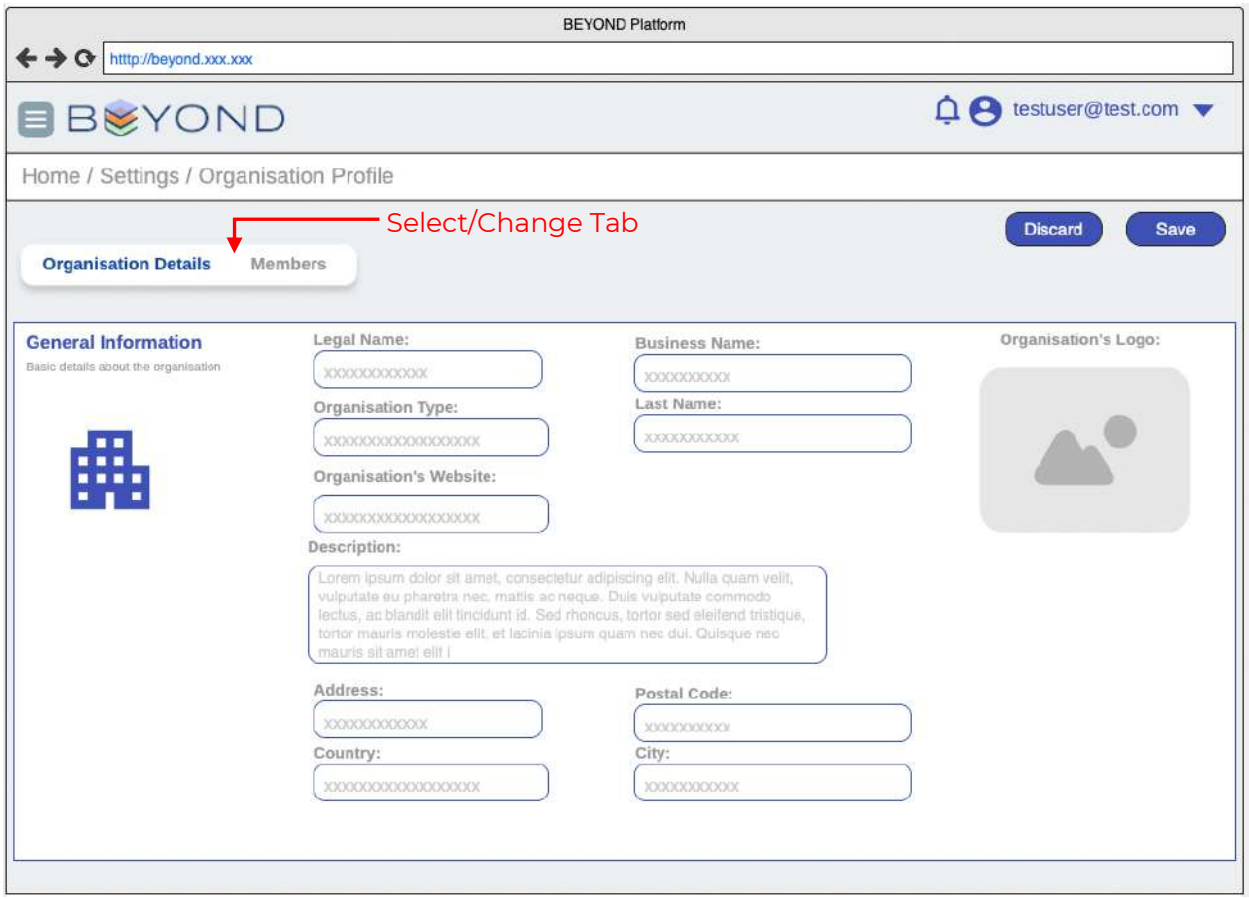

FIGURE 3 ORGANISATION PROFILE – VIEW/EDIT ORGANISATION INFO

3. Data Ingestion services

3.1 Data Check in

Within this section, the envisioned operation for the data check-in process is presented, through the use of mock-ups, presenting the various steps that a data asset provider shall follow, in order to successfully upload his/her data asset(s) into the BEYOND Platform.

In brief, the overall process starts with the data assets provider creating a new data check-in job (see section 3.2), defining the harvester configuration (section 3.3) responsible to load the data on the platform, outline his/her preferred pre-processing rules to be applied on his/her data asset, any accompanying metadata and the licensing details and as a last step execute the data check-in job to initiate start loading the data to the BEYOND Platform.

3.2 Create new Data Asset check-in job

In order for a user to upload his/her data asset to the BEYOND Platform, it shall undergo through the data check -in process. This process starts once a perspective data provider selects from the "Home" menu the "Data Check-in" option (see Figure 2). Thereafter a series of steps shall be followed, where users are prompted to configure various parameters, so as to successfully upload their data assets onto the BEYOND Platform.

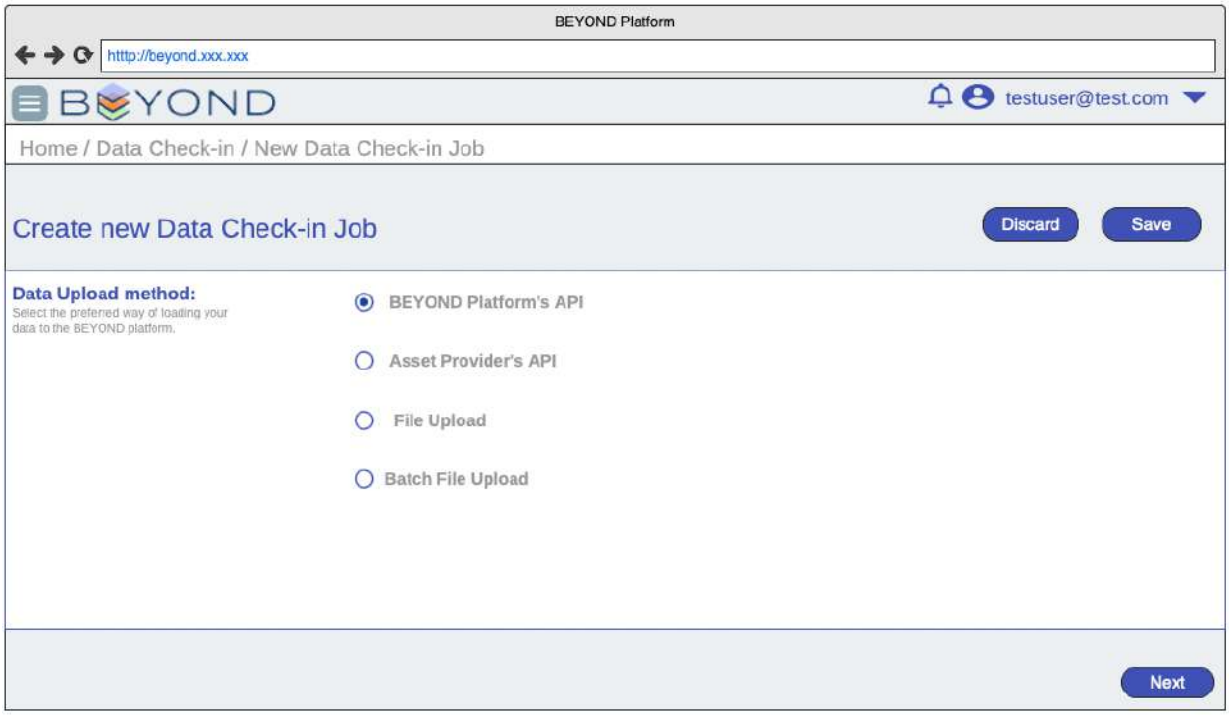

FIGURE 4 DATA CHECK IN – SELECT UPLOADING METHOD

Based on the preferred data uploading method, the appropriate configuration page will appear to allow the user to select more options relevant to his uploading task These refer to operations relevant to: a) Mapping of the uploaded data to the BEYOND CIM, b) Cleaning of the data (e.g., removal of null values, etc), c) Anonymisation of the data for safeguarding any sensitive information and d) Encryption of the data.

3.3 Configure Harvester

Having selected the BEYOND Platform's API as the preferred uploading method, the user shall proceed with the configuration of the Harvester (see Figure 5), by defining the processing frequency and uploading a sample of the data to be uploaded.

