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## Deliverable D7.8

### New version of main portal with improved user interface

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Co-ordinator: Prof Nigel Mason, University of Kent

1. **Nature:** R = Report, P = Prototype, D = Demonstrator, O = Other

2. **Dissemination level:**

| PU     | PP  | RE  | CO   |
|--------|---|---|--|
| Public | Restricted to other programme participants (including the Commission Service) | Restricted to a group specified by the consortium (including the Commission Services) | Confidential, only for members of the consortium (excluding the Commission Services) |

## Executive Summary / Abstract:

Several upgrades of the VESPA portal have been released, implementing recommendations derived from a user experience study detailed in MS81. The improvements are explained here, together with suggestions for future upgrades.

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## 1 VESPA elements

The goal of VESPA is to set up and finalize a global data distribution system for Solar System data consistent and compliant with the Virtual Observatory (VO), the mature infrastructure used for Astronomy data.

The VESPA ecosystem consists of 4 major original elements:

- 1) A Data Access Protocol able to describe and query the main parameters in this field, including coverages, data type, observational and instrumental conditions, and physical quantities. This is the EPN-TAP protocol which has been approved in Aug 2022 by the International Virtual Observatory Alliance (IVOA), and has become the international standard to publish Solar System Data in the VO.
- 2) A dedicated EPN-TAP client demonstrating the capacities of this protocol and its interactions with visualisation and analysis tools existing in the VO. This is the VESPA portal, a web interface mostly oriented toward the discovery of data content.
- 3) Data services responsive to the EPN-TAP protocol, provided either by VESPA partners, other work packages in Europlanet, or the broad Solar System community through collaborative work.
- 4) Tools to visualise and analyse metadata and data. To save unnecessary development time and efforts, VESPA asks VO developers to add specific support of Solar System data in existing VO tools (e.g., reflected light, coordinate systems, etc), and connects external tools of interest to the VO (e.g., GIS, time series, image processing, etc).

This deliverable focuses on item 2: the VESPA portal.

## 2 The VESPA portal

The VESPA portal (<https://vespa.obspm.fr>) is a major piece of the ecosystem developed in Europlanet to access Solar System data.

To preserve sustainability, the design of EPN-TAP keeps it consistent with the generic TAP protocol and related clients. However, those do not exploit the full potential of EPN-TAP, which the portal does. In particular, EPN-TAP describes the data content uniformly, and the portal is the only TAP client which queries all EPN-TAP services simultaneously. This allows the user to focus on science questions and to easily discover data of interest in many services, including those unknown to him.

The portal was one of the first elements set up in previous Europlanet programmes and, upgrades notwithstanding, demonstrated its age at the onset of Europlanet 2024 RI. A long-term action was started with the help of the SpaceFrog company to improve the user experience and make it a useful tool to access and exploit the growing data content available through VESPA.

In parallel, other actions were conducted to explore alternative ways to reach the data. In addition to other clients, command-line access, Jupyter notebooks, etc, care was taken to study alternative query systems or designs, in particular those centred on more visual workflows. The more satisfying solutions will be included in the portal as additional access modes.

## 3 Evolutions

A series of study reports on user experience was produced by SpaceFrog (MS 23, 47, 81) to identify flaws in the interface and help solve them. Extra inputs were collected from users during conferences, workshop, online via the helpdesk, and by studying interfaces with similar goals in neighbouring fields.

An important constraint is related to the number of data services queried by the portal: currently 63, another ~20 at draft level and nearly 180 in preparation by the NASA PDS / PPI node (planetary plasmas); in the longer term, possibly 100s more services from various repositories organised in independent collections. This obviously impacts the way results are displayed.

Solutions proposed by SpaceFrog were implemented in several steps, starting with the most obvious ones at the onset of the programme, then in June 2022 (MS48) and July 2023 (this deliverable D7.8) – other, intermediate updates were essentially restrained to bug fixes.

- The first update (2020) included:
  - a clarification of the query panel in the portal, to enter parameter values.
  - improvements to existing functionalities, such as unit conversion in the exposed result table and pagination.
  - a compilation in a single file of the first results returned by each EPN-TAP service, mostly as a demonstrator.
  - an improvement of multi-protocol queries. The EPN-TAP queries generated by the portal were converted to other protocols used by space agency archives: PDAP (to ESA and JAXA) and Keyword search (to NASA PDS), both far less capable than EPN-TAP but accessing larger

content. Even the improved PDAP interface was never very satisfying, due to the protocol shortcomings – in fact, the International Planetary Data Alliance is considering the deprecation of PDAP, in which case this function will be removed from the portal.

- The second update (June 2022) provided:
  - a first improvement and clarification of the layout with on-boarding process, as per MS47 (Fig. 1).
  - an upgrade of the location of services in the IVOA registry, which triggered a modernization of EPN-TAP service declaration process.
  - the portal was later moved to the https domain, as recommended by the VA review board, which raised many interfacing issues to solve (redirections, but also accessing data on http sites from https).

