aliaspace

DAFNE

Dataflow Network Environment

SOFTWARE USER MANUAL

Role/Title	Name	Signature	Date
Author	DAFNE Team		12/08/2025
Verified/Approved	DAFNE Team		12/08/2025

Change Register

Version/Rev.	Date	Change	Reason
1.0	18/12/2021	All	First Release
1.1	02/02/2022	Add section 2 Improved sections: 1, 4.1, 4.2, 4.3, 4.4	Updated for OSF release
1.2	28/03/2022	Add section 6	Updated for metrics addition
1.3	24/05/2022	Improved sections: 1, 2, 3, 4, 6	Update for DAFNE 2.0.2 release
1.4	30/06/2022	Improved section: 6	Update for DAFNE 3.0.0 release
1.5	27/07/2022	Improved all sections and updated pictures.	Update for DAFNE 3.0.2 release
2.1	12/08/2025	Updated all sections and pictures Removed sections about synchronizers, not supported in this version	Update for DAFNE 4.1.1 release

Table of Contents

Index of Figures

1. Introduction

The Dataflow Network Environment (*DAFNE*) is the Consortium response to the Collaborative GS users need for a strong dataflow visualization and control solution.
The aim of DAFNE is to give to CDC Services stakeholders an intuitive and modern interface for managing the dataflow massively lowering down the need for log checking or manual interventions.
It is designed as a powerful plug-and-play visualization tool exposing a standard HTTP interface for harvesting data to be visualized.
In terms of visualization and control the system oversees:

- **Completeness**
  - *Visualization* of the number of products published in every configured centres.
- **Service Availability**
  - *Visualization* of the availability of the local centre over a limited period, shown on a chart.

1.1. Purpose and Scope

This document is a comprehensive guide of the Data Flow Network Environment (*DAFNE*) and provides help for interpreting the information presented. This document has been prepared in the frame of the Collaborative Data Hub Software Maintenance and Evolution Services for Digital Twin Earth (*hereinafter referred to as the "Service"*). This document applies to DAFNE version 4.1.1.

The overall structure of the document is described below:

- Chapter 1 is an introduction with reference and applicable documents
- Chapter 2 explains the concepts
- Chapter 3 contains the getting started section
- Chapter 4 describes the configuration details about the system
- Chapter 5 explains the dataflow visualization

1.2. Applicable and Reference Documents

ID	Document Title	Reference	Issue
AD-1.	Statement of Work: Collaborative Data Hub Software - Maintenance and Evolution Services - Ready for Digital Twin Earth	ESA-EOPG-EOPGC-SOW-12	1.0
AD-2.	Collaborative Data Hub Software - Maintenance and Evolution Services - Ready for Digital Twin Earth - System Requirements Specification (SRS)	COPE-SERCO-RD-21-1177	3.0

Table 1 Applicable Documents

ID	Document Title	Reference	Issue
RD-1.	DHS Operational Concept Document	COPE-SERCO-TN-21-1174	1.6
RD-2.	DAFNE System Design Document	ALIA-DAFNE-SDD-21-0001 DAFNE System Design Document	1.5
RD-3.	DAFNE Installation and Configuration Manual	ALIA-DAFNE-ICM-2025-0001_Installation_and_Configuration_Manual	2.1
RD-4.	DHuS Administration Manual	COPE-SERCO-TN-22-1351-Collaborative-Data-Hub-Software-DHuS-Administration-Manual	3.1
RD-5.	Collaborative Data Hub Software - Maintenance and Evolution Services - Ready for Digital Twin Earth - System Requirements Specification (SRS)	COPE-SERCO-TN-21-1171	1.0
RD-6.	GSS Administration Manual	GAEL-P311-GSS - Collaborative Data Hub Software GSS Administration Manual	2.1.2

Table 2 Reference Documents

1.3. Acronyms

Acronym	Description
API	Application Programming Interface
CPU	Central Processing Unit
DB	Database
DAFNE	Data Flow Network Environment
DHS	Data Hub Software
DHR	Data Hub Relay
DHuS	Data Hub Service
EO	Earth Observation

ESA	European Space Agency
GSS	Gael Store Service
HTTP	Hyper Text Transfer Protocol
IDP	Identity Provider
JSON	JavaScript Object Notation
RAM	Random Access Memory
TCP	Transmission Control Protocol
URL	Uniform Resource Locator
VM	Virtual Machine

2. Concepts

This section describes the fundamental concepts behind DAFNE.

- **Local Centre**
  - It is the centre that DAFNE will monitor allowing to visualize its completeness of products and service availability
  - The kind of services that can be associated to the local centre, i.e.: the services that DAFNE will be able to monitor are:
    - Multiple Back-End DHuS instances
    - 1 Front-End DHuS instance

    or alternatively

    - 1 DHuS Single Instance
    - 1 CDSE (DAS) Instance
    - 1 PRIP Instance
    - 1 LTA Instance
    - 1 GSS Instance
- **Completeness**
  - In the context of DAFNE the completeness is related to DHuS Front-End, CDSE, PRIP, LTA or GSS instances, meaning that DAFNE will report the results of the selected query for all the services configured with the following service types: DHuS Front-End, DHuS Single-Instance, CDSE, PRIP, LTA, GSS in the Services page
- **Metrics**
  - In this version of DAFNE the Service Availability of the Local Centre is collected, based on the associated service.

3. Getting Started

This section describes the first steps in the DAFNE application: how to access and navigate between panels and a general description of the graphical user interface.
Please bear in mind that some sections in the main page are visible, but disabled in DAFNE v4.1.1, because of the dismissal of the DHuS service and the incoming support of GSS in DAFNE. An alert will be present in this document, when a section refers to this limitation.

3.1. Accessing DAFNE

DAFNE is a web application and is accessible from the web browser. It can be installed on a local VM or it can be hosted on a web server (*Please refer to RD-3 for installation details*).
The first time the user reaches the application URL, a login dialog is displayed.
Service Admin or Service User login into DAFNE and credentials are checked thanks to the OAuth2 authentication interface between the Service IAM and DAFNE.

DAFNE manages two user roles as defined in RD-1:

- **Dataflow Manager** (*this role allows the user to visualize, manage, configure DAFNE*)

- **Dataflow Viewer** (*this role allows the user to visualize all the information shown and reported by DAFNE*)