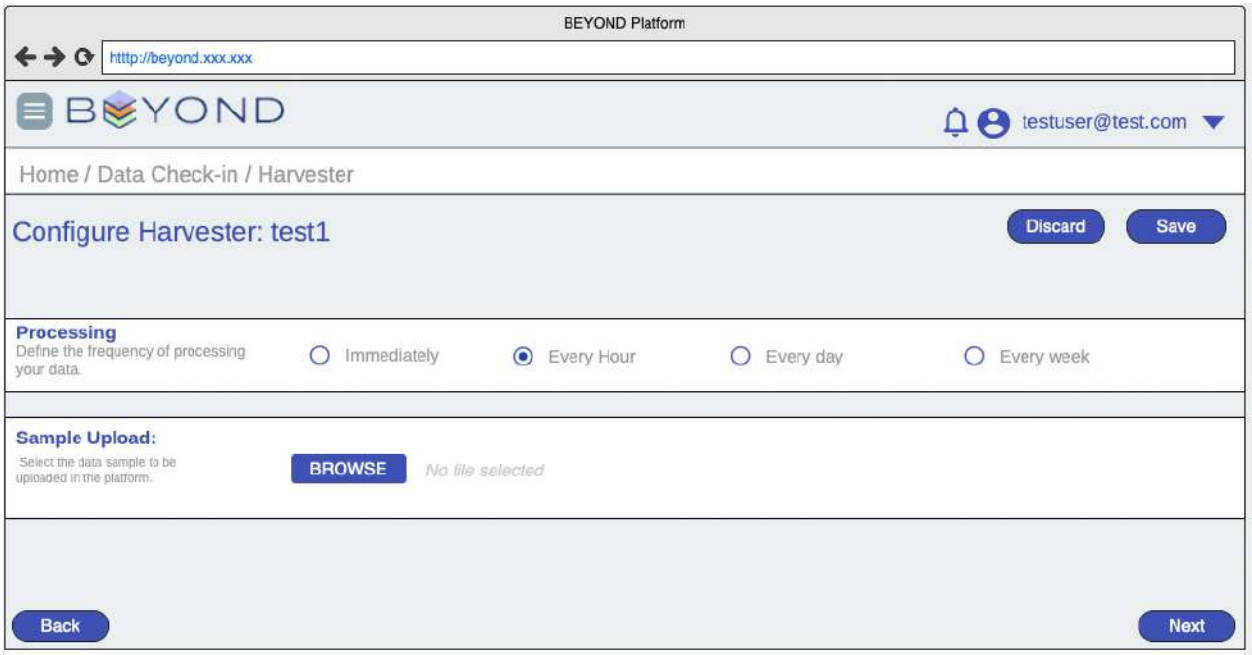

FIGURE 5 DATA CHECK IN – CONFIGURE HARVESTER

3.4 Data Mapping Configuration

Once the configuration of the harvester is finalised user can proceed with the mapping of their data asset's attributes to the BEYOND CIM concepts, which consist of an essential part of a Data Collection Job. (It shall be noted that, if the data mapping process is skipped, the data uploaded though this data collection job will be handled as a single object, which means that in future time it will not be possible to perform other tasks requiring mapping, such as queries on these data).

During the mapping step, the user shall select the standards (if any) applicable to his/her data asset, as well as the relevant concept of the latest BEYOND CIM, that his/her data refer to. (see Figure 6). The "Relevant Concepts" listed here, directly refer

to the different concepts of the BEYOND CIM. As in the previous case, the Relevant Standard and Concept cannot be changed once set by the users; if future changes are required, the user will need to create a new data collection job.

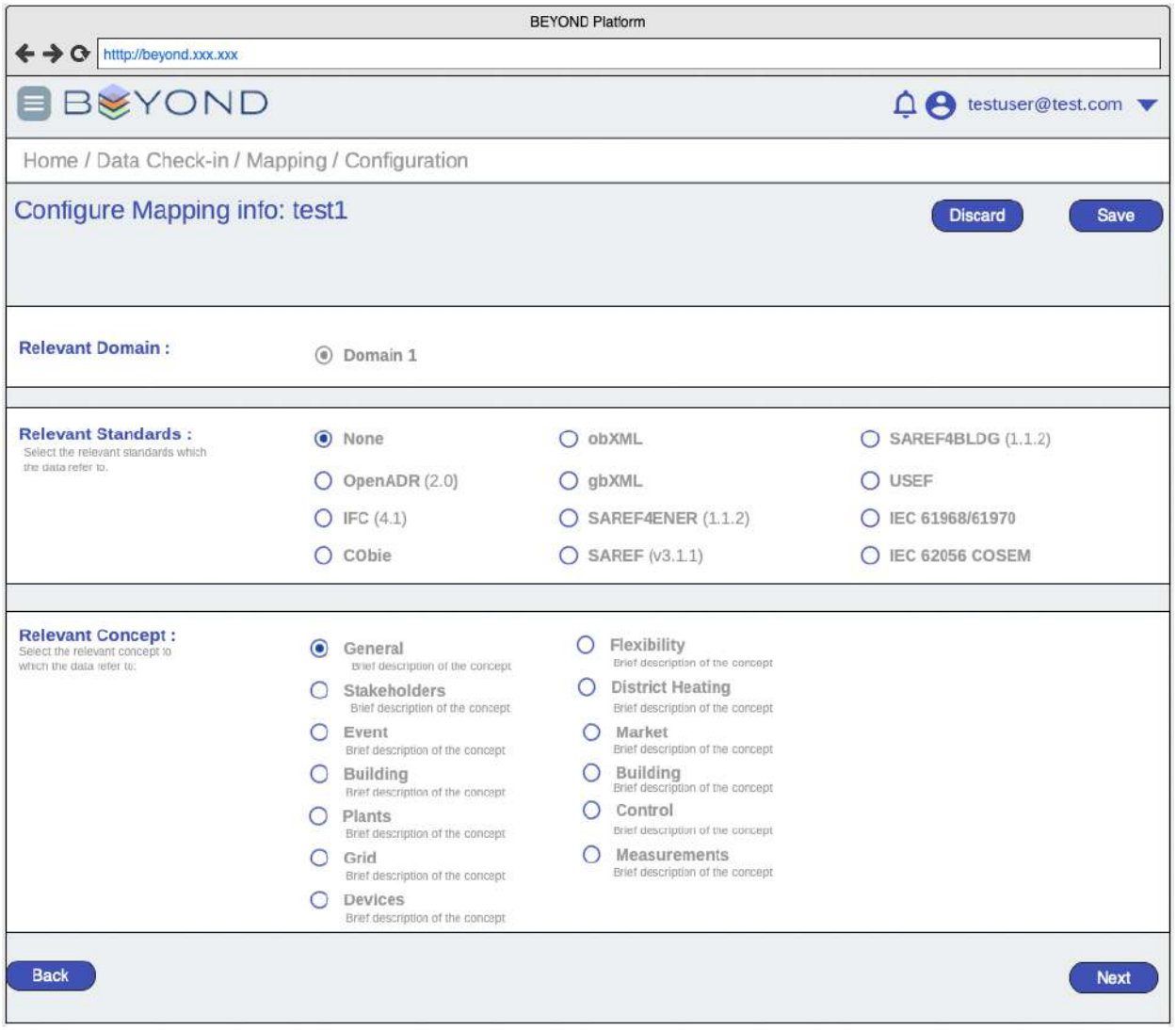

FIGURE 6 DATA MAPPING CONFIGURATION – SELECTION OF RELEVANT STANDARD AND CONCEPT

Once done, preliminary automated mapping predictions for the source concepts of the data are presented to the user, who is then tasked to identify any data type mismatches and delete any wrong mappings.

3.5 Data Cleaning

Once the user selects the cleaning pre-processing option, he/she can configure the preferred anonymization rules for his data asset.

The user can view all the mapped concepts of the ingested data asset, that have proceeded to the cleaning step and select the field(s) to which he/she will define the cleaning rules (highlighted in blue. Multiple cleaning rules can be set for each field, while the user may save the cleaning configurations to revisit them at a future time.

