

BEYOND

D3.5 – BEYOND Integrated Platform & Open APIs – Beta Release

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D3.5 - BEYOND Integrated Platform & Open APIs – Beta Release

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D3.5 - BEYOND Integrated Platform & Open APIs – Beta Release

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EXECUTIVE SUMMARY

D3.5 “BEYOND Integrated Platform & Open APIs – Beta release” aims at providing a description of the beta release of the BEYOND Integrated Platform incorporating the beta version of all the different services bundles pertaining to the data assets’ collection, storage, exploration, and secure trading, implemented in the context of WP3 and WP4 activities.

As the actual deliverable is of type OTHER, this document comes as an accompanying report presenting the beta release of the BEYOND Integrated Platform, describing the various functionalities offered to its users through usage walkthroughs, accompanied by screenshots of the actual software implementation briefly describing each functionality offered.

Under this context, D3.5 presents the beta release of the BEYOND Integrated platform incorporating the various services offered to its users (such as Data Asset Providers, Consumers and Brokers).

In alignment with the BEYOND architecture (described in D2.6), in its beta release, the integrated BEYOND Platform delivers to its users the beta version of the four planned services, namely the: a) Data Collection services b) Data Searching services c) Data Analytics services and d) the Data Sharing and Trading services. These services bundles are built on different state-of-the art technologies, while the user interface is based on the platform’s Alpha - mock-ups release described in D3.4.

The upcoming iteration of the BEYOND Integrated Platform (i.e., release 1.00) due in M20 of the project’s implementation will be built on the outcomes of this deliverable and will focus on: a) delivering the full set of planned functionalities by introducing the services that remain at this point in the development backlog, b) improving the end-to-end user experience based on the feedback acquired during the integration activities between the platform and the BEYOND End-user tools, as well as from the experimentation in the pre-validation site, and c) upgrading the already delivered services while introducing a set of already planned extensions and new functionalities.



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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
CIM	Common Information Model
CPOM	Cloud Platform Operation Manager
DIS	Data Ingestion Services
Dx.y	Deliverable x.y
DoA	Description of Action
ETH	Ethereum
Mx	Month x
PDSL	Polyglot Data Storage Layer
SEC	Security Services
Tx.y	Task x.y
UC	Use Case(s)
UI	User Interface
WPx	Work Package x



1. INTRODUCTION

1.1. Scope of the document

D3.5 reports the early outcomes of the development activities by M16 of the project, presenting the beta release of the integrated BEYOND platform and describing the various functionalities offered to its intended users, such as Data Providers and Data Consumers/Brokers. This beta release of the BEYOND Integrated Platform is mostly based on the development outcomes of D3.1 [4] and D4.1 [6], while the overall user interface (UI) is based on the outcome of D3.4 [5] and the feedback received from the partners. D3.5 presents the various functionalities delivered in this beta release of the BEYOND Integrated Platform offering an end-to-end usage walkthrough through step-by-step instructions supplemented by appropriate screenshots explaining in depth each service's intended usage.

In alignment with the DoA, this beta release of the BEYOND Integrated Platform and the current document will provide significant input and guidance to the upcoming releases of the platform (Release 1.00) due in M20 (documented in D3.7) and finally in release 2.00, due in M32 (documented in D3.8), which will include all the planned features as well as updates and enhancements.

1.2. Relation to other tasks/deliverables

D3.5 receives input from the following BEYOND tasks:

- T3.5 Platform and Services Bundles Continuous Integration and Open APIs Delivery
- 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 D3.5 will be also used as input in the following BEYOND deliverables and work packages:

- D3.7. - BEYOND Integrated Platform & Open APIs - Release 1.00
- D3.8 – BEYOND Integrated Platform & Open APIs – Release 2.00

Moreover, D3.5 will offer a better understanding of the different services offered by the BEYOND Platform to all BEYOND End-users tools, that are delivered in WP5 “AI Analytics-based Decision Support Suite for Optimizing Energy Policy Planning,



Infrastructure Sizing and De-risking Renovation Investments and in WP6 “AI Analytics-based Innovative Energy Services Suite towards Optimized Buildings Energy Performance Management”. It is anticipated that these tools/applications will provide valuable feedback and lessons learnt from the actual usage of the platform (and its services); that will be used in the delivery of its first stable version (Release 1.00) due in M18 and its final (Release 2.00) due in M32. Finally, D3.5 and the integrated BEYOND Platform, will be part of the overall BEYOND Infrastructure integration, while also extensively tested and evaluated during the demonstration and impact assessment phase carried out in WP7.