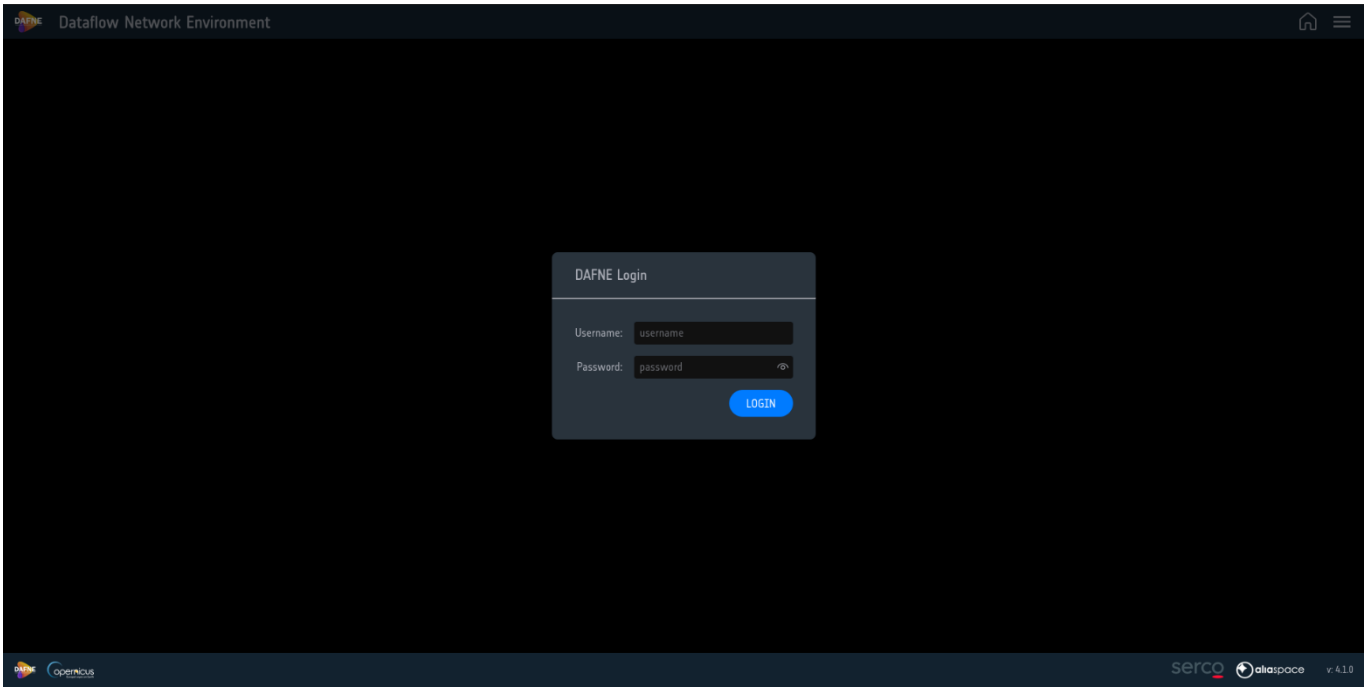

Figure 1 – Login Dialog

Once logged in DAFNE, the home view appears showing the default centres configuration as shown in the picture below:

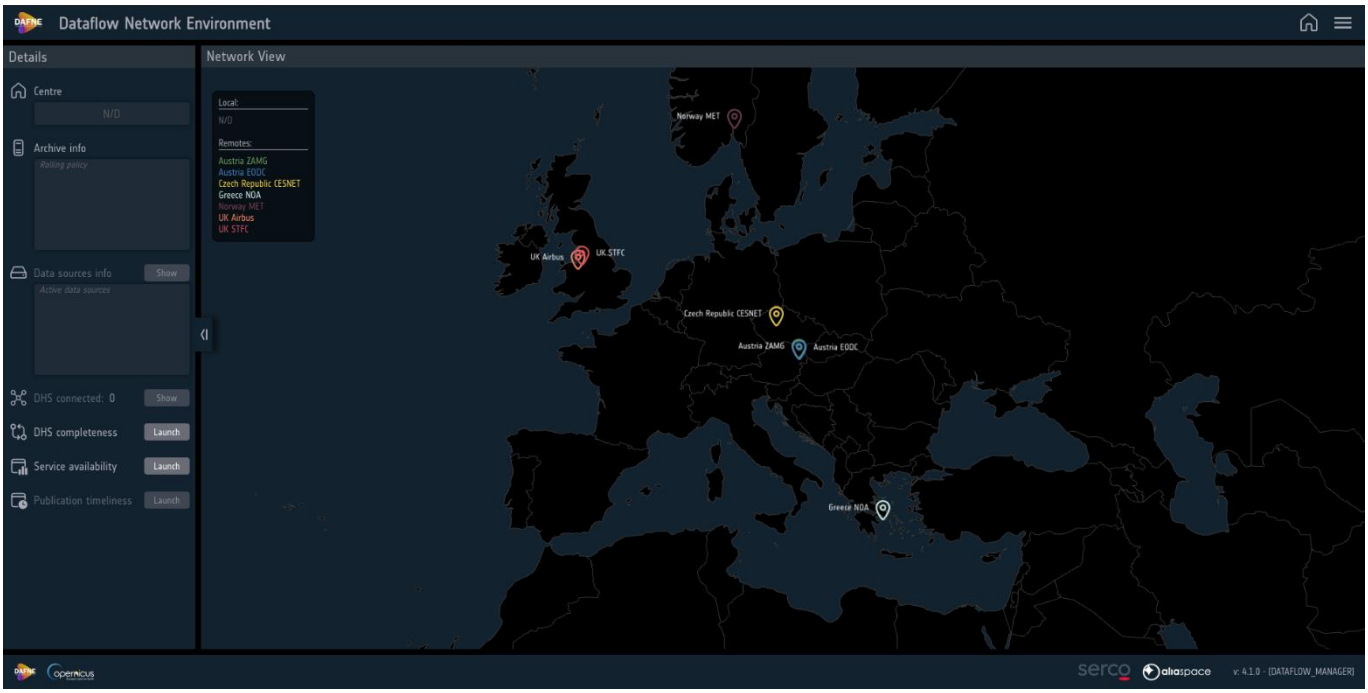

Figure 2 – Home View with default centres

3.2. Structure of DAFNE

DAFNE application GUI is divided in four panels:

- Header
- Sidebar
- Main View
- Footer

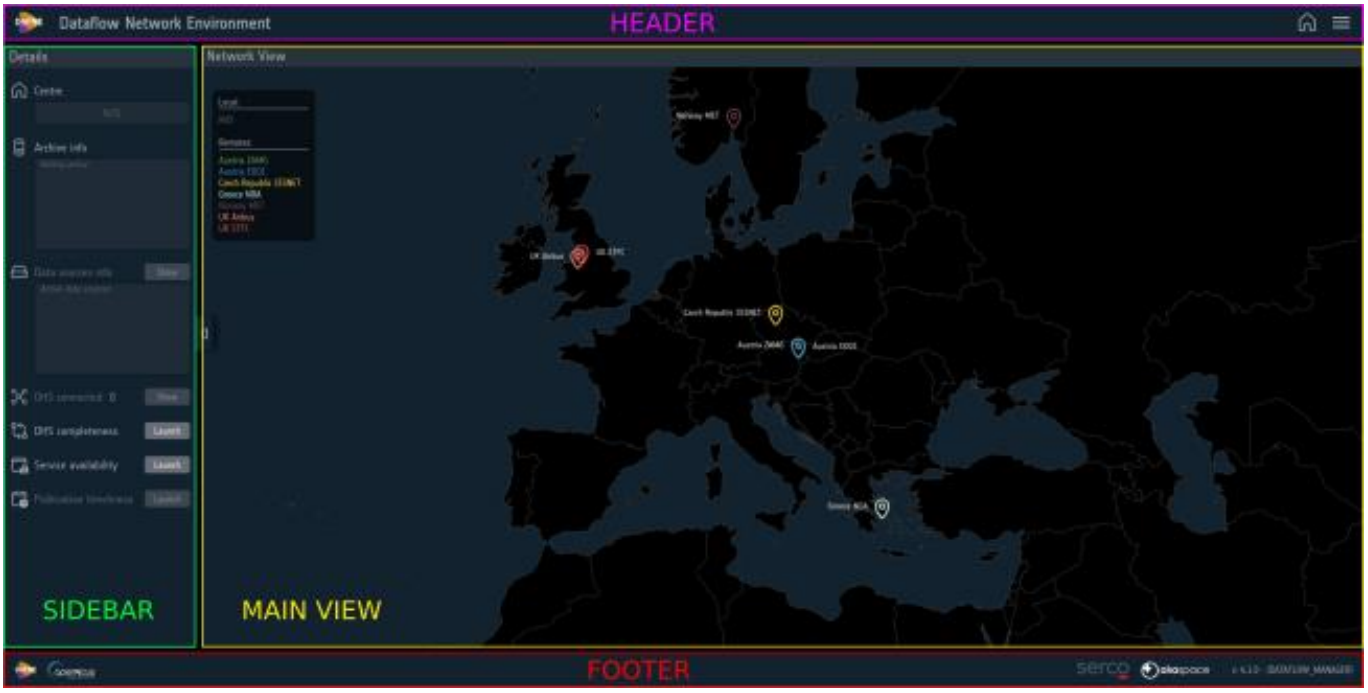

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Figure 3 – GUI Structure

HEADER panel contains the DAFNE logo, the application title, the home icon (*click on it to return to the main page*) and the user icon (*to access the navigation menu*).