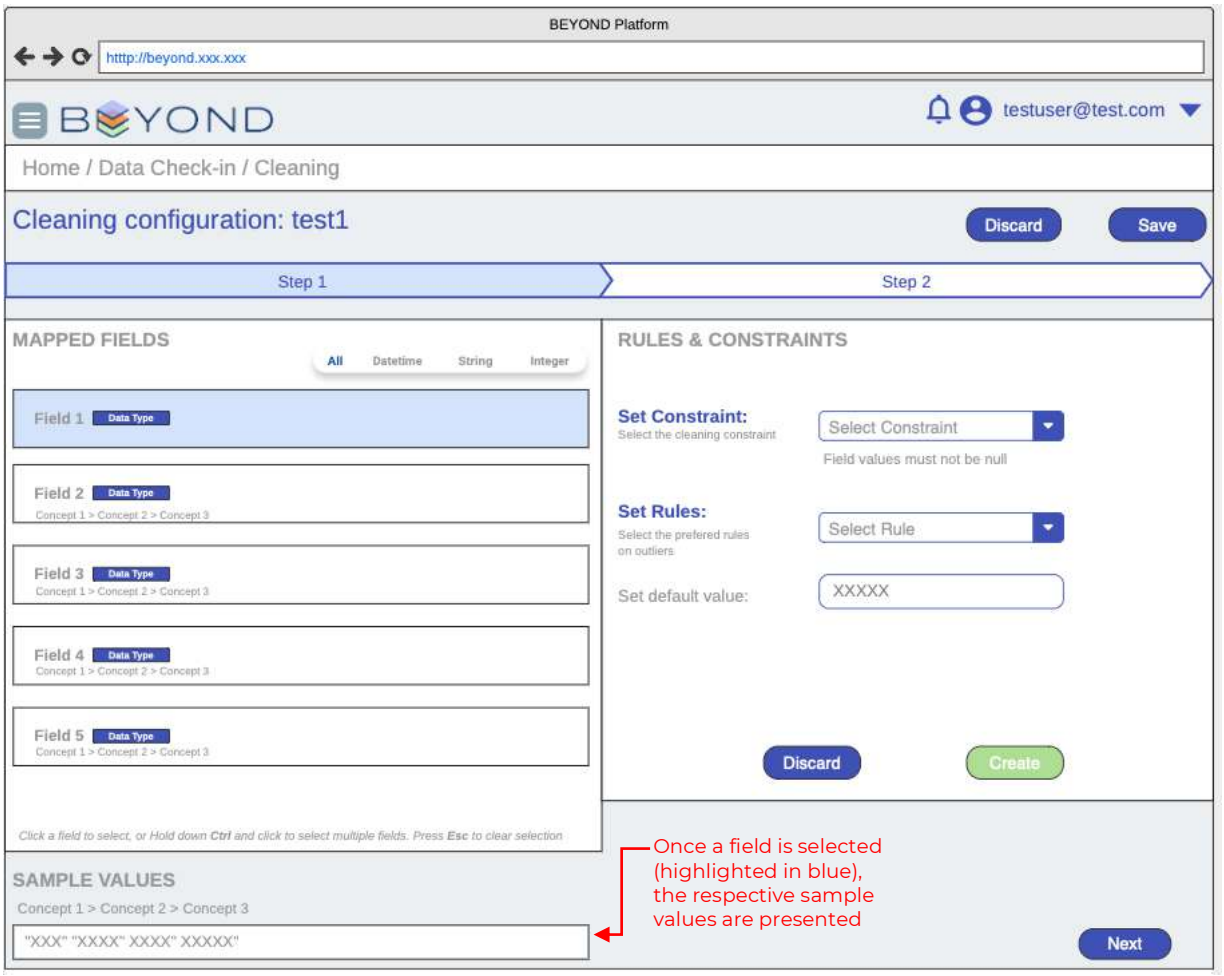

FIGURE 7 CONFIGURE CLEANING

For each cleaning rule, the user shall also define its details and define how the outlier values will be handled (e.g., replacement with a specific default value, etc.).

3.6 Data Anonymisation

Once the data mapping and data cleaning step is completed the user can proceed (if required) with the Data Anonymization process as described in this section.

As shown in Figure 8, depending on the data type of the selected field the user shall define the preferred anonymisation rule and its details, (e.g., type, method etc.).

The following options are foreseen: (a) the user may decide not to apply an anonymisation rule, thus the selected field remain as *insensitive*, (b) the user denotes the field as *identifier*, meaning that the particular column will be dropped, (c) the user denotes the field as *quasi-identifier*, meaning that based on the field's data type the suitable generalization method will be applied (e.g., masking for strings, etc.) and lastly (d) the user denotes the field as *sensitive*, meaning that the field's values will be protected by generalizing the quasi-identifier.

A description of the different anonymisation rules will be also provided to the user, so that he/she can select the desired anonymisation type.

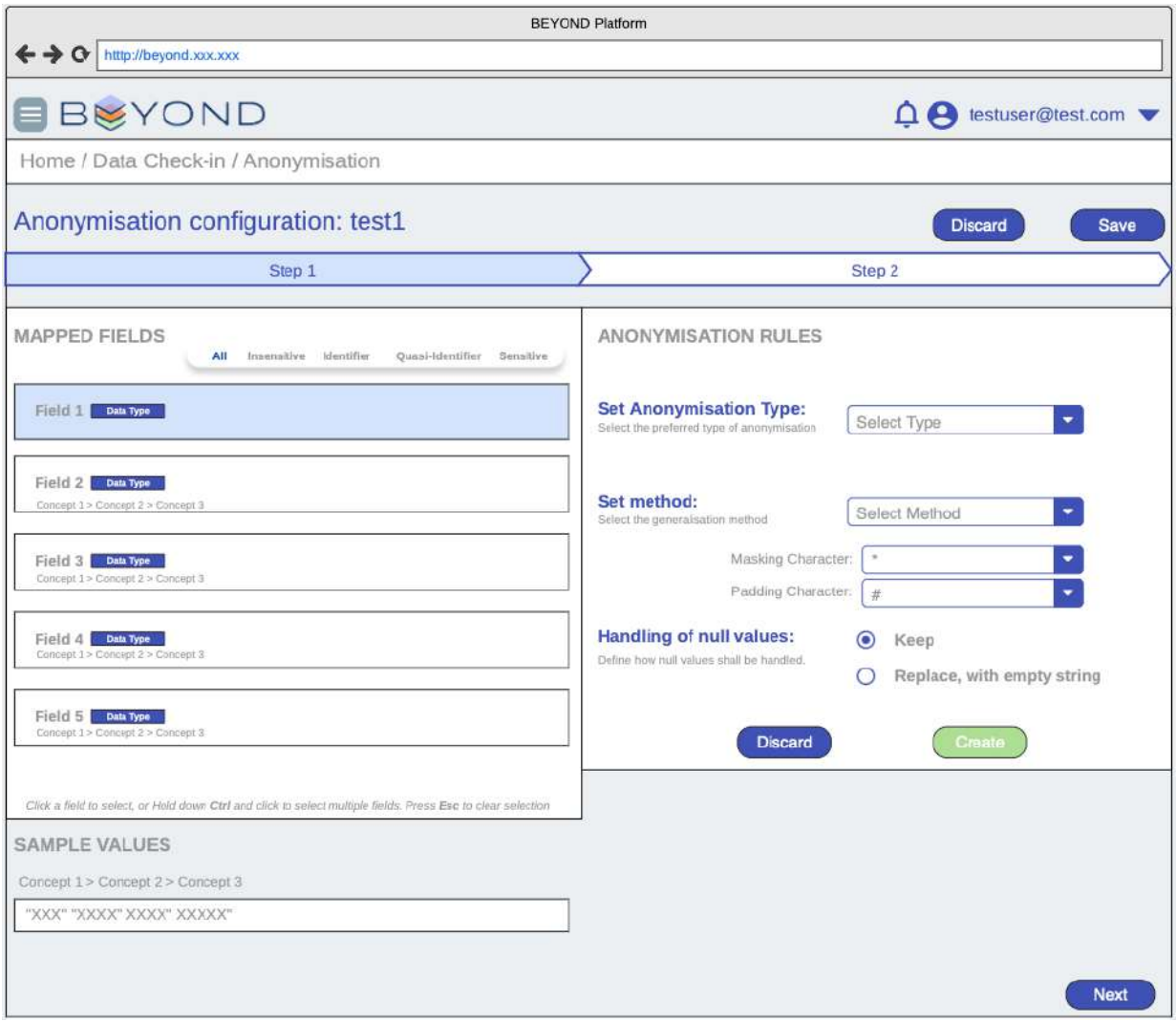

FIGURE 8 CONFIGURE ANONYMISATION RULES

3.7 Data Encryption

The data encryption functionality is available to the user once the respective option is activated during the initial steps of the data check-in job configuration. Here a user can apply various encryption rules, either to his whole data asset or to specific parts of it, thus further protecting it and minimising any risks of unauthorized data access or leakage.