1.3. Structure of the document

Towards addressing all the aspects relevant to the scope of D3.5, the remaining of this document has been structured as follows:

- Chapter 2 presents the details and overall integration plan considered for the consequent releases of the BEYOND Integrated Platform
- Chapter 3 provides a navigation to the beta release of the BEYOND Integrated Platform, describing to the reader the Data Asset Collection service (section 3.1), the Data Asset Exploration and Retrieval service (section 3.2), the Data Asset Analytics (section 3.3) service and the Data Asset Trading service (section 3.4)
- In Chapter 4 the conclusions are provided along with the plan for the upcoming release 1.00.



2. Accessing the BEYOND Platform

The BEYOND Cloud based platform is accessible to all authorised users through the following URL: <https://www.beyond-platform.eu/>

As shown in Figure 1, through the landing page the user can log-in to the platform; while additional links are provided, directing the user to the BEYOND project's web portal and the platform's dedicated wiki (see Figure 2) serving as the live documentation for all the components, modules and entities that are part of the BEYOND platform.

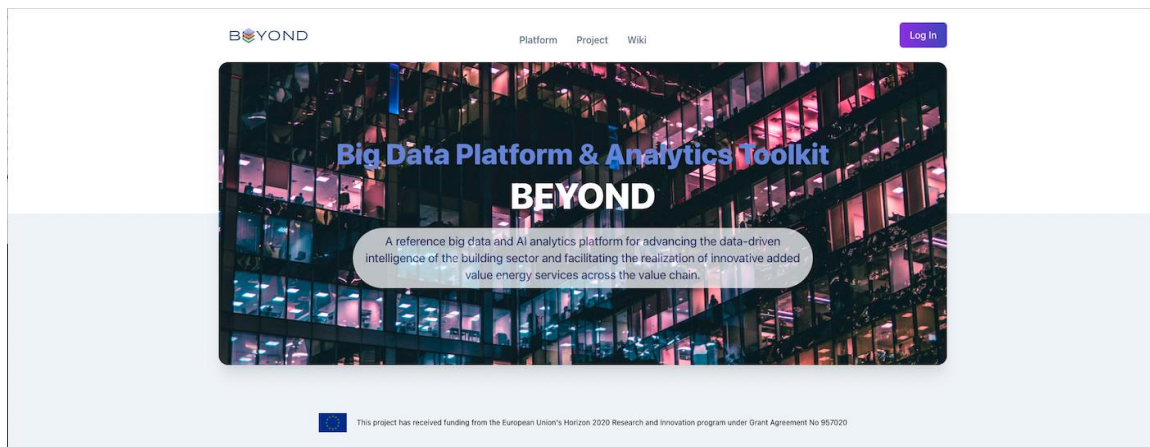


FIGURE 1 BEYOND PLATFORM – LANDING PAGE

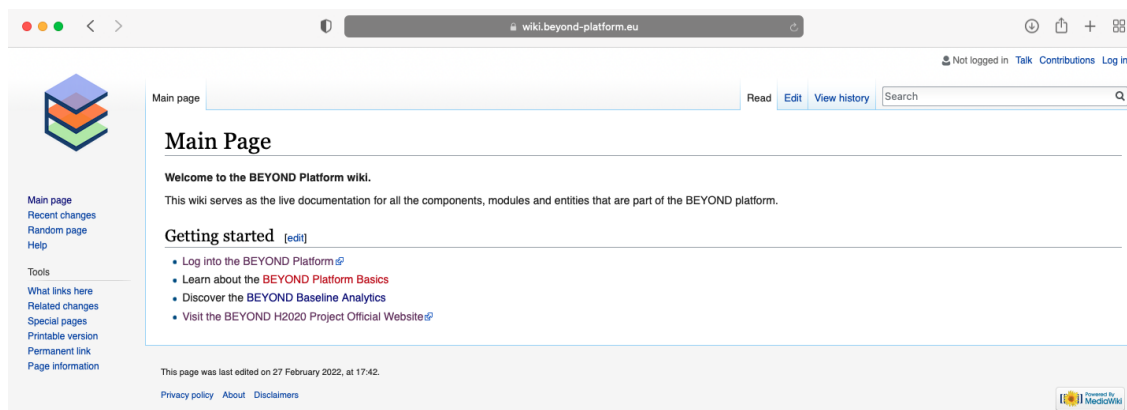


FIGURE 2 BEYOND PLATFORM'S WIKI

2.1.Registration & Authorization

Once the user clicks on the Log-in button, she/he is directed to the login page where the user's credential shall be provided. As shown in Figure 3, password recovery is also provided, or (if not previously done) the user can select to register to the BEYOND platform by creating an account.



