EPN 2024 RI

EUROPLANET 2024 Research Infrastructure

H2020-INFRAIA-2019-1

Europlanet 2024 RI has received funding from the European Union's Horizon 2020 Research and Innovation Programme under
Grant agreement no: 871149

Deliverable D7.1
Deliverable Title: WP7 VESPA JRA 1st year report

Due date of deliverable:	31/01/2021
Actual submission date:	29/01/2021
Nature:1	R
Dissemination level2	PU
Work package:	WP7
Lead beneficiary:	ObsParis
Contributing beneficiaries:	CNRS, CBK PAN, DLR, IASB-BIRA, INAF, IWF-OEAW, JACOBSUNI, SPACEFROG, UCL, UPV-EHU.
Document status:	Final

Start date of project: 01 February 2020. Duration: 48 months
Project Co-ordinator: Prof Nigel Mason, University of Kent

Executive Summary / Abstract:

During the first year of the project, JRA-VESPA set up various communication tools and started the study of new infrastructure elements. Most notably: the OPUS platform from the ESCAPE programme has been installed and is being tested with ESA for JUICE support, with application to Callisto flyby test sequences; test data services are being installed on EOSC with support from eduTEAMS/GÉANT and EGI to identify a standard installation procedure on the cloud. New versions of existing display and analysis tools have been released with extended support for VESPA data services and EPN-TAP access protocol. The SSHADE spectroscopy infrastructure has been enlarged to support multi-angular data and band lists.

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)

Table of Contents

Deliverable

1. Explanation of work & Overview of progress

1.1 Objectives

VESPA-JRA (JRA2, WP7)
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

1.2 Explanation of the work carried per WP

The first deliverable in VESPA JRA2 WP7 is the present report.
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,including: Confluence wiki for internal interactions, public web site, github for code and tutorials. This relies on experience gained during Europlanet-2020-RI.
Coordination of the two VESPA WPs has focused on starting and maintaining coordinated activity, e.g. by organising bi-monthly topical videocons during the first semester, and focused discussions in smaller groups later on. Due to a very busy schedule since September (EPSC, then Council, then international involvements in the same field), videocons were paused during the second half of Year 1 and will resume in the beginning of 2021
.

Task 2.

- The older data servers have been upgraded and sometimes fixed for hardware issues: CNRS/IRAP, CNRS/IPAG, JacobsUni, ObsParis. New servers are being installed at INAF/OATs, CBK-PAN, CNRS/IPSL/GEOPS (in IPSL ESPRI mesocenter), ObsParis/Nançay (radio-astronomy).
- The VESPA-Cloud activity has been started in the EOSC-hub project. Implementation of the first test VM is still pending due to incomplete procedure documentation. A VESPA-Cloud DaCHS service deployment on Docker has been prototyped.
- A VESPA virtual organisation has been set up with the help of eduTEAMS/GÉANT, to be used for common management of services and access to EOSC.
- The OPUS platform from H2020 ESCAPE has been installed for VESPA and is being tested with the MASER service. It has been used by ESA for JUICE sequencing, with application to Callisto flyby test sequences. It is also used in the SPIDER WP.

Task 3.

Several tools were developed or upgraded:
- The VO-GIS bridge, allowing users to pass OGC-like queries from VESPA services to QGIS, has been upgraded to python3. This makes it compliant with QGIS v3.x, and allows interfacing the VESPA search system with GIS standards.
- The TOPCAT tool has been updated with visualisation enhancements for Planetary Science and export formats (v4.8) and improved support for datalink.
- Aladin Desktop has been modified to manage more cleanly the planetary reference systems and to anticipate the evolution of the IVOA standards. The resource discovery mechanism has been improved to specifically take into account planetary resources, particularly those that are EPN-TAP compatible. With the recent addition of Ceres and Moon geological maps, 64 HiPS planetary maps are now available in the CDS collection for use with Aladin and various planetarium applications. MOC are also adapted to planetary science resources to handle space and time coverages.
- A major update of the DaCHS server have been released (v2.3), which is now fully python3-compliant and implement updates of IVOA standards as well as extended support doc for EPN-TAP. Most existing services need to be reviewed for consistency before installation.
- Tests of the MOC standard for footprints are very promising, as they are more robust than the current STC-S standard, and support time coverage in addition to spatial coverage.
- The main SSHADE interfaces for users and providers have been greatly improved, and new functions added.

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.
- VizieR catalogues containing planetary resources are now grouped in a consistent TAP service on CDS side. A special access mode from the VESPA portal has been drafted, which is justified by the importance of these resources (related to publications).
- The VESPA github (and the new gitlab) contain more examples of service definition files, e.g. to include ephemeris when ingesting the data, or to retrieve the data from a private existing database. These are available as a knowledge database for future data providers.