As a starting point, the user shall select if he/she requires the full data asset to be encrypted or specific fields of it (see Figure 9). If only selected fields need to be encrypted the user can manually select them (these are highlighted in blue). By clicking on the "Finalise" Button, the user is presented with the Encryption report (see Figure 10) where the selected fields will appear in the "Encrypted Fields" list.

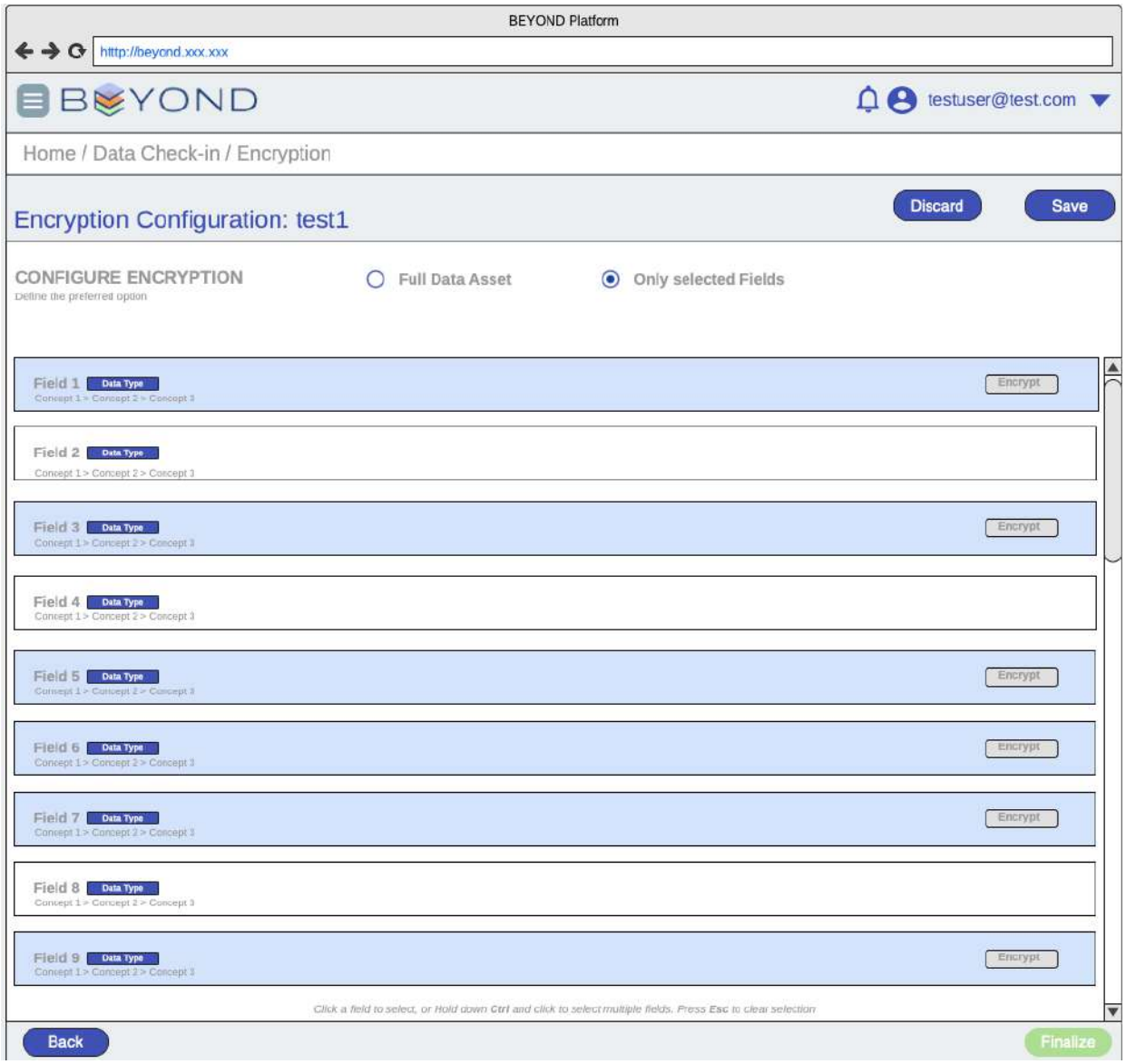

FIGURE 9 ENCRYPTION CONFIGURATION

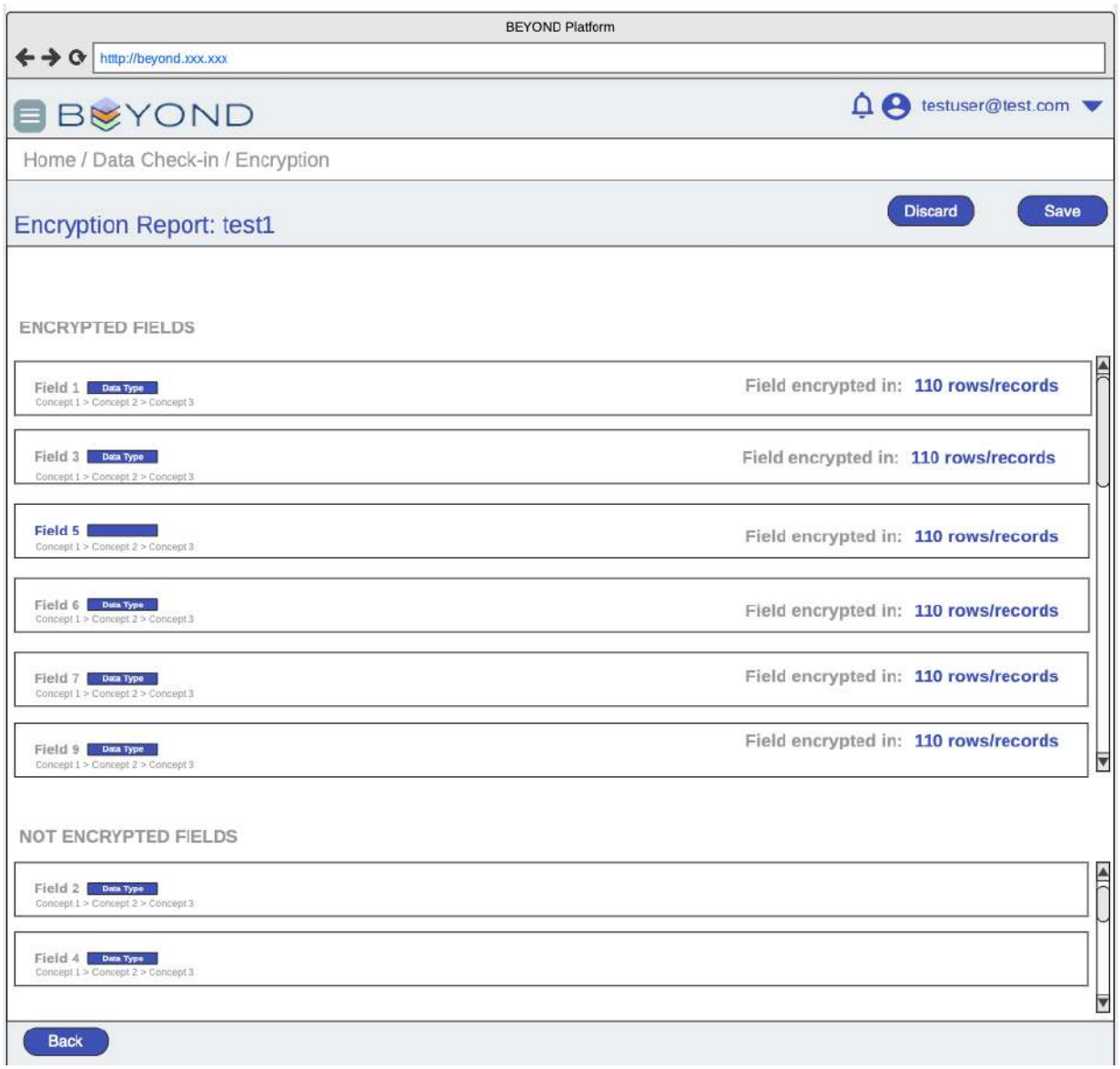

FIGURE 10 ENCRYPTION REPORT

4. Data Analytics Services

The data analytics services offered through the BEYOND Platform are accessible by the user by selecting the “Data Analysis” option on the “Home” menu (see Figure 2). Through this functionality, the user is provided with a variety of tools, enabling him/her to design and execute analytic workflows on the data assets they own, to get valuable insights while increasing their usability and commerciality.