SIDEBAR panel contains information about the local centre (*i.e. the DHS centre managed by DAFNE*)

- *Centre*: name of the "local" centre. The local centre is the one on which the synchronization dataflow and archive information will be shown and on which metrics are calculated
- *Archive info*: the local centre rolling policy (*Disabled in version 4.1.1*)
- *Data sources info*: the active data sources (*i.e. the data providers from which the local centre retrieves the data*). (*Disabled in version 4.1.1*)
- *DHS connected*: number of the DHS that retrieve the data from the local centre. (*Disabled in version 4.1.1*)
- *DHS completeness*: Show the amount of products published per day, in a selected time period, on all selected data sources, restricted to the selected filter. Clicking on the "Launch" button a new panel appears in the Main Panel with the products filter, the date selection and graph types

- *Service Availability*: the average daily availability of the local Centre; clicking on the “Launch” button a new panel appears in the Main Panel with a start and stop date filter and the possibility to show weekly or daily aggregation.

- *Publication Timeliness*: the time difference in the publication of the local Centre products, compared to the origin on a single synch base. (*Disabled in version 4.1.1*)

MAIN VIEW panel shows the map, the centres and the dataflow connections among them or the completeness and metrics data charts

FOOTER panel contains the configurable local centre logo, the Copernicus logo, the SERCO logo, the Alia Space logo, the application version number and the current logged-in user role

4. Configuration details

The following section shows the detailed panels to configure centres, services and synchronizers entities. Please note that only users with Dataflow Manager role can configure and edit those sections.

4.1. Centres

Centre is the entity representing the local or remote node in the network. DAFNE comes with a predefined centre configuration on board, including the following centres:

- Austria ZAMG, https://vsentdhr.zamg.ac.at
- Austria EODC, https://dhr.datahub.eodc.eu
- Czech Republic CESNET, https://fe1.dhr.cesnet.cz
- Greece NOA, https://dhr.copernicus.grnet.gr
- Norway MET, https://sentinelhub2.met.no
- UK Airbus, https://ukdhr.co.uk
- UK STFC, https://srh-services8.ceda.ac.uk

Users with “Dataflow Manager” role can add, edit or remove a center by accessing the Centres page from the user menu, as shown in the following figures:

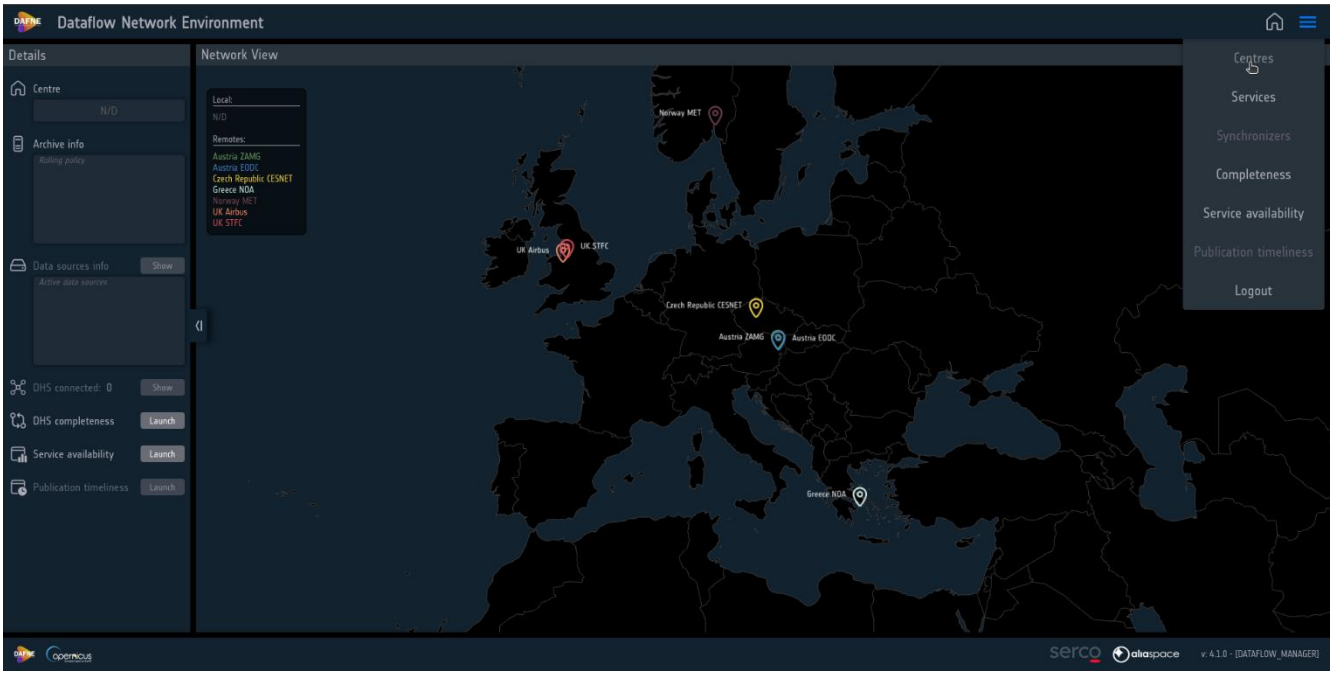


Figure 4 – Accessing to the centres page

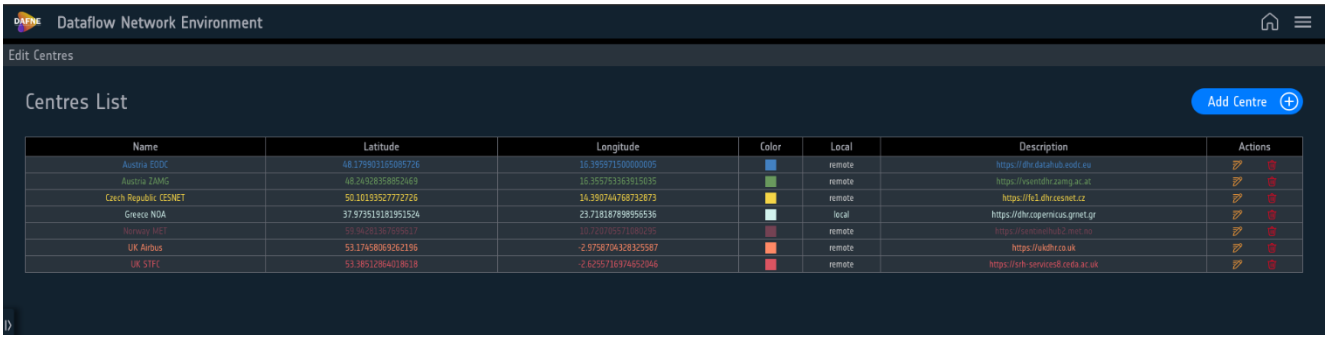


Figure 5 – Centres page

4.1.1.1. Add a Centre

To add a new centre user has to click on “Add Centre” button on the Centres page.
A new dialog appears, containing the centre fields to fill, as shown in the figure below:

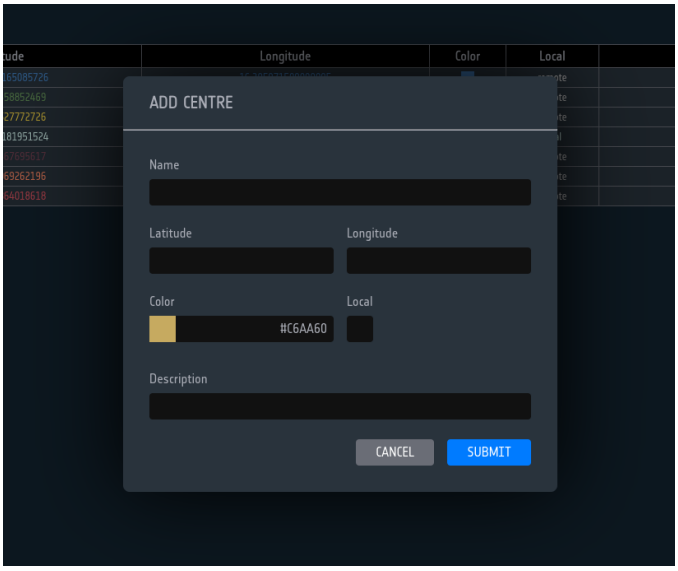


Figure 6 – Add centre dialog

Name – Name of the new centre

Latitude, Longitude – Coordinates of the centre to visualize on the map. The coordinates must be inserted in decimal degree inside their range [Latitude: (-90.0, 90.0), Longitude: (-180.0, 180.0)]

Color – Color of the Centre Icon and connection arcs on the map

Local – Local or Remote flag (this flag will also make the Centre Icon change from “place” to “home”); only one local centre can be configured at a time.

