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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:

An update for year 2 of the Virtual European Solar and Planetary Access (VESPA) Joint Research Activity of the Europlanet 2024 Research Infrastructure is provided. Several tools were upgraded in this period, most notably TOPCAT which can now ingest tables in PDS and heliophysics formats. Outcomes of the VESPA-cloud activity during year 1 are routinely used in support of data providers and users in the VA. The reference TAP server used in the VA has been greatly enhanced with specific support to EPN-TAP planetary data, and a docker installation is available to data providers. User interfaces (SSHADE UI and VESPA portal) are being upgraded from user feedback and design, with new functions added (not yet published). Several services requiring a specific design has been published, in particular the VizieR catalogues from published papers at CDS, and the Venus Climate Database in IPSL (expected publication in February 2022). Specific standards have been finalized for bandlists in SSHADE, and for cartographic/mapping metadata in data files.

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1. Explanation of VESPA WP7/JRA2 Work & Overview of Progress

a) Objectives

Task 1.

- Coordination – ObsParis, CBK-PAN + JacobsUni

Task 2.

- Infrastructure – ObsParis, CNRS/IRAP + UCL, CBK-PAN, CNRS/CDS
- Implementing the code-on-line platform OPUS to analyse data; setting the stage for use of EOSC in VESPA (for services and computation)

Task 3.

- Tools & Interfaces – JacobsUni, CNRS/CDS + Heidelberg, Spacefrog, Bristol Uni, ObsParis, CNRS/IRAP
- Improving user interfaces, visualisation / analysis tools, and data servers

Task 4.

- Design of internal services – CNRS/IPSL, CNRS/IRAP + ObsParis, JacobsUni, DLR
- Studies of services requiring specific design, such as Global Climate Models, VO-GIS interfaces, etc

b) Explanation of the work carried in WP

The present report is the second deliverable of WP7 VESPA VA (D7.2). The schematic VESPA infrastructure is summarised in Fig. 1 to help follow this discussion.

Task 1

Task 1 is responsible for overall coordination and management of the JRA. Interaction tools to support the VESPA JRA team have been installed at the start of the project. Deliverables and milestones are linked from this page:

<https://voparis-wiki.obspsm.fr/display/VES/Deliverables+and+milestones%2C+EPN2024>

The VESPA Confluence site also contains extensive material about the WP activity.

Coordination of the two VESPA WPs has focused on discussions in smaller groups during year 2.

Task 2

- The VESPA-Cloud activity has been concluded in the EOSC-hub project. Implementations of test VM have been performed, including on EOSC.
- The VESPA virtual organisation set up during year 1 with the help of eduTEAMS/GÉANT is now commonly used to provide access to the GitLab used in VA task 5. Usage has been certified during the implementation workshop in the VA (Dec 2021).
- The OPUS platform from H2020 ESCAPE installed during year 1 is now currently used by the MASER services and the SPIDER WP (this will be D7.6).

Task 3

Several tools were developed or upgraded:

- (D7.5) The TOPCAT tool (v4.8.2) has been updated again with extended support for EPN-TAP (including a service validator) and further improved support for datalink. The current beta version (to be released in early 2022) includes support for PDS4 tables (in collaboration with ESA) and JCDF library for heliophysics formats.
- (MS36 and MS63) An update of the DaCHS server has been released in April 2021, which is fully compliant with python 3 and includes extensive support for the EPN-TAP protocol. Other updates (currently v2.5) were released later on to further support EPN-TAP (mixin and doc) and to include functions required by VESPA providers (e.g., incremental updates from remote database tables, unit conversions, etc).
- (MS41) Version 2.5 of DaCHS is available on a Docker container for fast and flexible deployment. Usage has been certified during the implementation workshop in the VA (Dec 2021).
- The main SSHADE interfaces for users and providers have been greatly improved, and new functions added.
- (MS47) The collection of user feedback on portal usage was pursued (Europlanet meetings and EPSC, in particular in connection with fireball networks during year 2). The VESPA portal is being redesigned from this user experience feedback. A new version has been drafted and is still evolving (will be MS48).
- In parallel, we started testing an Elasticsearch interface to allow user to query services in natural language. This is more demanding (need to copy all metadata in a single place) but seems feasible. That could be the basis for an alternative query mode in the access portal.