4.1 Create new Data Analytics Workflow

Analytic workflows are designed through the analytics workflow designer. The user is able to select (from the Toolkit section, as shown on the left side in Figure 11) various input blocks and apply the preferred data processing/transformation functions and the algorithms on the input data, as well as select the type of output (such as via csv file, or via visualisations, etc).

Through the “Graphical view” the user can design the whole analytics workflow in a visual manner, where the aforementioned blocks can be easily arranged and connected so as to create the required data analytics workflow. Once the final workflow is ready the user can click on the “Finalise” button.

4.2 Analytics Workflow design

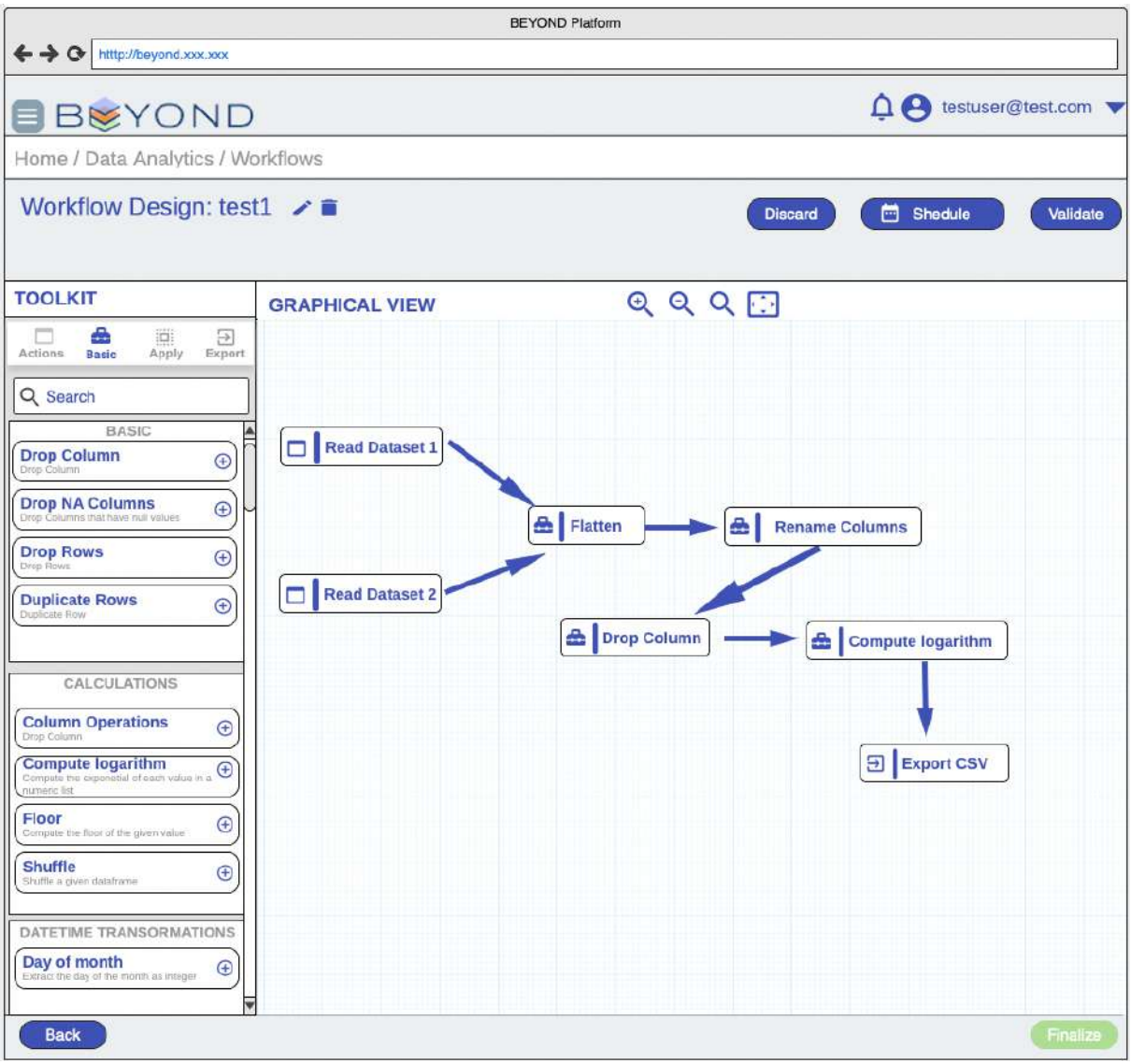

FIGURE 11 DATA ANALYTICS – WORKFLOW DESIGN: GRAPHICAL VIEW

In addition, scheduling capabilities will be offered, so that the user can define when the created workflow shall take place.

As shown in Figure 12, the user can see a preview of how the results would look like, and define the preferred visualisation output type (e.g., area chart, bar chart, etc.). In addition, from the Configuration area (right side) the user can configure the parameters to be visualized, such as defining the visualisation's title, description, legends, etc.