Description – Description of the new centre (optional)

4.1.1.2. Edit a Centre

To edit an existing centre, user has to click on the relative “pencil” icon in the row. A new dialog appears containing all the fields filled with the current centre values, as shown in the following picture:

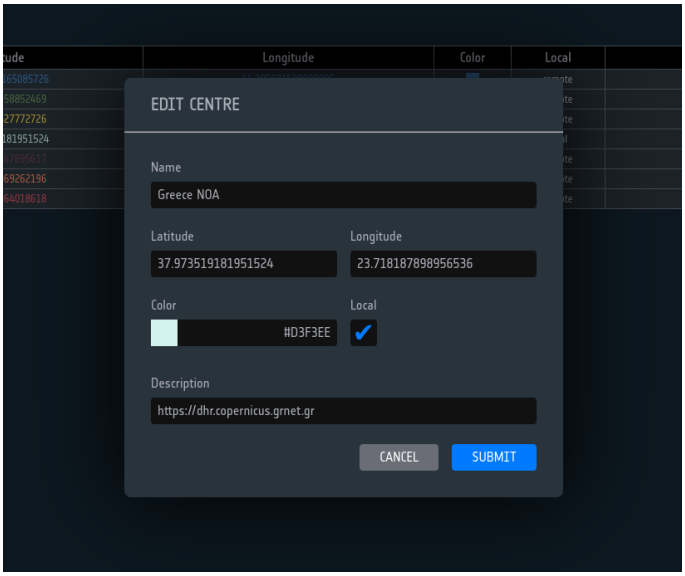


Figure 7 – Edit centre dialog

Once edited one or more fields, user should click on the “Submit” button to confirm the change or on the “Close” button to cancel the operation.

4.1.1.3. Delete a Centre

To remove an existing centre user has to click on the related red bin icon, as shown in the picture below. Please note that when deleting a Centre, all Services associated with that Centre are deleted as well.

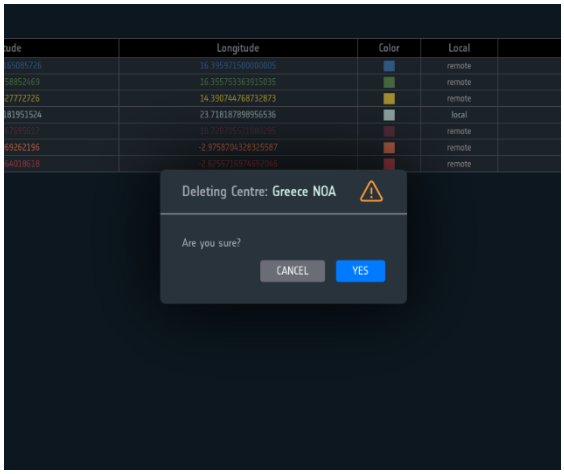


Figure 8 – Delete centre dialog

4.2. Services

Service is the DAFNE entity representing every local or remote DHS network node with an established interface with other configured network nodes.
For example, in a network topology where a Centre A (*local*) retrieves the data from Centre B and Centre C (*via synchronizers*) while Centre D retrieves data from Centre A (*via synchronizer*) the services you have to configure are: Centre A, Centre B, Centre C, Centre D with relative associations. Please note that more services can be associated to the local centre, with the limitation of only one Front-End or Single Instance, but unlimited Back-End Instances.
In terms of authentication, services can support: Basic authentication (DHuS or LTA), OAuth2 authentication (CDSE OAuth2, PRIP or GSS) and No Auth (CDSE). Depending on the chosen services type, different fields are visualized for that service (*see figure 12*).

Users with “Dataflow Manager” role can add, edit or remove a service by clicking on the Services item from the user menu as shown below:

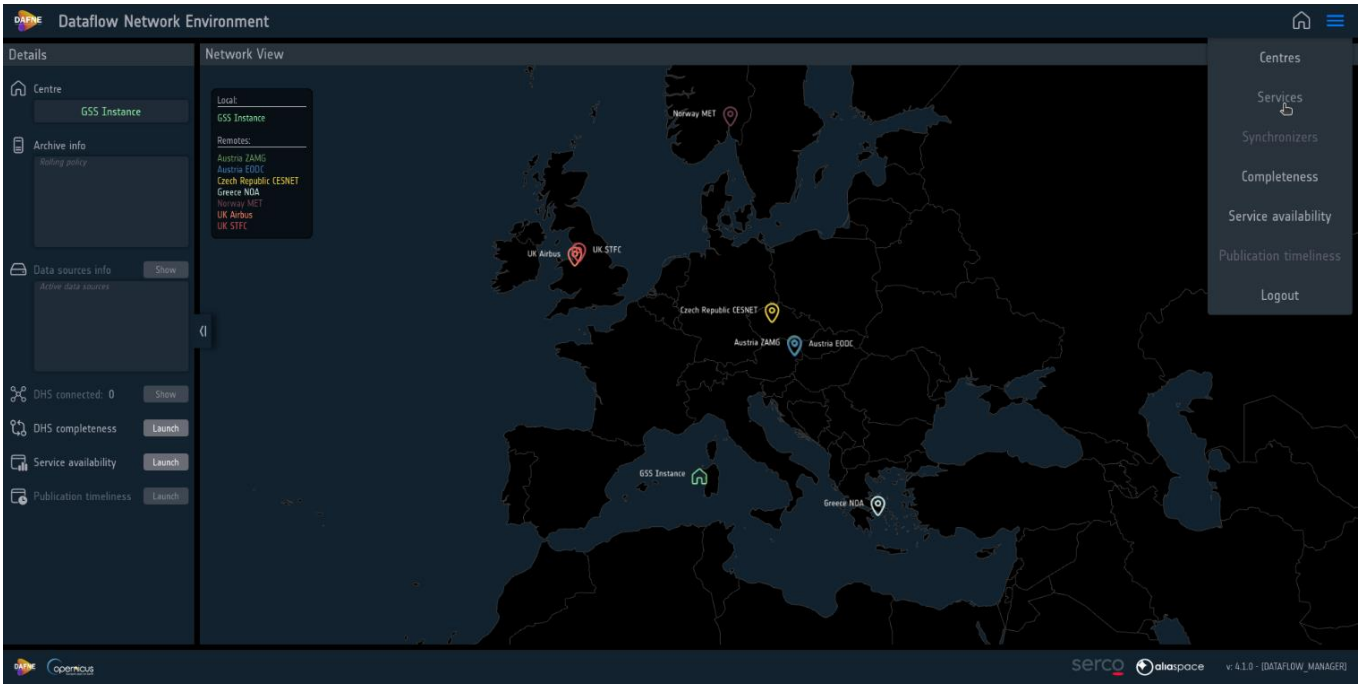


Figure 9 – Accessing to the services page

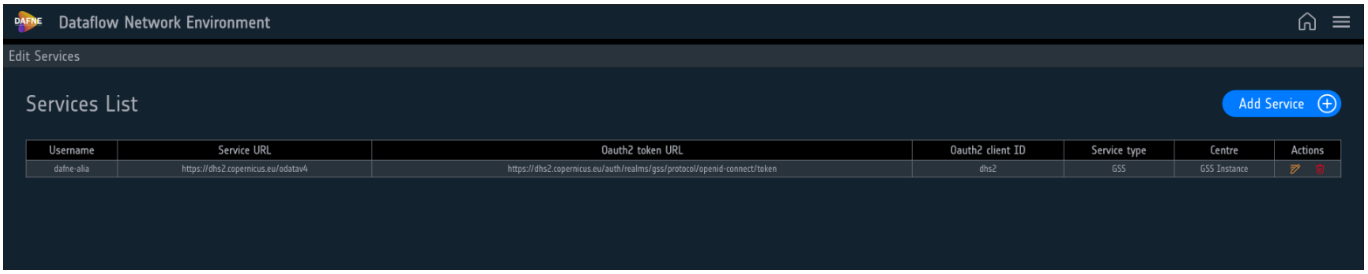


Figure 10 – Services page

4.2.1.1. Add a Service

To add a new service user has to click on “Add Service” button on the Services page.