Task 4

- SSHADE has enlarged its internal datatypes to include meteorites, BRDF spectral data, and band lists. Its specific interface has also been deeply updated in this period, e.g., with additional plotting tools for BRDF multi-angular data.
- (MS25) Vizier catalogues containing planetary resources have been reorganized on CDS side to prepare the EPN-TAP service. Extra functions have been implemented both on the CDS server and in the VESPA portal to support this particular service, which is justified by the importance of these resources (related to publications). This work has been presented at the ADASS conference.
- (MS40) Cartographic standards & comparisons of metadata from OGC/VO/PDS are being prepared at the time of writing (due end of Feb 2022).
- The VESPA GitLab (in VA task 5) contains more examples of service definition files, e.g., to include to retrieve data from a private existing database or to update a part of the content of large services. These are available as a knowledge database for future data providers.

VESPA: infrastructure

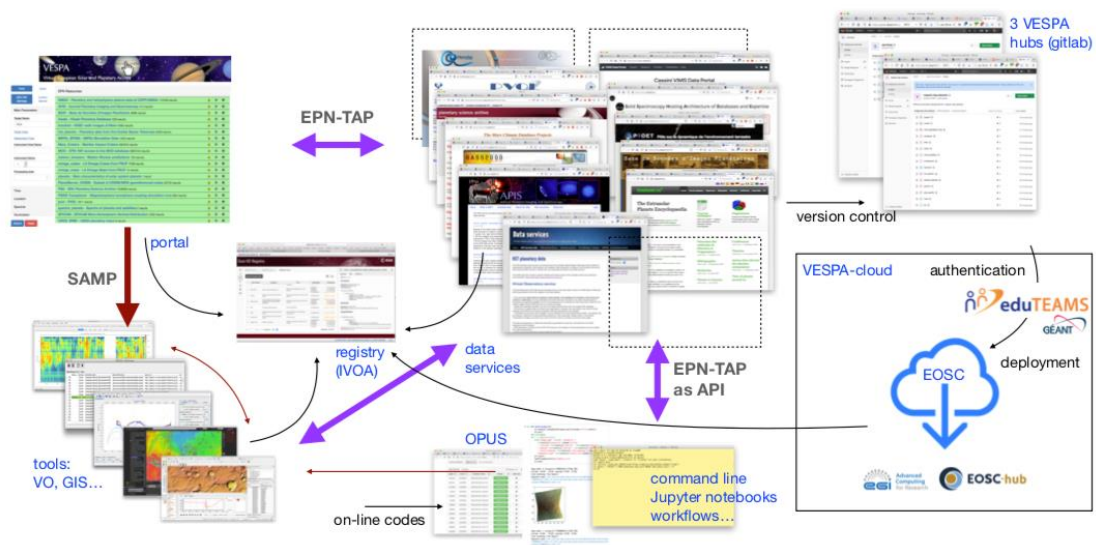


Figure 1: VESPA schematic infrastructure

c) Impact to date

The VESPA JRA is mostly in support of the VA, which delivers most of the impact. For the JRA specifically, the addition of functions in support of Planetary Science in the standard VO tools certainly tightens the links with the Astronomy community and increases visibility of Planetary Science in Astronomy.

Similarly, the VO-GIS bridge will simplify the use of tools from the Earth Observation community, provided standards are also made consistent in the VA. This is an important element in current discussions to create a Planetary Science WG at OGC (action led by CNES and USGS, involving VESPA).

d) Summary of plans for Year 3

Objectives for year 3 include:

- More user inputs for VO tools (TOPCAT, Aladin, CASSIS)
- More functions to support data providers in DaCHS server
- Finalization of the VESPA portal update
- Finalization of the ElasticSearch study, and possibly alternative query system.
- Further study of stability of services on EOSC
- Study of congruence between VO and OGC tools and standards (to make Earth observation tools usable for planetary science)

2. Update of data management plan

Not applicable for JRA2 WP7

3. Follow-up of recommendations & comments from previous review(s)

No recommendation for WP7