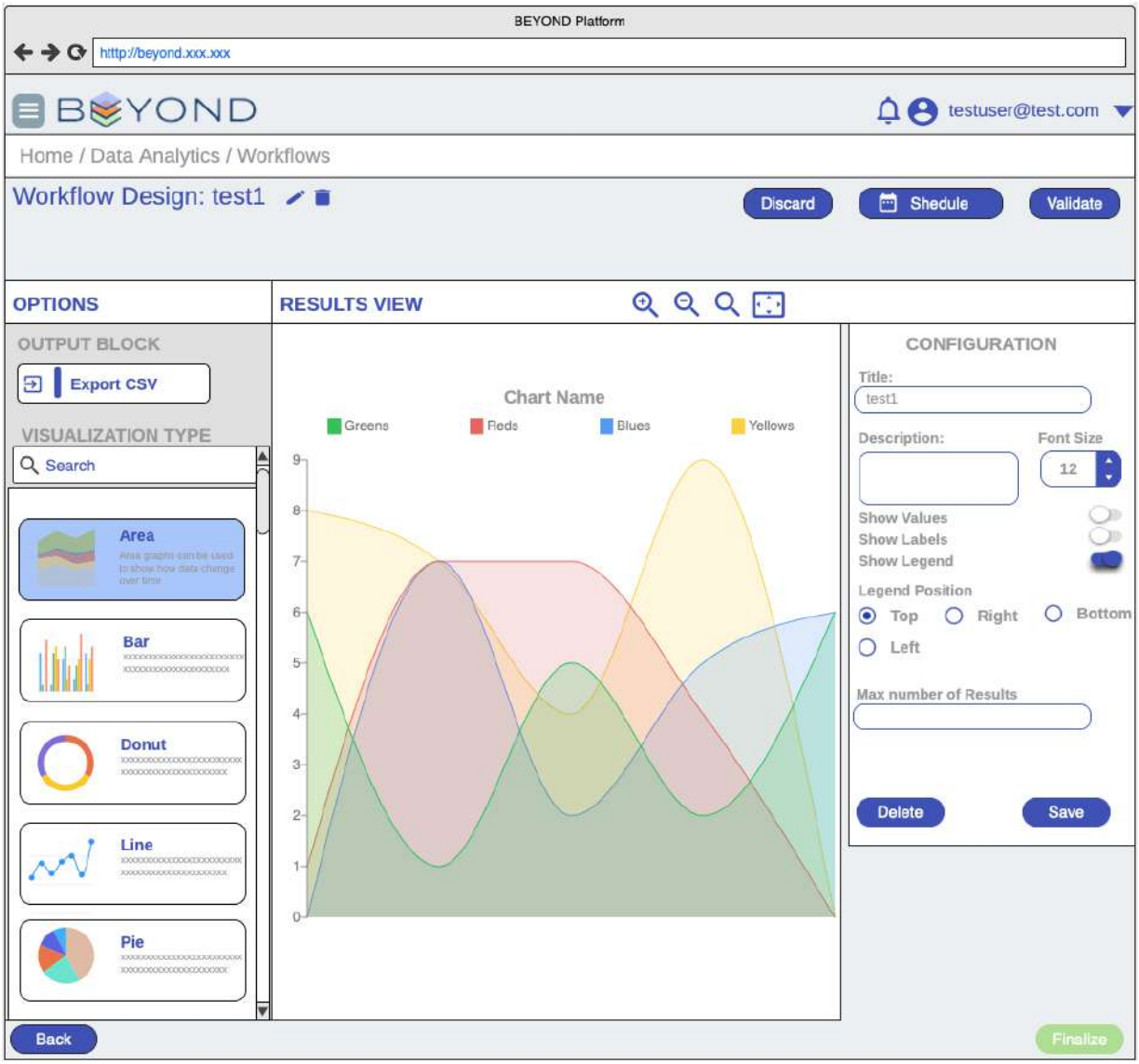

FIGURE 12 DATA ANALYTICS - WORKFLOW DESIGN: RESULTS VIEW

5. Data Exploration services

As described in detail in D2.6 [3] , the Data Exploration Module (DEM) of the integrated in the BEYOND Platform offers to its users data asset data browsing and exploration functionalities , thus enabling them to identify potential data assets of interest that are residing in the platform and that might be of interest/value to them.

Through the “Create Retrieval Query” the user is enabled to create a retrieval query through an API; a pop-up window (see Figure 13) prompts the user to provide a title and a description for the intended query.

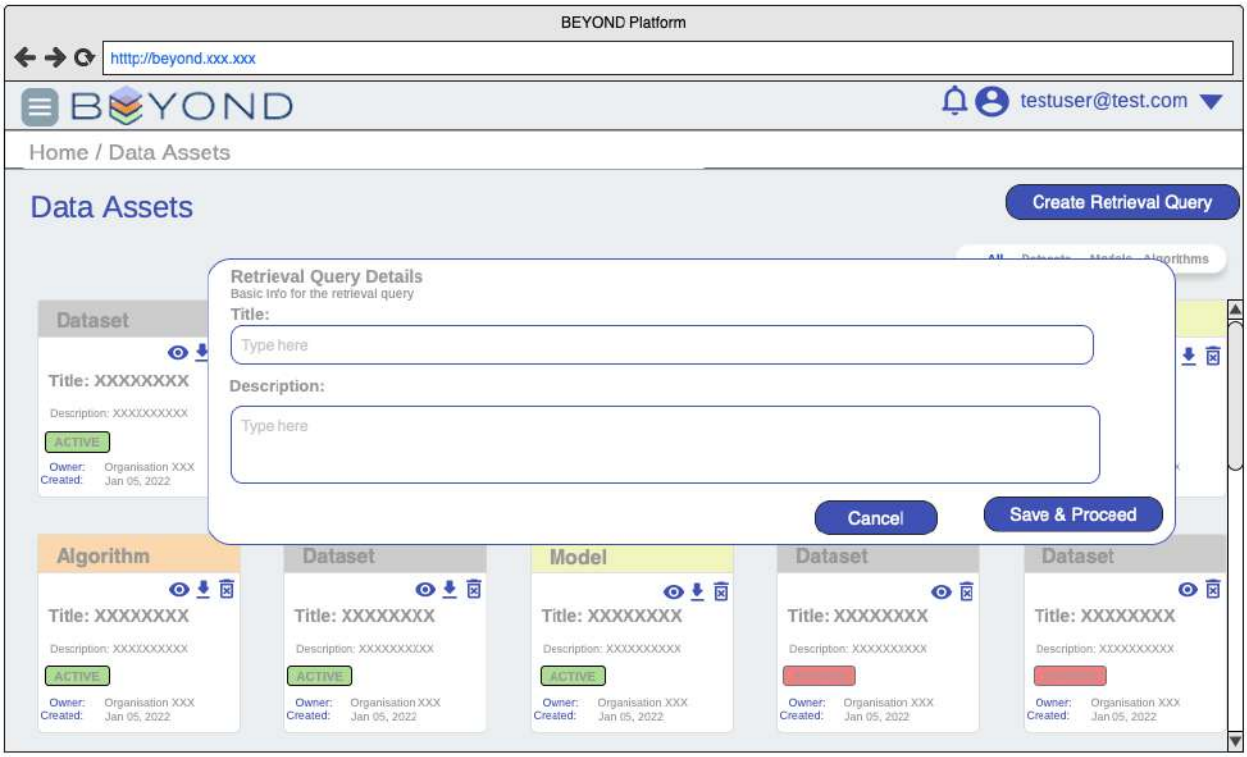

FIGURE 13 DATA ASSETS – NEW RETRIEVAL QUERY

Once the requested details are filled-in, by clicking on the “Save & Proceed” button the user shall configure the retrieval parameters as described in the following sections. It shall be noted that retrieval queries are only permitted for data that are stored in the BEYOND Platform and are not encrypted.

6. Data Sharing/Trading Services

The BEYOND Platform offers to its users' data sharing and trading functionalities, meaning that a data asset consumer/broker can search and acquire data assets belonging to other BEYOND platform users (i.e., asset providers) by mutually agreeing on the sharing terms and signing the respective smart data asset contract drafted and executed through the platform. The overall envisioned operation entails the users (asset consumer) searching for a data asset of interest, though the BEYOND Marketplace, review its details and if meeting his/her needs proceed with its acquisition by sending a request to the respective asset provider, negotiating the terms of the contract and finally if agreement is reached, sign the respective contract, and proceed with the payment. Once the receival of the payment is verified by the asset provider, the contract is activated, and the asset consumer can download the acquired the data asset.

6.1 BEYOND Marketplace

The BEYOND Marketplace is accessible to the users by selecting the respective option from the "Home" menu. In the main screen of the Marketplace, asset consumers/brokers can see the various data assets (that they are eligible to see, based on the asset providers' predefined access policies) and that are available through the BEYOND Marketplace. The user can also sort the data assets, according to their type (i.e., Dataset, Algorithm, Model) through the provided filtering option.

6.1.1 View data asset profile

The user can see more details of each data asset, by clicking on the "eye" icon; this opens a pop-up window presenting an overview of the respective data asset, such as its owner (i.e., data provider), date of creation/updated, size and its license.

If the user is further interested into this data asset, by clicking on the "Review Data Asset" button, he/she can see all the details available for this data asset, including its generic information, its distributions and extent details.