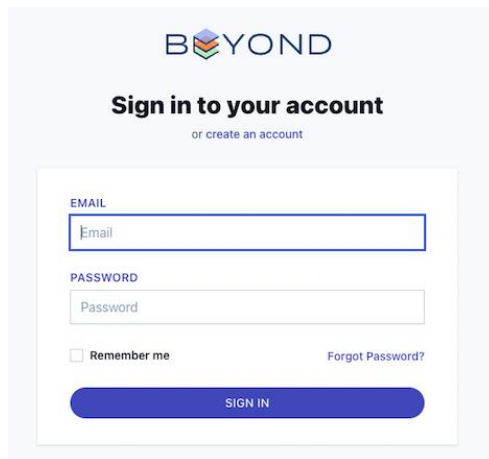


FIGURE 3 BEYOND PLATFORM SIGN-IN

2.2. Home Menu

As shown in Figure 4, the BEYOND platform’s “Home” function offers to its users six 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.
- **Analytics**, offering to its users a variety of tools for designing and executing analytics on their data assets and receiving the corresponding analysis results
- **Assets**, where users can view the data assets, she/he owns (or have legitimately acquired through the BEYOND Marketplace) and edit their details.
- **Marketplace**, offering to the platform’s users data sharing and trading functionalities.
- **Retrieval**, which enables users to retrieve data assets (or selected parts of them) that they own or have legitimate acquired through the BEYOND Marketplace, through the platform APIs
- **Contracts**, where the user can see the contract’s she/he is involved, their details and/or edit any draft contract related to an upcoming data asset acquisition.

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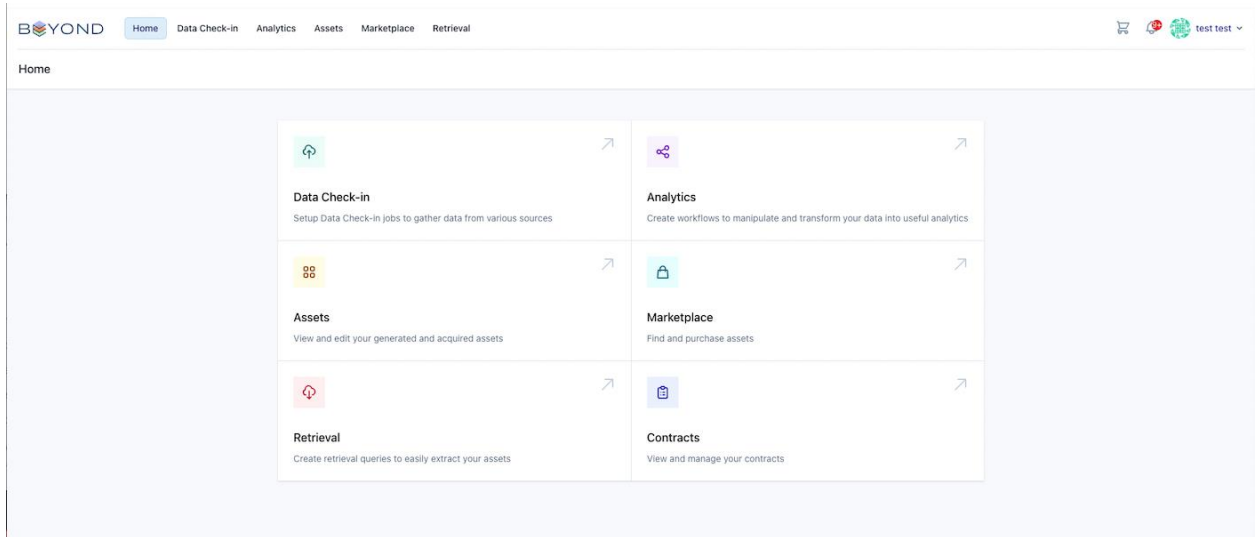


FIGURE 4 BEYOND PLATFORM: HOME

As shown in Figure 4 the aforementioned functionalities (except the latter, i.e., contracts) are also accessible through the top menu.



3. Data Collection

The overall data asset collection process described in this section, is necessary for successfully uploading and storing a data asset to the BEYOND Platform. In this process the Data Provider shall configure different steps which relate to various pre-processing functions that can be applied on the uploaded data asset (if selected from the user) prior to its secure storage in the platform. This process starts once the Data Provider (user) selects the “Data Check-in” option from the top menu (see Figure 4 **Error! Reference source not found.**). Thereafter a series of steps shall be followed, where the users are prompted to configure various pre-processing parameters, towards successfully uploading their asset onto the BEYOND Platform.