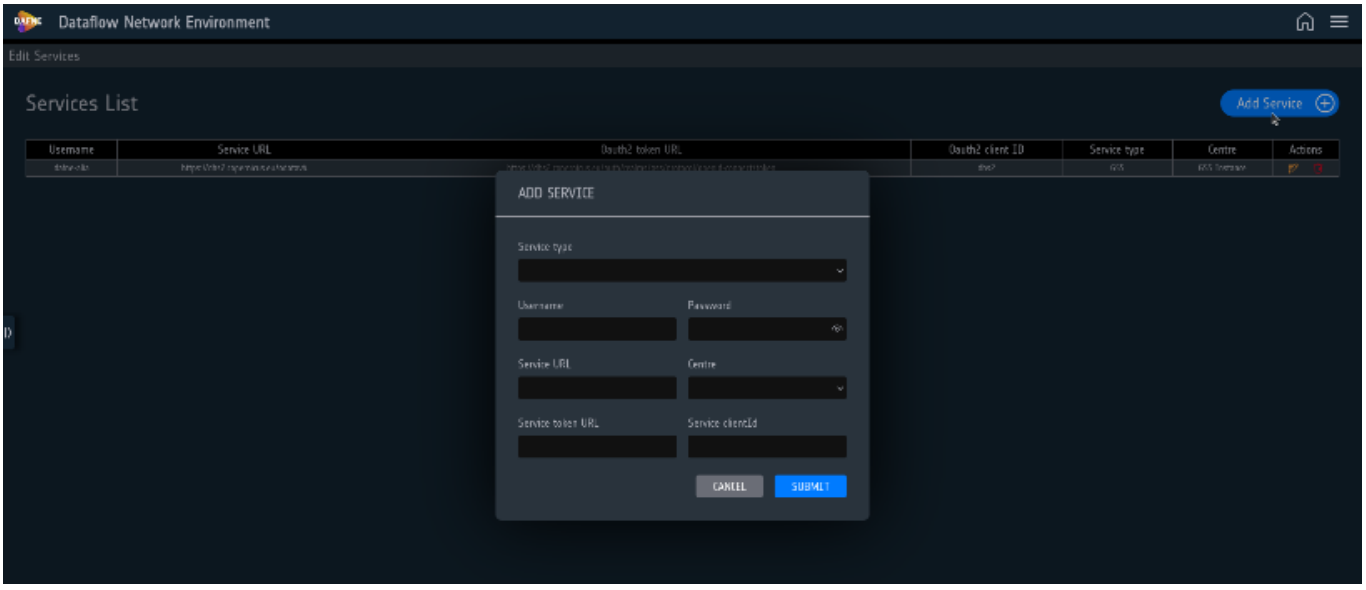


Figure 11 – Services page

A new dialog appears, containing the service fields to fill:

Username – Username authorized to use the service (*with the exception of CDSE NoAuth*)

Password – Password of the user authorized to use the service (*with the exception of CDSE NoAuth*)

Service URL – HTTP end point of the service

Service type – Type of DHuS (*DHuS Single Instance, DHuS Front-End or DHuS Back-End*) or CSC Services (*CDSE, CDSE OAuth2, PRIP, LTA or GSS*)

Service token URL – The URL of the authentication service at which the token should be asked (*for OAuth2 services only*)

Service clientId – The client ID of the authentication service for the token retrieval (*for OAuth2 services only*)

Centre – Centre to which the service is to be associated

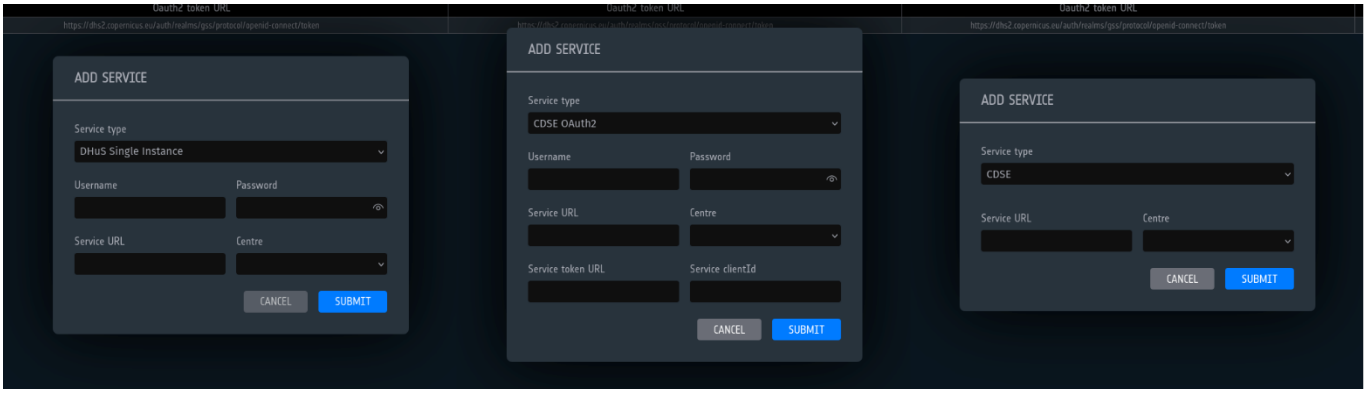


Figure 12 – Add service dialog (Basic, OAuth2, CDSE NoAuth)

4.2.1.2. Edit a Service

To edit an existing service, user has to click on the relative “pencil” icon in the row. A new dialog appears containing all the fields filled with the current service values, as shown in the following picture:

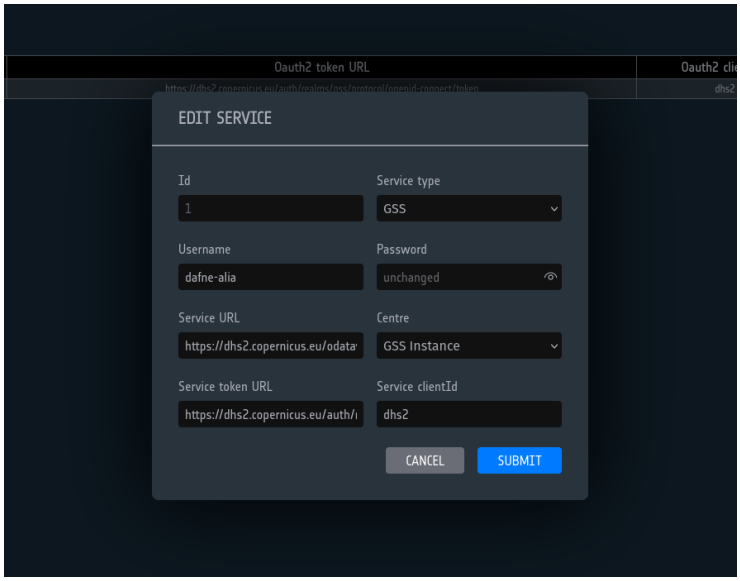


Figure 13 – Edit service dialog

Once edited one or more fields user should click on the “Submit” button to confirm the change or on the “Close” button to cancel the operation. Until the user doesn’t modify the password, it remains unchanged.

4.2.1.3. Delete a Service

To remove an existing service, user has to click on the related red bin icon, as shown in the picture below (*Yes to confirm, Cancel to exit*):

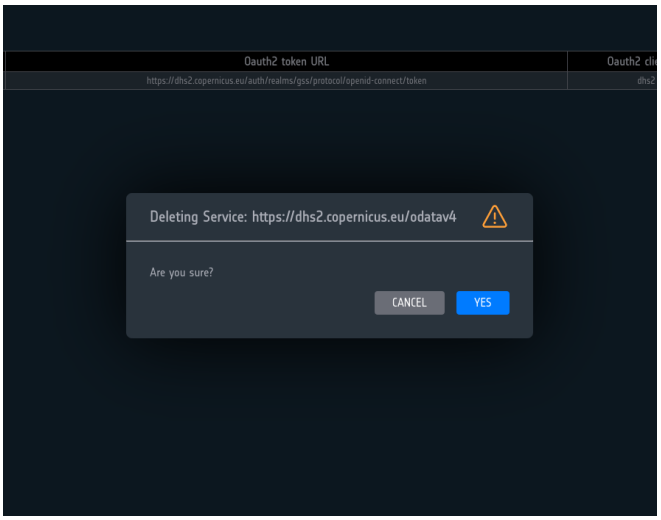


Figure 14 – Delete service dialog

5. Metrics

DAFNE can collect different types of measurements related to DHR services, that will be drawn as different kinds of charts.
In each metric panel there is a filter area where the user can choose which data to be seen. After clicking on the Filter submit button, the chart and the bottom table will be filled with the requested data. If a value cannot be retrieved, the “NaN” acronym will be displayed instead.