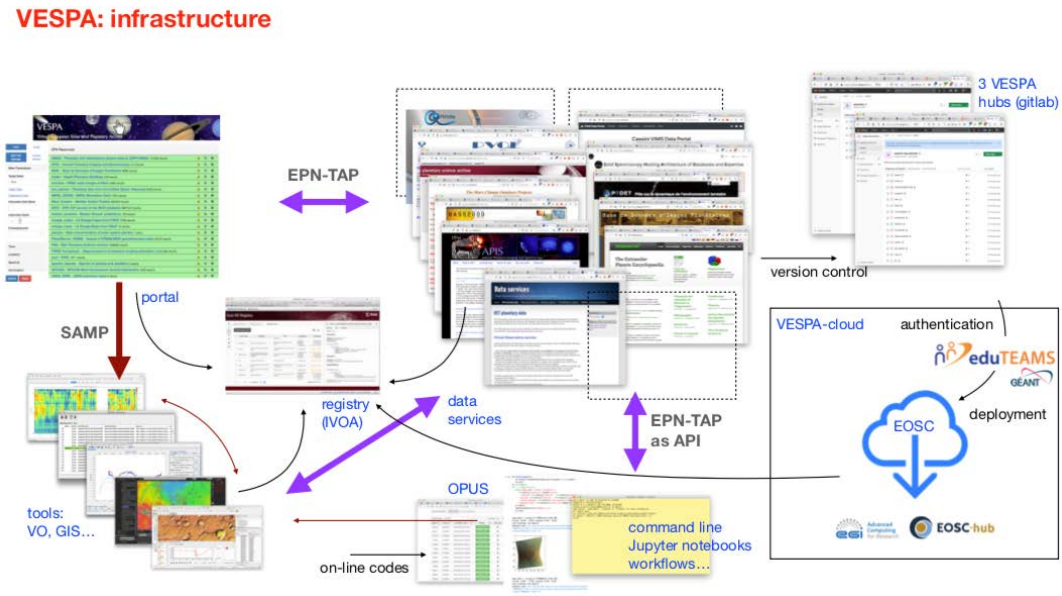

Figure 1: VESPA schematic infrastructure

1.3 Impact

The VESPA JRA is mostly in support of the VA, which delivers most of the impact.
Specifically, for the JRA, 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.

1.4 Access provisions to Research Infrastructures

Not applicable for JRA2 WP7.

2. Update of exploitation & dissemination plan

Not applicable for JRA2 WP7.

3. Update of data management plan

Not applicable for JRA2 WP7.

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

Not applicable for JRA2 WP7.

5. Deviations from Annex 1 (DoA)

5.1 Tasks (JRA):
Work has been slowed down because many engineers were busy installing and supporting Videocon tools in all institutes.
- Installation of Virtual Machines in CNRS/ESPRI are being discussed to adapt to local maintenance policies. A similar situation in CNRS/IPAG resulted in delays for a new installation.
- A big issue with the data server in JacobsUni required a change of machine plus reinstallation and redesign of all services. Later difficulties on the M3 service resulting in sporadic access are currently being addressed.
- The installation of VESPA hub repositories has been studied and simplified (one common gitlab used by three support teams). Issues with the authentication process were identified and solved.
- An unexpected issue arose from recent evolutions of IVOA standards used by VESPA – namely, the datalink protocol used to associate documents and on-the-fly services to data elements, e.g. ephemeris. The recent version of the standard has side effects on EPN-TAP service implementation, which are being studied and fixed. This will require updates of older services when fully understood.
- Ingesting data from an existing, private database (required for the largest services) also proved to be more demanding than expected.
- Some associations of data formats and mapping tools result in reversed plotting direction. This is being documented, e.g. the use of geotiff seems to solve many problems.
- An issue has been identified with the ephemeris used by PVOL, resulting in an incorrect estimate of the central meridian and observed areas for some objects in the last few years. Possible fixes include calling Miriade upon data ingestion. We have a working model, but recomputation of the whole PVOL content will not be an easy task. Actions to solve this issue are scheduled for 2021, as efforts on PVOL have concentrated on preparing the JunoCam data this year.

5.2 Use of resources

Resources were redefined in the recent amendment, no modification since.

- **5.2.1 Unforeseen subcontracting**
  In the JRA, one contract has been started with University of Bristol, as detailed in the Grant Agreement. No unforeseen contract has been added.

- **5.2.2 Unforeseen use of in-kind contributions from a 3rd party against payment or free of charge**
  GEANT contributes in-kind to support VESPA authentication issues and EOSC access, as detailed in the Grant Agreement. No unforeseen in-kind contribution has been added.