In sequence, the different steps that a Data Provider shall follow, to successfully upload his/her data asset(s) into the BEYOND Platform are described in as follows:

- 1) Creation of a new data check-in job; where user is prompted to provide basic details about the job (e.g., name, brief description) and select the preferred pre-processing steps (such as data mapping, cleaning, anonymisation and encryption) to be applied on the data asset
- 2) Configuration of the harvester, responsible to load the data asset to the platform. Here users shall select the preferred data asset collection method, such as i) acquisition through the BEYOND platform’s own API, or ii) using the Data providers API (see Figure 5).

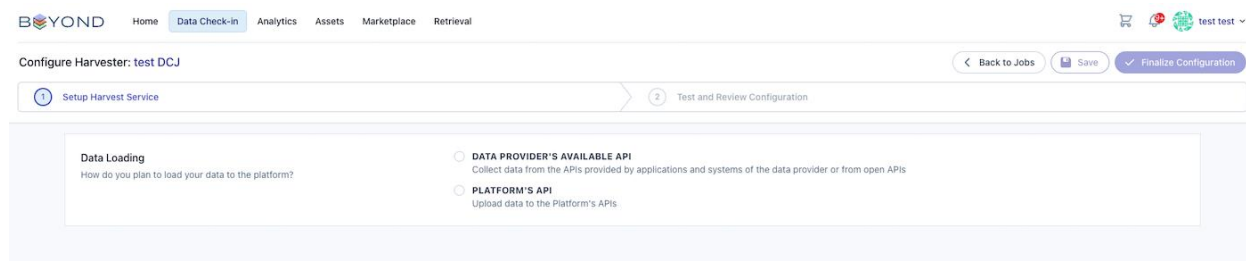


FIGURE 5 DATA CHECK-IN: HARVESTER CONFIGURATION

Depending on the selected method in the following steps, the user shall configure different pre-processing parameters. For example, if data acquisition will be carried through the data providers own API, the user shall specify the API's connection settings, such as the format of the response (JSON or XML), the authentication and pagination details, the URL and the method (GET, POST) along with the necessary request parameters as dictated by the API URL. In case of POST methods, the user shall also specify the query body of the API connection

- 3) Mapping of the data assets fields (source data) to the concepts and fields of the BEYOND CIM; here the user is provided with semi-automatic mapping predictions, which she/he shall review and manually verify/configure. In case a mapped field has a numerical data type, the user shall also provide its



measurement unit, so that the respective transformation to the baseline measurement unit of the BEYOND CIM can be performed. Similarly, if a mapped field has a datetime data type, the user shall specify the datetime format and the reference time zone of the data.

- 4) Cleaning of the data asset (if selected during Step 1); where the user is enabled to set the desired cleaning rules according to the data type of the fields that need to be cleaned. For each field, multiple cleaning rules may be applied, while the user can specify their details and define how the outlier values will be handled by the Data Collection service (e.g., drop outlier or replace them with other value).
- 5) Anonymisation of the data asset (if selected during Step 1), where the user is enabled to set different anonymization rules depending on each field's data type. The user may (a) maintain a field as insensitive, i.e. no anonymization rules will be applied, (b) set the field as identifier, where the respective column will be dropped, (c) set the field as quasi-identifier, where the appropriate generalization method will be applied according to the field's data type and (d) set the field as sensitive, meaning that these field values will be protected by generalizing the quasi-identifiers.
- 6) Encryption of the data asset (if selected during Step 1), where the user is enabled to apply encryption to his data asset towards further protecting it and minimising any risks of unauthorized data access or leakage.
- 7) Execution of the data check-in job to load the data to the BEYOND Platform, where the user is prompted to define the name and the description of the data asset.
- 8) Data asset's metadata definition, which shall be defined by the user to make the data asset available to the BEYOND platform. Here generic information for the data asset shall be defined such as its distribution, temporal, and spatial details. Moreover, the licensing and access policies information shall be specified, indicating who can have access on this dataset.

Upon finalisation of all the above process the data asset is finally stored in the BEYOND Platform's repositories, and visible to the user through the "Assets" functionality (see chapter 4), while the data check-in job is marked as completed.

As shown in Figure 6, a summary of all the check-in jobs carried out and their details is visible to the users, while the status of any unfinished configuration or failed job is highlighted accordingly.