Clicking on the buttons on the right, user can change the chart type.
Clicking on the left or bottom, handles the side panel or the table will be hidden to let more space to the chart.
A csv file containing the table data can be exported clicking on the relative button.
An image of the shown chart can be exported too, through the right-click context menu.

5.1. Completeness

The completeness in DAFNE is shown as the amount of product published per day on all selected DHuS (Front-End or Single-Instance) or CSC services, configured within DAFNE and it is useful to compare the status of their archive in respect to the primary nodes and/or to other network nodes.
The visualization of the completeness information is computed using a filter. The user can select the choosen mission, product-type, platform number and a data range to retrieve daily product numbers to compare.

Figure 15 – Completeness page

PRODUCT FILTER - It gives the possibility to choose the filter on which the data shown is based, in a maximum range of 15 days. The filter parameters can be entered manually (i.e. mission or product type). In version 4.1.0 the possibility to choose from a list of configured synchronizers and use its filter to show data is disabled.

CHART AREA - It represents the main view of the completeness, showing the different charts. In this area you can zoom, pan or save the chart as an image with the mouse:

Central or wheel button to move the pan

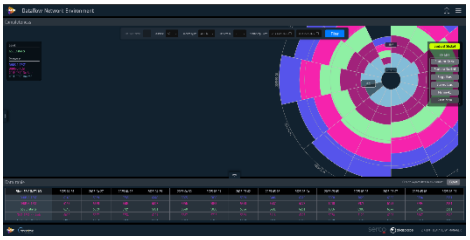


Figure 16 – Pan on chart

Use the mouse wheel to zoom in/out

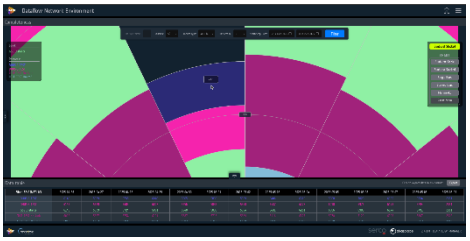


Figure 17 – Zoom on chart

Right-click to save the chart as image

Figure 18 – Save image on right mouse click

Double click or click on the [Reset Zoom] button to reset the view

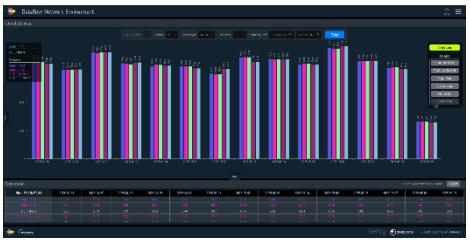


Figure 19 – Double click resets the view

DATA TABLE – It contains the chart data in tabular form. User can export the data in csv (*comma separated values)* file format as depicted in the following picture:

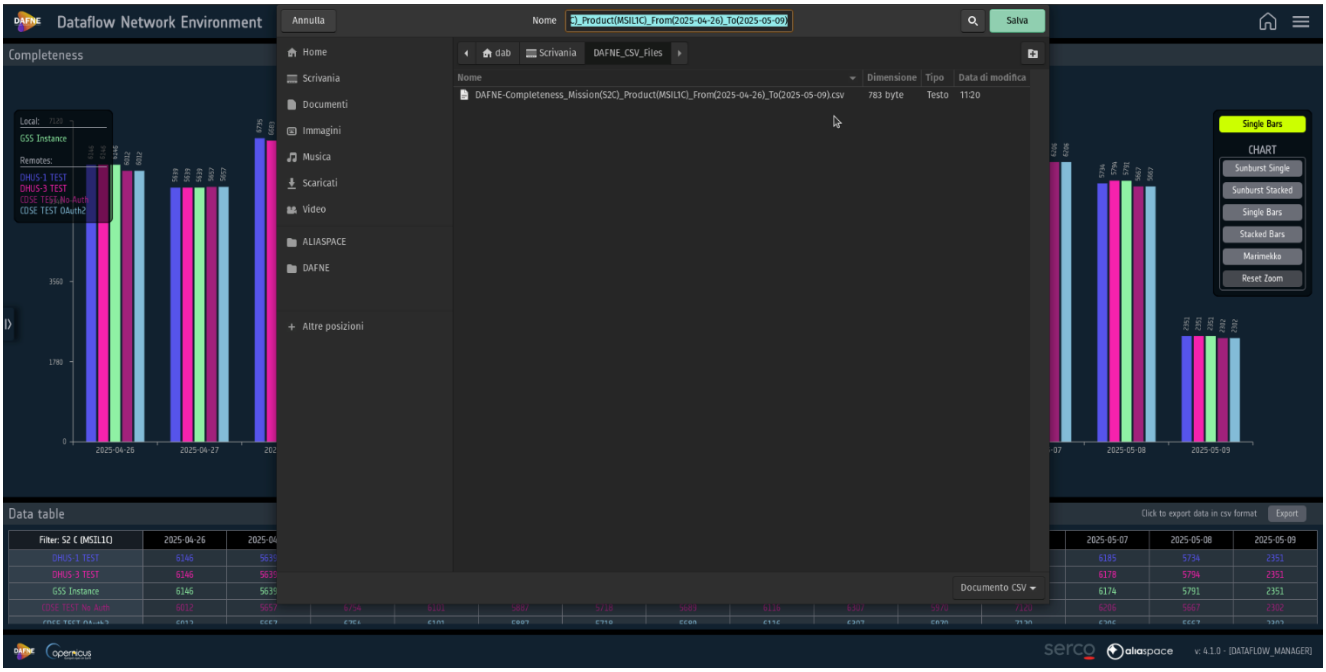


Figure 20 – Save data in a csv file

The file will be saved with the following name convention:
`DAFNE-Completeness_Mission(MM)_Product(PRD)_From(YYYY-MM-DD)_To(YYYY-MM-DD).csv`
`in case of manually entered filter.`

`Example:`
`DAFNE-Completeness_Mission(S1)_Product(OCN)_From(2021-12-04)_To(2021-12-18).csv`

CHART SETTINGS – users can choose among different available charts:

- Sunburst Single
  - It is a circular statistical graph divided into slices. Each slice represents a specific day and the colored sections depict the number of products for each hub for that specific day, scaled using the maximum value received between the hubs for the requested days as a reference for the maximum chart value. In both Single and Stacked Sunburst charts some labels are present to show relative values for 25%, 50%, 75% and 100% of the maximum value and when hovering with the mouse over a section, a bubble appears showing that hub product number for that day.
- Sunburst Stacked
  - Same graph as the Sunburst Single but the number of products for each hub is stacked on each other for the same day as colored sections of a slice. The product sum per day is scaled using the maximum sum of products between the requested days as a reference for the maximum chart value.
- Single Bars
  - It is a bar graph showing days on the x-axis and the number of products on the y-axis. For every day all the requested hub products are displayed as single-colored bars, scaled in percentage on the maximum value received.
- Stacked Bars

- Same graph as the Single Bars but the requested hubs products numbers are displayed as colored blocks stacked on each other for the same day and scaled in percentage on the maximum day product sum.

- Marimekko
  - It is a peculiar Stacked Bars chart, in which on the Y axis, for each day, the sum of the products of that day represents the 100% and every section of each bar is colored and scaled according to the number of products of that hub relative to the day sum. The number of products of each hub is also reported over the colored part. The X axis reports the sum of the products of that day and the width of the bar is scaled in percentage with respect to the total of products retrieved from all the hubs for the entire selected period.