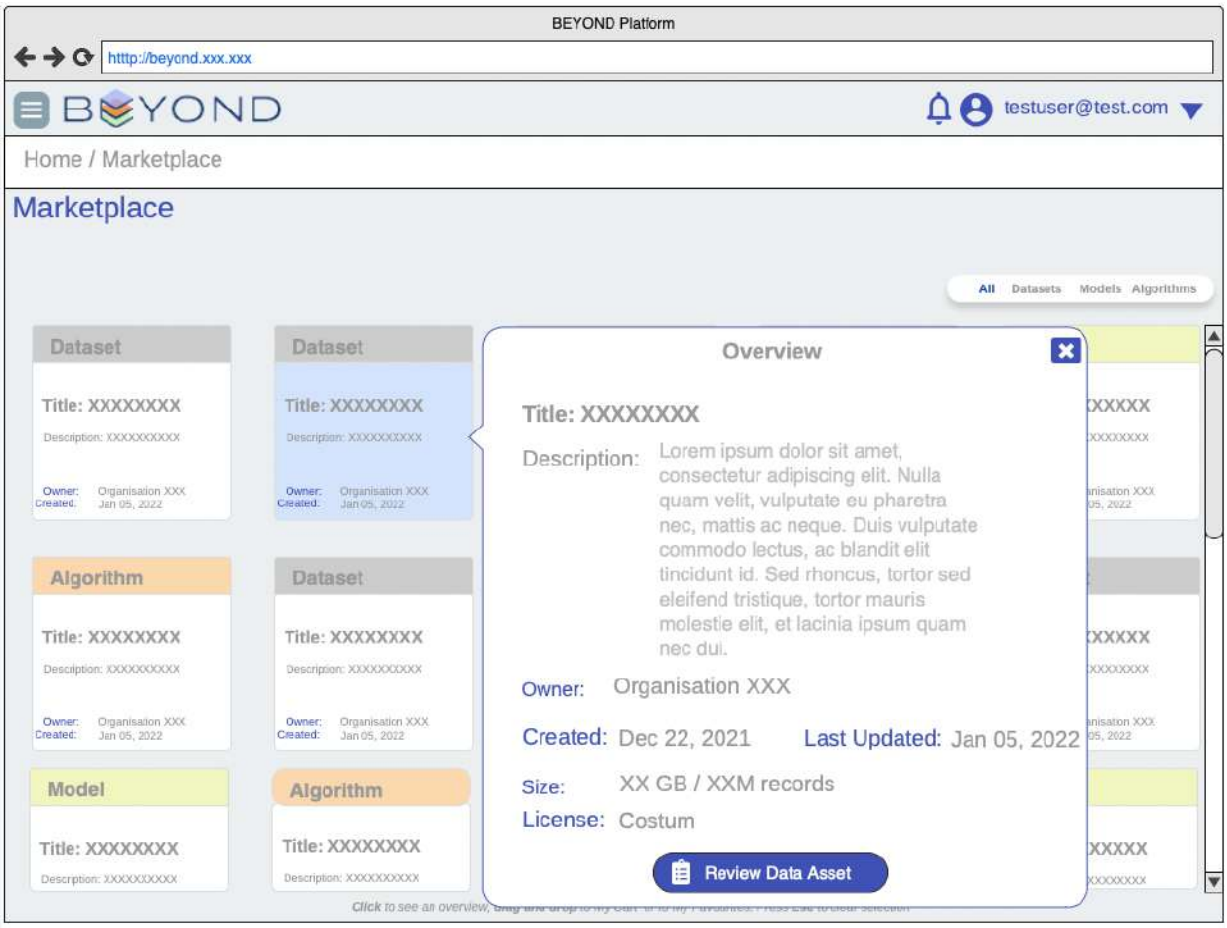

FIGURE 14 MARKETPLACE – DATA ASSET OVERVIEW

6.2 Explore Data Assets

A user search for data assets of interest available through the BEYOND Marketplace. The user can search either by text, typing keywords in the provided search box (or the specific name of the data asset- if known) and see the corresponding results. The user can also apply the preferred filters to the results (such as the applicable domain, concept, type, format accessibility, etc.) in the right menu and see the respective data asset results (left side in Figure 15).

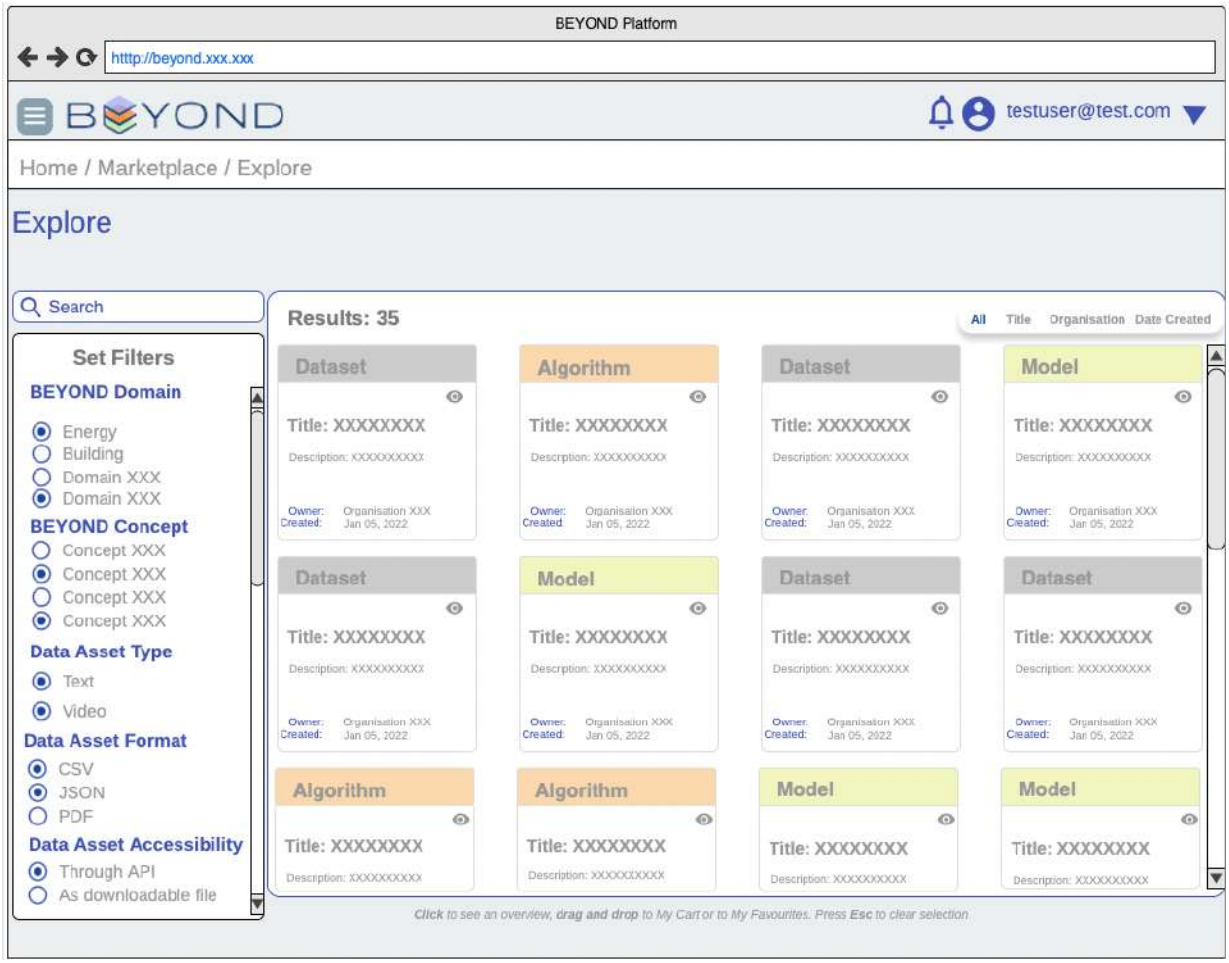

FIGURE 15 MARKETPLACE – EXPLORE DATA ASSETS

6.3 Drafting a new smart data asset contract

Once an Asset Provider (testuser1) receives the request and if he/she accepts it, a new smart data asset contract can be drafted through the Contract Composer (described in detail in D4.1 [5]); where he/she can edit the contract terms that shall be applied on this data asset contract. It shall be noted that the terms enforced by the BEYOND Platform cannot be edited by any of the users. If the Asset Provider rejects the request, the process finishes here, and the Asset Consumer cannot access to requested data asset.

Once all negotiations are finished and both parties are agreed with the revised terms, the Asset Consumer shall review it one final time and if satisfied, proceed with the pre-selected payment method.

As shown in Figure 16, once the user can see all the contract details, such as the involved parties, the contract's timeline, duration, as well as its contract terms. It shall be noted that the contract's info is only visible to the involved parties, to ensure confidentiality.