DETAILS	LAST MODIFIED	STATUS	ACTIONS
Test DCJ 1 by test test	March 1, 2022	Configuration	Harvester
Test DCJ 2 by test test	March 1, 2022	Configuration	Harvester
Test DCJ 3 by test test	February 28, 2022	Completed	View Asset
Test DCJ 4 by test test	February 28, 2022	Failed	Harvester
Test DCJ 5 by test test	February 28, 2022	Failed	Harvester
Test DCJ 6 by test test	February 28, 2022	Failed	Harvester
Test DCJ 7 by test test	February 28, 2022	Configuration	Harvester
Test DCJ 8 by test test	February 28, 2022	Configuration	Loader
Test DCJ 9 by test test	February 28, 2022	Configuration	Mapping
Test DCJ 10 by test test	February 28, 2022	Configuration	Mapping

Showing 11 to 20 of 98 results

FIGURE 6 DATA CHECK-IN JOB SUMMARY

4. Data Exploration

As described in detail in D2.6 [3], the Data Exploration Module (DEM) of the integrated in the BEYOND Platform enables users to search for data assets available in the platform, browse through the results, and if interested retrieve them (see Chapter 6) data assets (or specific parts of them) once the applicable access policies are resolved. It shall be noted that in the case of privately owned data assets, in order for a user (i.e., data consumer) to retrieve them, he/she shall first come into a contract (see Chapter 5) with the respective data provider. As shown in Figure 7 once the user selects the “Assets” option, from the top menu all his/her owned data assets (either directly owned or purchased through the BEYOND Marketplace) are visible. The user can also filter the data assets according to their type (Dataset, Result or Model).



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The screenshot shows the 'My Assets' page in the BEYOND platform. On the left, there is a sidebar with filters for 'Own Organisation' (78) and 'Acquired' (0). The main area displays a grid of asset cards. Each card includes the asset name, a status badge (e.g., 'Incomplete', 'Deprecated', 'Available'), creation and modification dates, and 'Edit' and 'Delete' buttons. Assets shown include 'testLoader5', 'test loader 3', 'test loader 1', 'Test DCJ loader', 'Test DCJ 1', 'Test Services', and 'Test File 2'.

FIGURE 7 ASSETS: SUMMARY OF ALL DATA ASSETS OWNED BY THE USER

If the user is interested in retrieving a data asset, this can be done by adding it to the query results, also saving his/her search query by providing a title and short description. Following the data asset can be retrieved as described in the next chapter. In order for an asset to be marked as “Available” the user shall define its generic details (title, description, etc.) and further metadata as shown in the following figure.

The screenshot shows the 'Edit Asset Details' form for 'Test DCJ 12'. The form is divided into two main sections: 'General Information' and 'Distribution Details'. The 'General Information' section includes fields for 'TITLE', 'DESCRIPTION', 'TAGS', and 'REFERENCE'. The 'Distribution Details' section includes fields for 'TYPE' (with radio buttons for Text, Image, Model, Video, Audio, Text and Binary), 'FORMAT' (with a dropdown menu set to 'JSON'), and 'LANGUAGE'. The status 'INCOMPLETE' is displayed at the top of the form.

FIGURE 8 ASSET: EDIT DATA ASSET'S DETAILS



5. Data Retrieval

Through the “Retrieval” option on the top menu (or from the home view), the user can retrieve in a configurable manner the data assets (or specific parts of them) that he/she owns (directly owned and/or purchased through the BEYOND Marketplace).

In sequence, the different steps that a Data Consumer shall follow to retrieve a data asset available in the BEYOND Platform are described below:

- 1) Creation of a data asset retrieval query; as shown in Figure 9, the user interested in retrieving a data asset shall initially define the title and provide a brief description for the intended query, as well as define the retrieval accessibility mechanism (through an API, data streaming, or as downloadable file).

FIGURE 9 RETRIEVAL – CREATION OF A RETRIEVAL QUERY

- 2) Selection of the preferred search results fields (if not the whole data asset) that need to be extracted and returned as search query results (see Figure 10).
- 3) Definition/configuration of the retrieval parameters used to filter the query results (optional) (see Figure 10, right side)

The screenshot displays the 'Data Retrieval: Test 1' configuration page in the BEYOND platform. It is divided into three main sections: 'AVAILABLE ASSETS', 'SELECT SEARCH RESULTS FIELDS', and 'DEFINE QUERY PARAMETERS'. The 'AVAILABLE ASSETS' section lists five datasets: 'Test Services' (marked as 'SELECTED'), another 'Test Services' dataset, 'Test DCJ 12', 'Test File 2', and 'Test DCJ loader'. The 'SELECT SEARCH RESULTS FIELDS' section shows a dropdown menu for 'Test Services' with four selected fields: 'Building', 'constructionMethod', 'actualGrossArea', and 'actualNetArea'. The 'DEFINE QUERY PARAMETERS' section is currently empty, with an 'ADD QUERY PARAMETER' button. A progress indicator at the top shows three steps: '1 Search Results Configuration', '2 Test Results Acquisition' (current), and '3 Results Acquisition Information'. A 'Save' button is located in the top right corner. At the bottom, a warning message states 'Please select at least one concept from each dataset to proceed' next to a 'Save and Proceed' button.