The following pictures show the different charts:

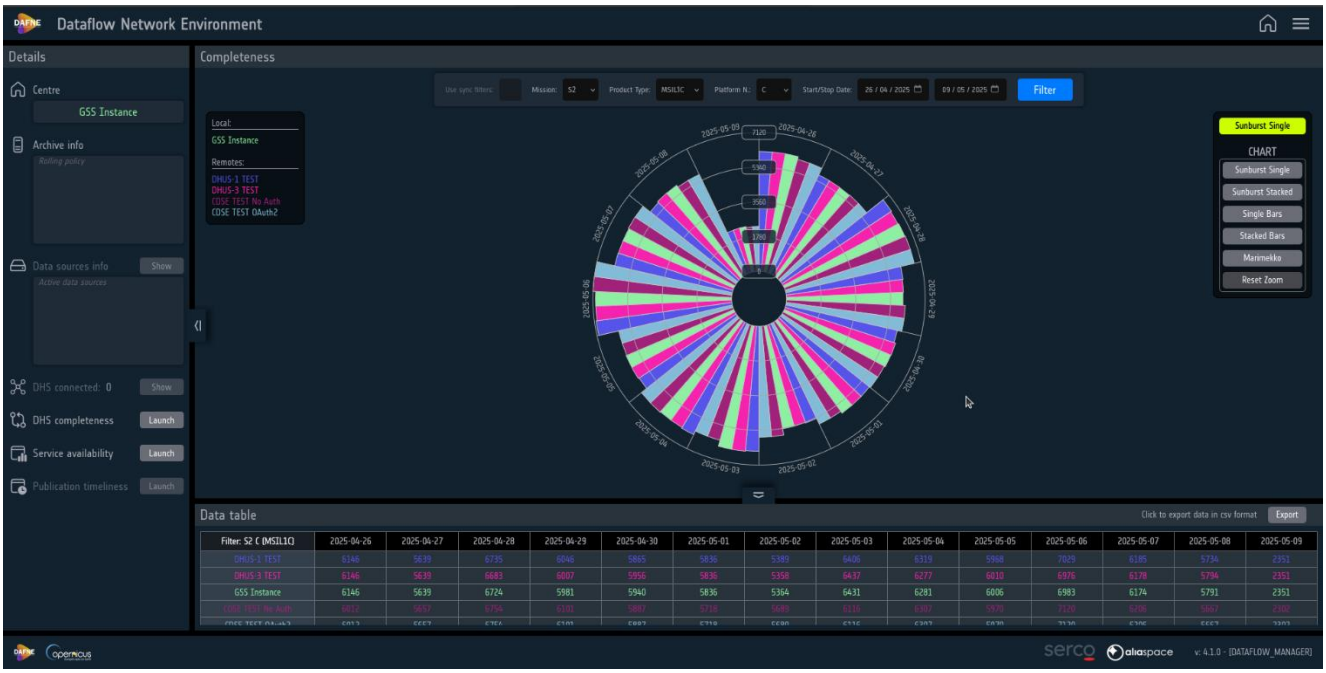


Figure 21 – Sunburst Chart single

Figure 22 – Sunburst Chart Stacked

Figure 23 – Bar Chart Single

Figure 24 – Bar Chart Stacked

Figure 25 – Marimekko Chart

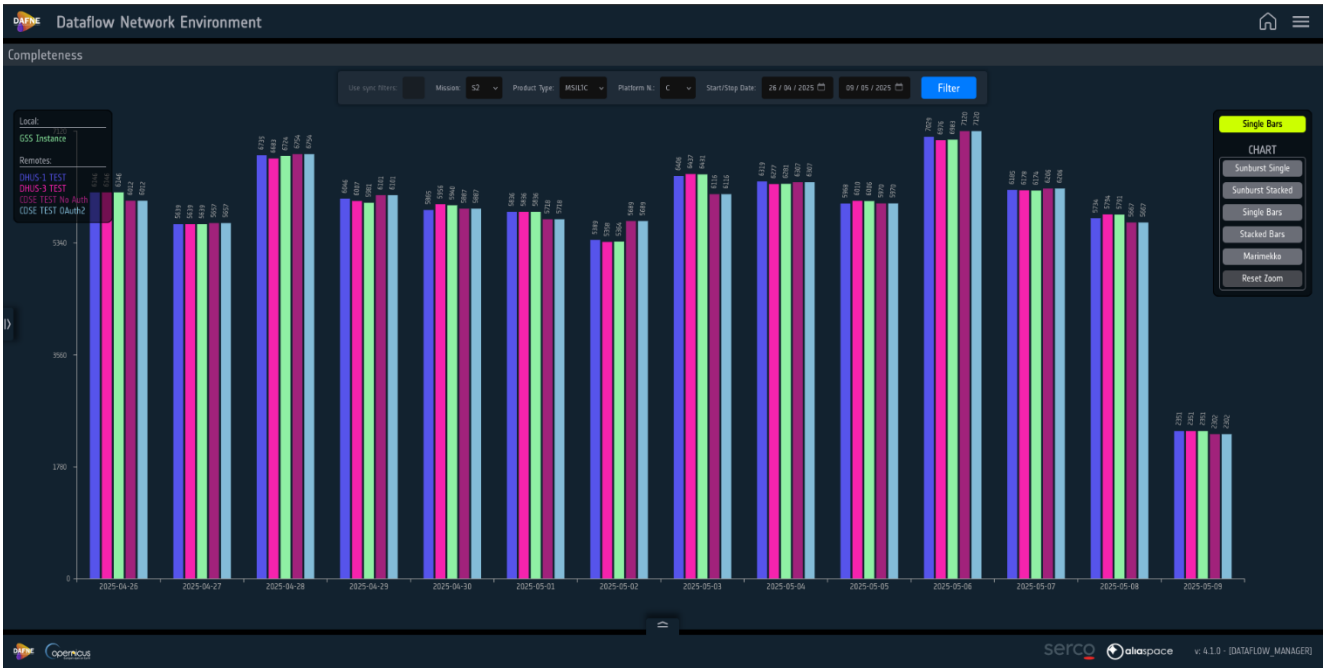


Figure 26 – Chart in Full Screen Mode

5.2. Service Availability

The Service Availability in DAFNE is shown as the weekly or daily average of the local centre Front-End or Single Instance availability, which is recorded in a configurable interval which defaults to 10 minutes. Please bear in mind that setting a very low value, depending on the connection speed, DAFNE Back-End could be overloaded.

The visualization of the service availability information is computed using a filter based on a time range. The last 90 days are stored in the DAFNE Database and the user can visualize the whole period in the weekly aggregation view and a maximum of 31 days (inside that 90 days range) in the daily aggregation view.

Every week starts on Monday and ends on Sunday, therefore if days other than those have been selected as the start and stop date, in the weekly visualization the user will see, as first and last week dates, those matching with Mondays and Sundays, but only data between the selected dates will be taken in account. To help the user in such cases, the label of those weeks changes from “Week (n) to “Partial Week (n)”.

Thanks to the service availability data, users can monitor eventual Service malfunctions or inoperability.

The service availability chart can be shown as a Bar Chart or a Calendar Chart.

Through a checkbox in the filter the operator can choose whether group the data weekly or daily before submitting the request.

In the bar chart, when weekly aggregation is choosen, every bar represents the related week service availability average percentage, which is shown in the table and also when hoovering with the mouse on a bar, and will be colored in respect of the configured thresholds and colors.

If the operator clicks on a bar the chart turns to the daily visualization of that week. A button on the right chart-settings panel appears to go back to the weekly visualization in case the user wants to check other weeks results.

Figure 27 – Weekly Service Availability Bar Chart page

In the daily bar chart, every bar represents the related day service availability average percentage and will be again colored in respect of the configured thresholds and colors. Those thresholds are also drawn as colored lines directly over the chart, on the relative y position.