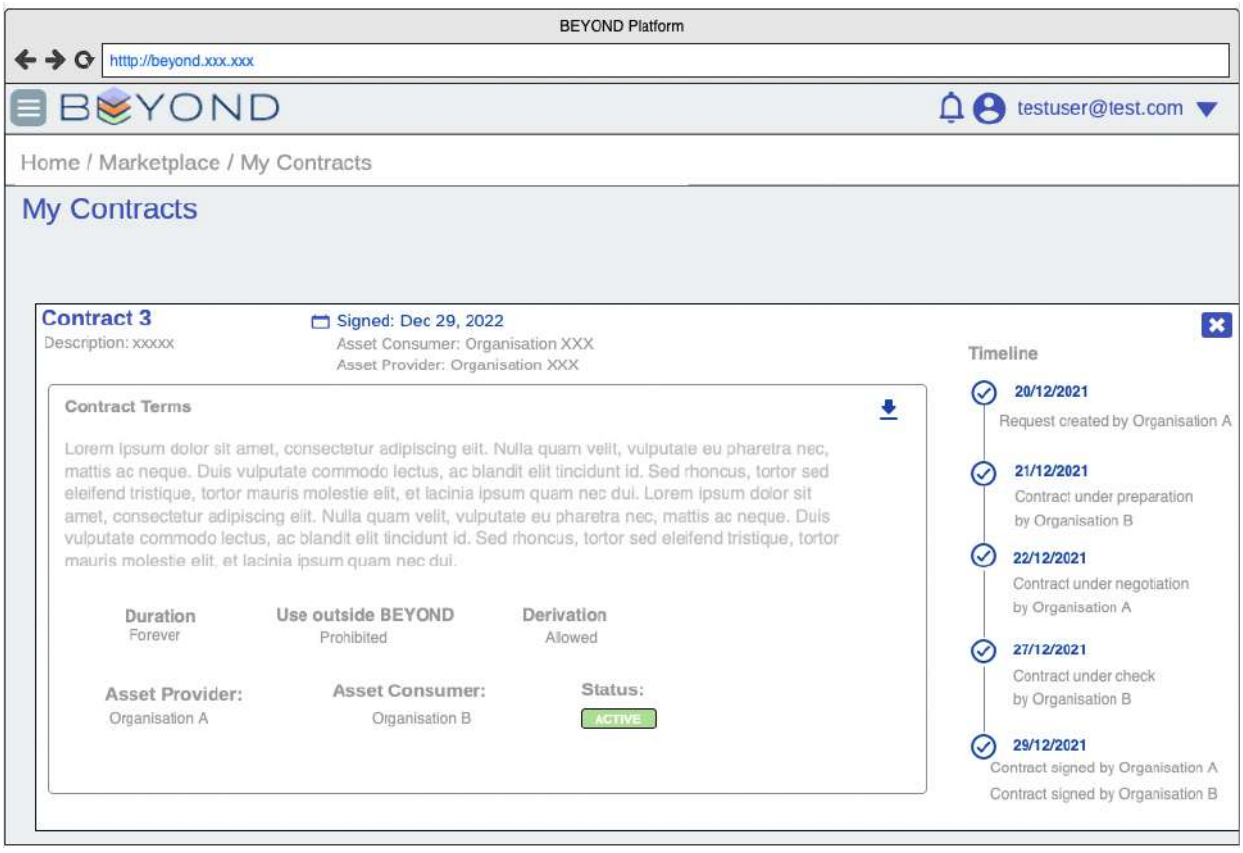

FIGURE 16 MARKETPLACE – CONTRACT DETAILS (ACTIVE)

6.4BEYOND Wallet

Through this option the user can access their organisation's payment account set up within he BEYOND Platform. The user can see an overview of his/her past transactions, the remaining funds in their organisation's account, as well as add funds to his/her account if required (see Figure 17). As described in D2.6[3] the transactions carried out through the BEYOND Wallet are undertaken in cryptopoints to minimise any risk of currency volatility. In the mock-up, we see that in case these cryptopoints are for example matched to ETH, then an exchange rate from Euros to ETH is visible to the wallet owner.

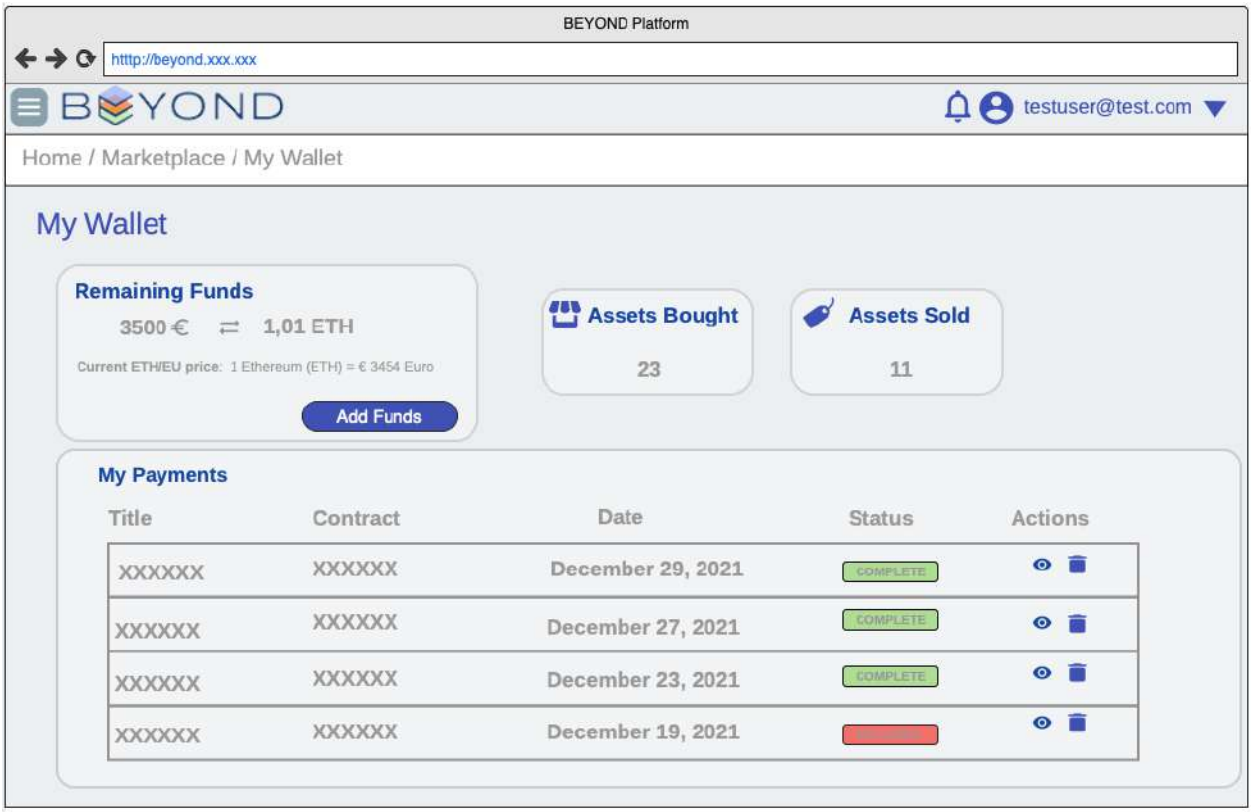

FIGURE 17 MARKETPLACE – MY WALLET

7. Conclusion

D3.4 reports the initial activities carried out in the context of "T3.5 Platform and Services Bundles Continuous Integration and Open APIs Delivery" by M14 of the project's implementation.
The main scope of D3.4 is to present the Alpha release of the integrated BEYOND Cloud based platform, through a series of functional mock-ups depicting its overall frontend environment; thus, enabling readers to understand the envisioned operations pertaining to the various services offered by the BEYOND Platform.
The final version of these mock-ups, presenting the Alpha release of the BEYOND Integrated Platform is based on the feedback received from the partners during the various meetings and incorporates any further comments received on their initial version.

In more detail the present deliverable presents the envisioned operations within the Integrated BEYOND Platform and which are related to the:

- data collections services offered through the Data Check-In feature and facilitated by the BEYOND Platform's Data Ingestion Services, enabling users to upload their data assets onto the platform.
- data analytics services offered through the Data Analytics feature and facilitated by the BEYOND Platform's Isolated Data Analytics Containers, enabling users to design and execute analytic workflows on the data assets they own, and which are stored in the platform.
- data sharing and trading services offered through the Marketplace feature, facilitated by the BEYOND Platform's Data Trading Module, enabling Asset Providers to share/sell their data assets to interested Asset Consumers/Brokers.
- data searching services offered through the Data Assets feature and facilitated by the BEYOND Platform's Data Exploration Module, enabling users to run queries on the data assets they own, and which reside in the platform and acquire the corresponding results through the provided API

References

[1] BEYOND (2020) Description of Action (DoA)
[2] BEYOND (2021a): D2.1 - End-user & Business requirements analysis for big data-driven innovative energy services & ecosystems –
[3] BEYOND (2021b): D2.6 – BEYOND Framework Architecture including functional, technical and communication specifications – a
[4] BEYOND (2022a): D3.3 - Data Collection, Security, Storage, Governance & Management Services Bundles – Beta Release
[5] BEYOND (2022a): D4.1 – BEYOND Data Analytics, Sharing & Matchmaking Services Bundles – Beta Release