FIGURE 10 RETRIEVAL: DATA RETRIEVAL CONFIGURATION

- 4) Configuration of the query body and running the query
- 5) Acquisition of the endpoints (GET & POST) for retrieving the query result, supported by instructions on how to use the platform's generated API regarding authorisation, pagination, etc.,

6. Data Trading

Through the “Marketplace” option on the top menu, users of the BEYOND Platform are provided with data trading functionalities; meaning that they can buy data assets they are interested-in (from the Data Consumer/Broker perspective) or share/trade the data assets they own (from the Data Provider perspective), by mutually agreeing on the sharing terms and signing the respective smart data asset contract drafted and executed through the platform and paying the respective fees.

In brief, through the BEYOND Marketplace, Asset Consumers can search for a data asset of interest (see Figure 11), 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 an agreement is reached, sign the respective contract, and proceed with the payment.

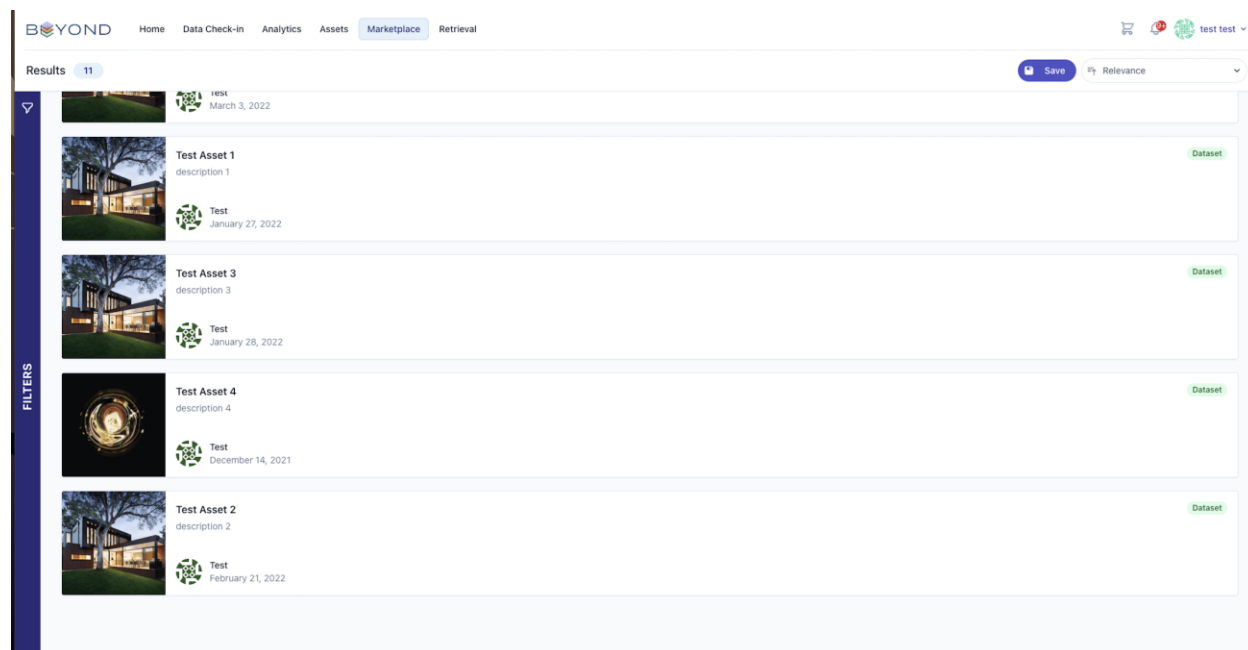


FIGURE 11 BEYOND MARKETPLACE

In sequence, the different steps that both parties (i.e., Data Consumer and Data Provider) shall follow to trade a data asset available in the BEYOND Platform are described below:

Data Consumer:

- 1) Explores data assets available through the BEYOND Marketplace (see Figure 11), filters the results, etc. (results are only visible upon resolution of their access policies)
- 2) Identifies data asset of interest and adds it in his/her cart
- 3) Sends request for trading transaction to Data Provider



Data Provider:

- 4) Rejects request offer - end of trading process (data consumer is notified)
- 5) Accepts request offer and proceeds with drafting of smart contract
- 6) Sends draft contract to data consumer

Data Consumer:

- 7) Rejects the contract and negotiates on the terms with the data provider (iterative process)
- 8) Accepts the contract terms, and proceeds with the respective payment using his/her organization wallet

Once the payment is verified by the data provider, the contract is activated, and the asset consumer can download the acquired data asset. As previously mentioned, at any point through the “Contracts” tab from the Home view (see Figure 4) the user can see the contracts she/he is involved in and monitor their status (see Figure 12).