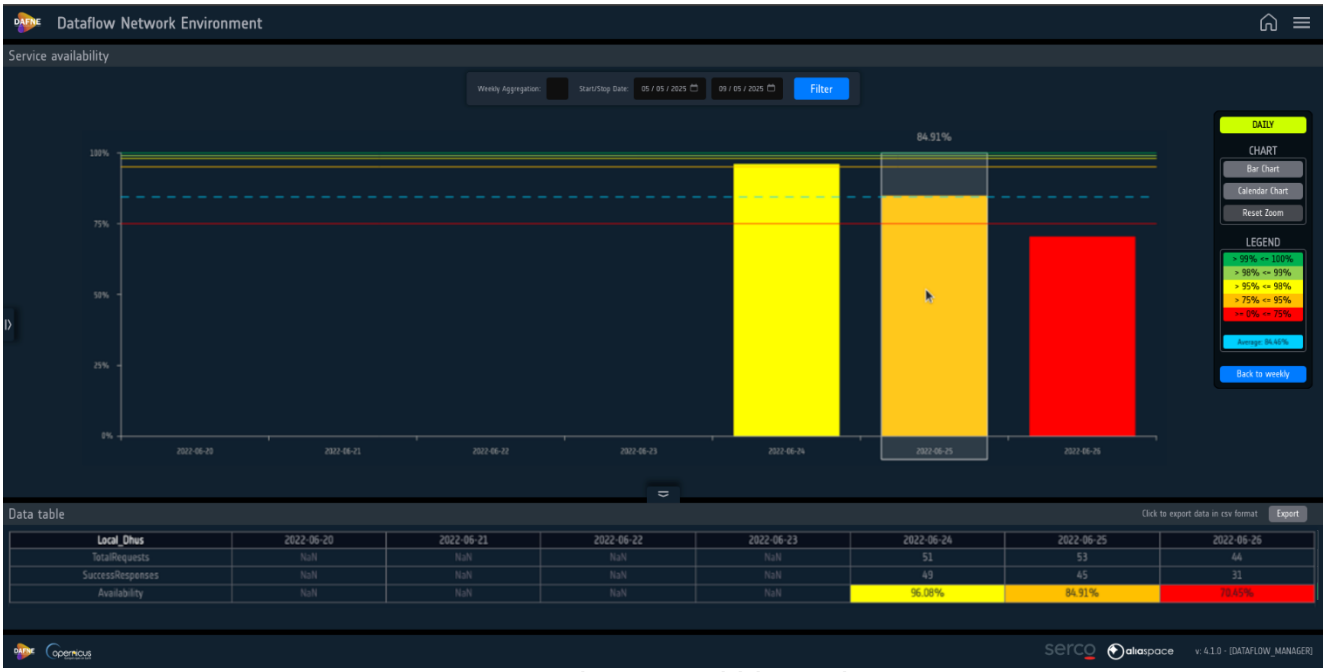


Figure 28 – Daily Service Availability Bar Chart page

In the calendar chart the same daily data are shown in a calendar form, on a weekly iteration. This can be useful to see if there are weekly repetitions of a malfunction.

Every cell represents the relative day availability with the corresponding percentage value and threshold color.

Figure 29 - Service Availability Calendar page

A weekly aggregation is also possible to be seen on the calendar chart. Again, also in the calendar chart, clicking on the single week brings out the daily chart of that week.

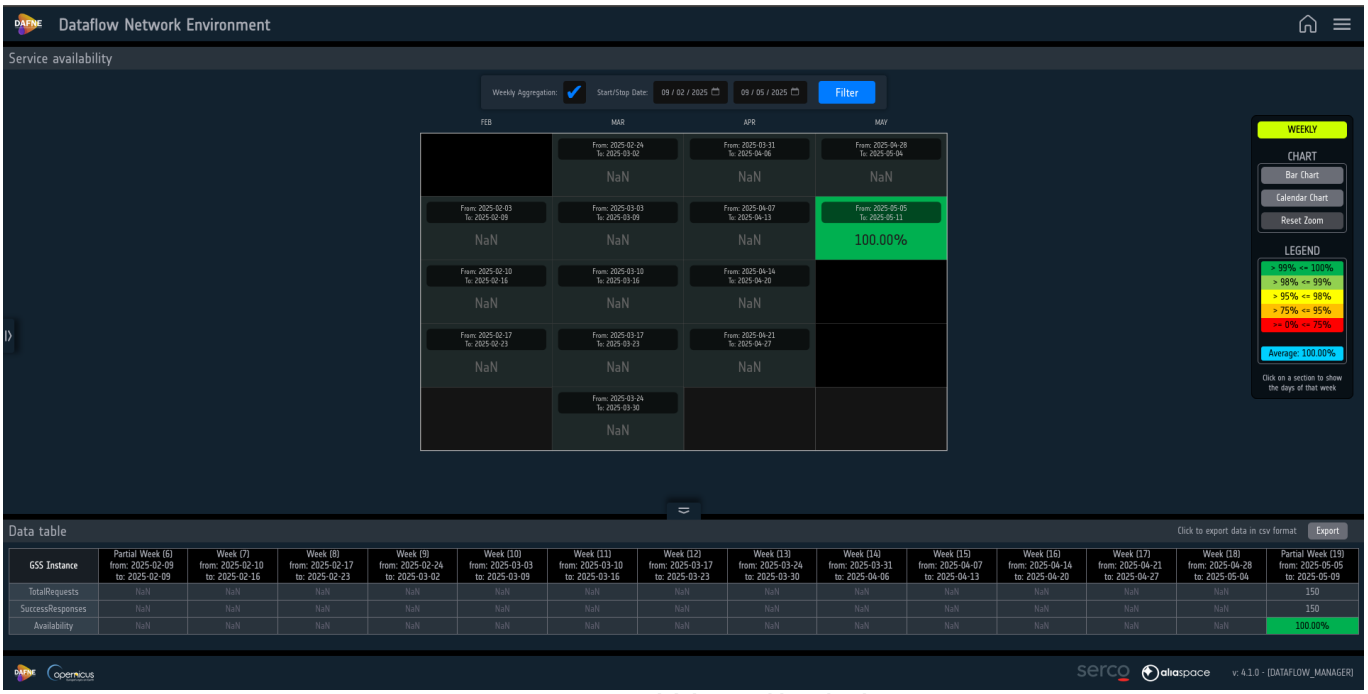


Figure 30 - Service Availability Weekly Calendar page

As in the other metrics panels data shown in the table can be exported as a csv file. The name of the service availability csv file will follow this convention:
`DAFNE-Service_TIMING_Availability_Centre(NAME)_From(YYYY-MM-DD)_To(YYYY-MM-DD).csv`

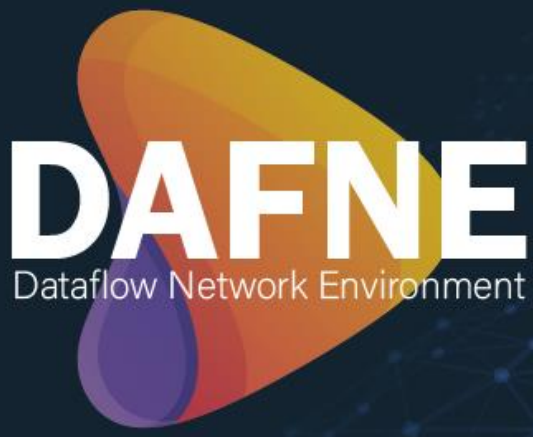
```
Examples:
DAFNE-Service_Weekly_Availability(DHuS Local)_From(2022-04-01)_To(2022-05-29).csv
DAFNE-Service_Daily_Availability(DHuS Local)_From(2022-05-23)_To(2022-05-29).csv
```

5.2.1.1. Calculation details

The Service Availability computation is based on the following steps:

1) Collect the measures of the FE Service of the local centre at configurable scheduled time *(every 10 minutes by default*). In this context, the FE Service represents the catalogue exposing the products to the users, so it is important to check if this kind of service is up or down. In order to check the availability of the service, the back-end side of DAFNE sends a HTTP request to the service FE and catches the HTTP response to establish which is the status of the service
2) An average value of the requested period, both in weekly and daily visualization, is shown both as a number and as a dotted line in the chart, and it is calculated using this formula: (SuccessResponses / TotalRequests) * 100
3) Group the measures by date for a given date range, for a maximum of 31 days in a rolling window
4) Roll measures older than a configurable number of days (*default rolling window: 90 days*)

aliaspace



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