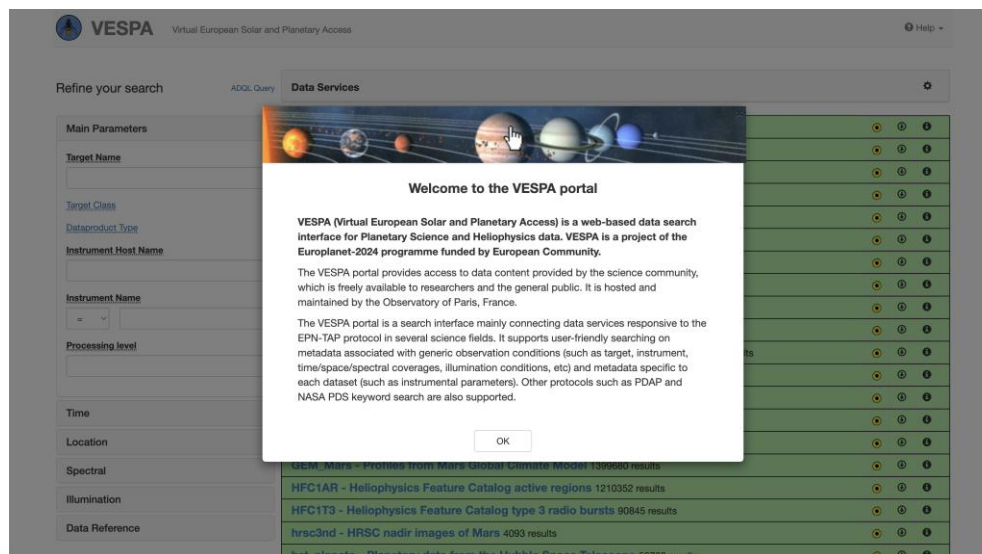


Fig.1: New entry message for fresh users

- The third (present) update implements more graphic improvements and more predictable behaviour, as described in MS81. Deep work on the code also took place:
  - port to Python 3 and Django 4.2 – which was required for sustainability reasons.
  - the responsivity of the main page displaying the number of results per service (Fig. 2) was greatly improved: queries are now sent in parallel, and answers are displayed simultaneously in a few seconds — this is intended to support the many data services currently in preparation.

The development version has been published just after the VESPA implementation workshop in Graz (early June).

The screenshot shows the VESPA (Virtual European Solar and Planetary Access) portal. On the left, there is a search form with fields for 'Target Name', 'Target Class', 'Dataproduct Type', 'Instrument Host Name', 'Instrument Name', 'Processing level', 'Time', 'Location', 'Spectral', 'Illumination', and 'Data Reference'. The main area displays a list of data services under the heading 'Data Services'. Each service is listed with its name and the number of results. For example, 'abs\_cs - Data for numerical modeling of planetary atmospheres' has 13 results, and 'AMDA - Planetary and heliophysics plasma data at CDDP/AMDA' has 2539504 results. On the right side, there is a 'Help' menu with options like 'Welcome Message', 'How to use', 'Download VO tools', and 'Report issue'.

Fig.2: Refreshed entry page, with the query form on the left and result section (number of answers / services) on the right

The current public version is obviously more user-friendly and more predictable to the user. On-line documentation aspects will be improved in the coming weeks to reflect the latest update.

#### 4 Prospects

Other solutions proposed by SpaceFrog are more difficult to implement as they have side effects on the user workflow which need detailed studies. A further upgrade of the portal layout is however scheduled before the end of the programme, to implement more results from the UX study.

The VESPA portal will also be used in the coming months to test the current prototype of services from the International Heliophysics Data Environment Alliance (IHDEA) in solar physics — this will help dimensioning the future interface.

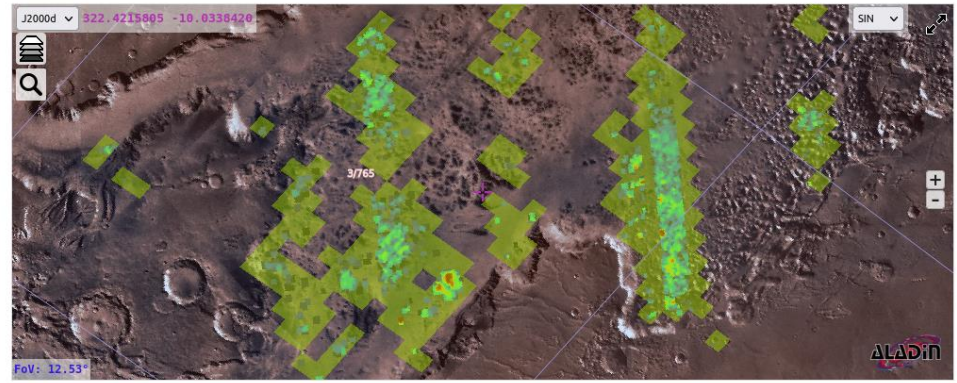
Alternative access modes are also being studied in the development version:

- a thematic grouping of services in the entry page of the portal, to mask services unrelated to the user's field of research. This will become a practical requirement when the current projects are published (~200 data collections).
- a display system exposing thumbnails, rather than tabular results.
- a global search mode on metadata based on ElasticSearch, with graphical outputs. This has been implemented as a non-public monitoring interface, and is currently used to check the data service contents and make them more consistent. It requires to download frequently the whole set of metadata from all services, and is therefore rather demanding.
- a search function based on spatial footprints. This is based on target name and MOC (Multiple Order Coverages), which are therefore computed for more and more data services. This system allows very efficient searches of overlapping data, or data located in specific regions (e.g., geological units), and can be crossed with time constraints (including local time and season). This is being assessed with an internship at Observatory of Paris, and looks very promising (Fig.3).

Change page theme [Help](#)

You can select a region on the following map

Confirm selected area    Reset drawn area    Reset MOCs of additional layers    Toggle draw mode    Center the view on a MOC



J2000d 322.4215805 -10.0338420 SIN

3/765

FoV: 12.53°

ALADiN

Main HiPS survey: Mars Viking-MDIM21-color

Add additional HiPS surveys: omega olivine\_osp1 Add

Enable HiPS to MOC conversion

Use Allsky FITS

Pixel range:

Fig.3: Spatial search based on MOC footprints, in development. Results are displayed in the web browser with Aladin Lite