DETAILS	CREATED ON	LAST MODIFIED ON	STATUS
● Test Asset 1 provided publicly by Test 2	December 10, 2021	December 10, 2021	Request
● test asset 2 provided publicly to Test 2	January 28, 2022	January 28, 2022	Active
● Test Asset 3 provided publicly to Test 2	December 14, 2021	December 14, 2021	Active
● Test File 2 provided publicly to Test 2	January 28, 2022	January 28, 2022	Active
● Created result2 provided publicly by test	January 28, 2022	January 28, 2022	Active
● test asset 4 provided publicly to test	January 28, 2022	January 28, 2022	Active
● different name dcl provided publicly to test	January 28, 2022	January 28, 2022	Active
Bundle	January 28, 2022	January 28, 2022	Draft
Bundle	January 28, 2022	January 28, 2022	Active

FIGURE 12 USER'S CONTRACT LIST



7. Data Analytics

By selecting the “Data Analytics” option on the “Home” menu (see Figure 4) the user can reap the benefits offered by the data analytics functions offered from the BEYOND Platform. 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.

In sequence, the different steps that a Data Provider shall follow, to successfully carry out a data analytics process on his/her data asset, are described in as follows:

- 1) Design of analytic workflows in a visual manner through the analytics workflow designer. As shown in Figure 13, the user is able to select, arrange/connect the various input blocks and apply the preferred data processing/transformation functions and the algorithms on the input data, as well as select the preferred type of output (such as via csv file, or via visualisations, etc).

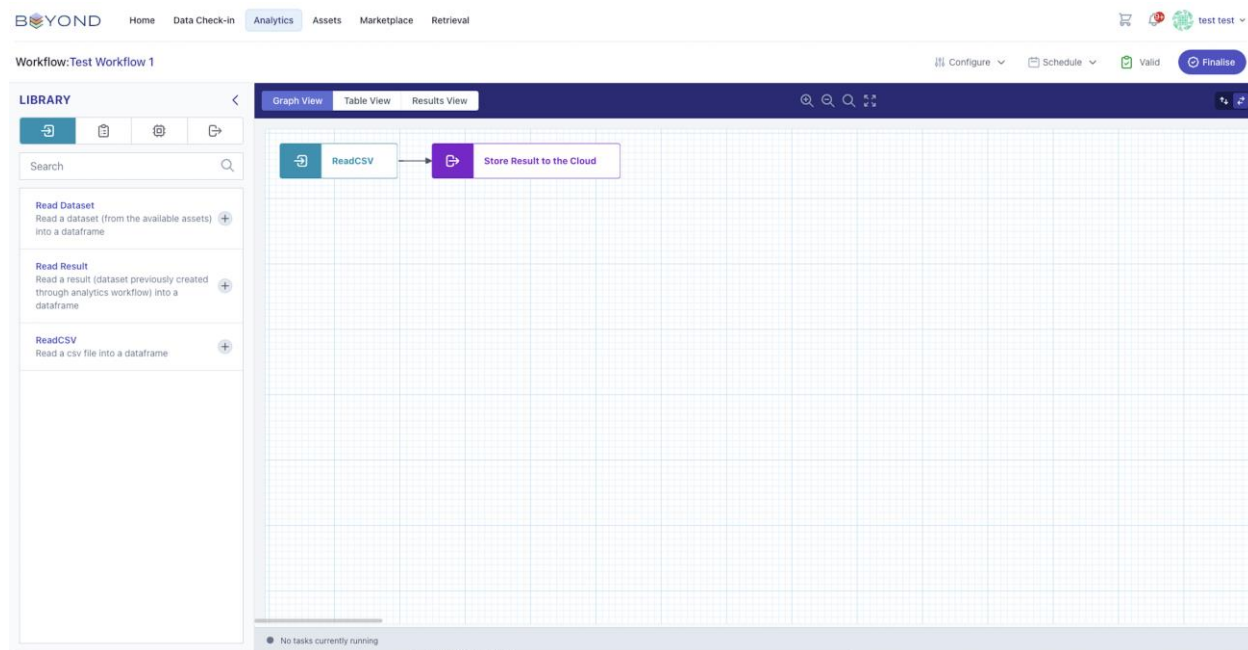


FIGURE 13 DATA ANALYTICS: DESIGN OF ANALYTIC WORKFLOWS

- 2) Definition of schedules (if required) for the created analytics workflow, defining when this workflow shall take place (see Figure 14).

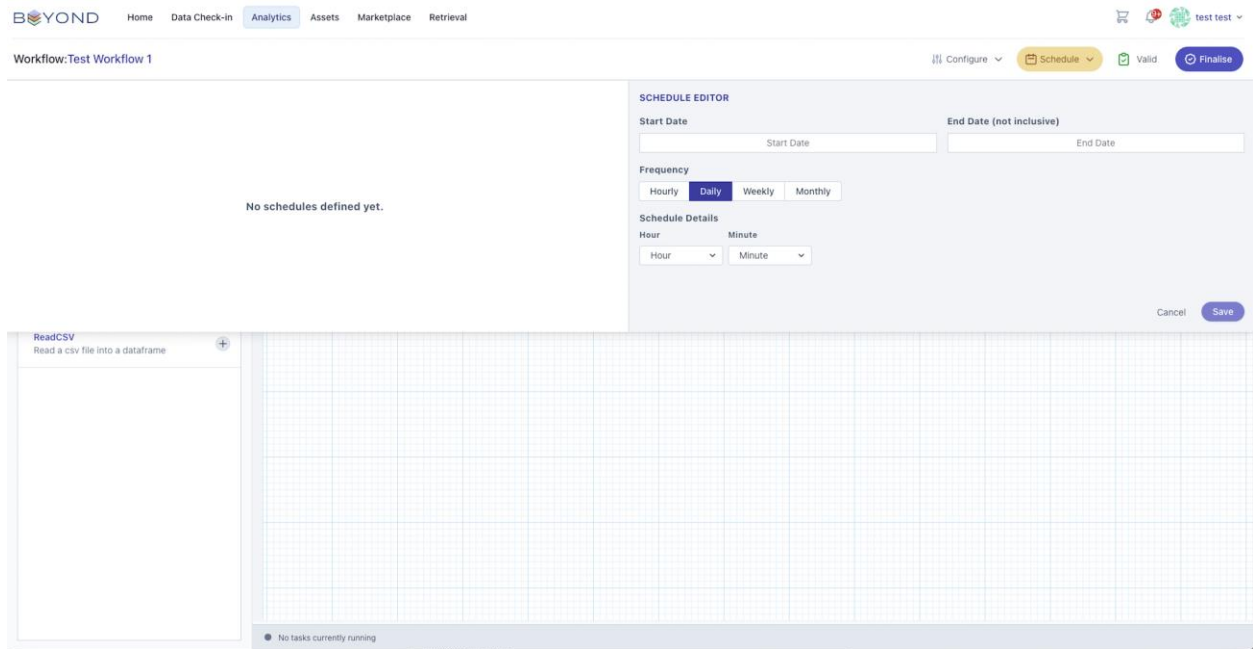


FIGURE 14 DATA ANALYTICS: DEFINITION OF AN ANALYTICS WORKFLOW'S SCHEDULE

- 3) Preview of results and definition of the preferred visualization output type (e.g., area chart, bar chart, etc.). In addition, the user can configure the parameters to be visualized, such as defining the visualisation's title, description, legends, etc.

8. Conclusions and plan for release 1.00

The deliverable at hand, describes the beta release of the BEYOND Integrated Platform, delivered in M16 of the project's implementation, consolidating the software development outcomes of WP3 and WP4 activities towards presenting the offered services, supplemented by appropriate screenshots depicting the user interface of the actual software implementation.

In this direction, to support end-users of the BEYOND Platform, D3.5 presents the:

- *Data Collection* process, that users (Data Asset Providers) need to follow to create, configure and execute a data check-in job (i.e., upload a data asset) so that it can be successfully stored in the platform and be available according to its access policies.
- *Data Exploration* process that enables users search for data asset of interest residing in the platform, and browse through/edit/delete the data assets they own
- *Data Retrieval* process, where users can retrieve the data assets they own
- *Data Analytics* process, enabling users to design and execute data analytics functions to their owned data assets and receive the corresponding results delivering valuable insights on their data
- *Data Trading* process that needs to be followed by users to share (from the Data Provider's point of view) or purchase (from the Data Consumer/Broker point of view) data assets, prepare the appropriate contracts and if needed negotiate on the contract's terms, and retrieve them based on the applicable terms.

This beta release of the BEYOND Integrated Platform provides the basis for the upcoming integration activities and additional development work towards successfully delivering the first stable release of the BEYOND Integrated platform: release 1.00, due in M20 and will be reported in D3.6 and release 2.00 due in M32, reported in D3.7.

The next steps of work towards the delivery of the first stable release of the platform (Release 1.00) will focus on:

- delivering the full set of planned functionalities for each of the component/services of the BEYOND platform
- further integration and additional back-end development/testing activities of all components
- debugging
- improvements of the user interface, based on the partner's feedback that will be received on this beta release



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 -a
- [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 (2022b): D3.4 - BEYOND Integrated Platform – Alpha, Mock-ups Release
- [6] BEYOND (2022c): D4.1 - BEYOND Data Analytics, Sharing & Matchmaking Services Bundles – Beta Release

