VESPA:developing the Planetary Science Virtual Observatory

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- Résultats Europlanet-RI (terminé déc 2012)

  => Infrastructure OV définie, mise en place

  => Quelques services en ligne (démonstateurs) + bcp de projets

  Rôle majeur des partenaires français (VO-Paris/CDPP/IPAG)

- Suite européenne dans Horizon 2020 :

  - WP VO dans Europlanet H2020:VESPA (~ 25% du total)

  - Objectifs ? — Surtout mise en ligne de contenu

  - 16 partenaires : français (OV-Paris, IRAP, IPAG, LATMOS,GEOPS, CDS)

    & européens (IAPS, Jacobs U, IWF Graz, IASB, UCL, IAP Prague, EHU Bilbao)

- Contexte spatial :

  - Thèmes à soutenir (pour développements lourds)

Planetary Science VO — Objectives in EPN-RI
(FP7: 2009-2012)

- Make data search in archives easy
- Allow quick-look visualisation of data
- Allow external users to include their data

} Initial set-up in Europlanet

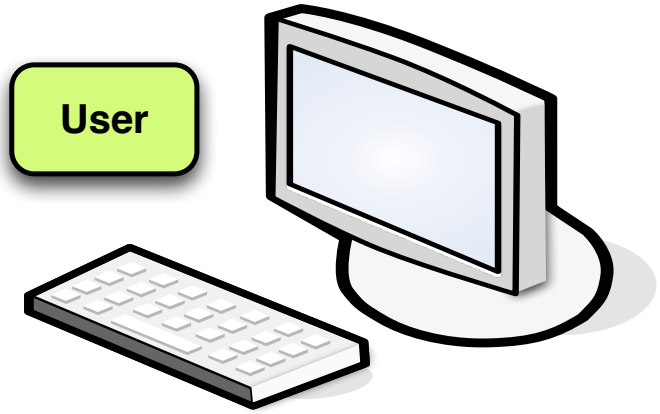
- Make "small" derived data sets accessible
- Develop specific processing/visualisation tools

} Contributions by external users

Constraint: minimise developments

Success: the user doesn't see the infrastructure

User's experience



User

Queries

Answers

Catalogue / Registry

Data access

SSODnet

GhoSST KIDA

PSA

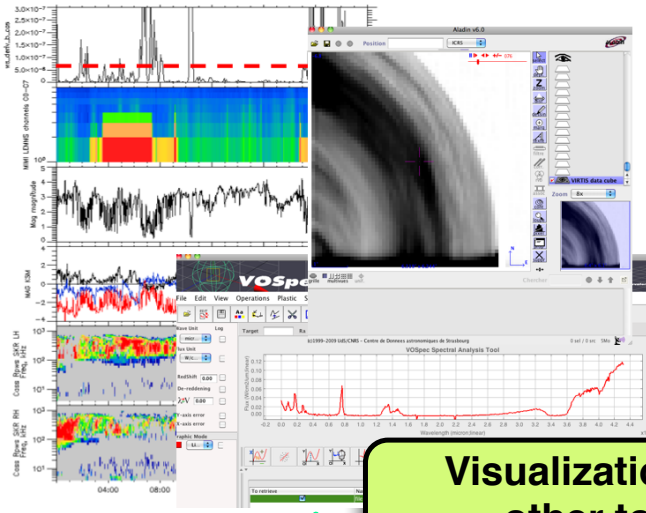
AMDA…

EPN

PDS

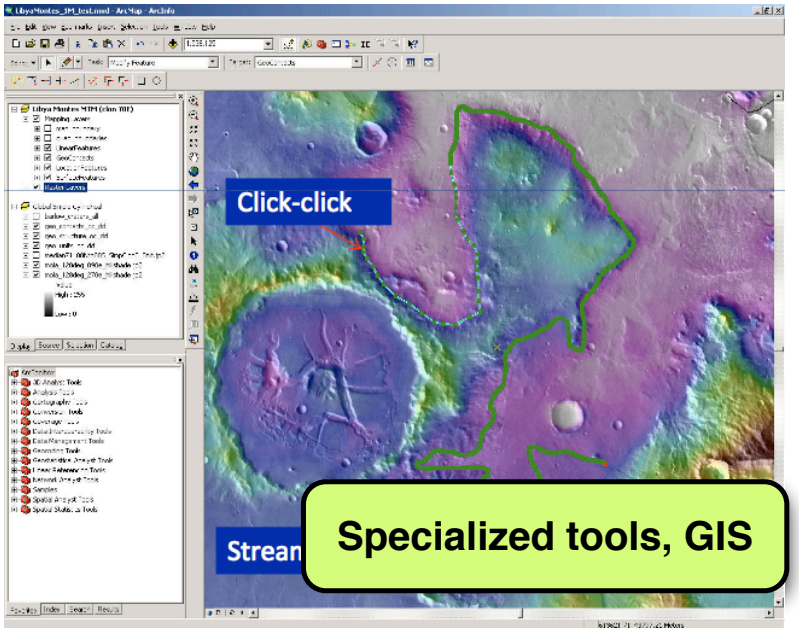
Data bases

Space agency archives



Data exchange

Visualization and other tools



Specialized tools, GIS

VESPA access

- Global search interface for Planetary Science services
- Supports EPN-TAP + PDAP

http://vespa.obspm.fr

Query form: All VO

Target name

Resource type: granule

Dataset ID

Time selection: Data range is included in

Time min

Dataproduct type: image, spectrum, dynamic_spectrum

Query All VO | Reset

Query results for all resources

gran

EPN Resources

Auroral Planetary Imaging and Spectroscopy
Results : 341
DISPLAY RESULTS
▶ Description :
Credits: Creator

Base de Donn
Results : 0
DISPLAY VOTABLE
▶ Description :
Credits: Creator

Extrasolar Pla
Results : 0
DISPLAY VOTABLE
▶ Description :
Credits: Creator

Heliophysics F
Results : 0
DISPLAY VOTABLE
▶ Description :
Credits: Creator

Results in service apis

Full Text

Show 20 entries | Search: | Show / hide columns | Select all | Deselect all

dataproduct_type	target_name	time_min (d)	time_max (d)	access_url
image	Titan	2009-01-23T16:09:22	2009-01-23T16:19:22	jb9z01011_proc.f
image	Titan	2009-01-23T16:21:40	2009-01-23T16:38:20	jb9z01021_proc.f
image	Titan	2009-01-23T16:41:58	2009-01-23T16:51:58	jb9z01031_proc.f
image	Titan	2009-01-23T17:42:54	2009-01-23T17:52:54	jb9z01041_proc.f
image	Titan	2009-01-23T17:55:12	2009-01-23T18:11:52	jb9z01051_proc.f
image	Titan	2009-01-23T18:15:30	2009-01-23T18:25:30	jb9z01061_proc.f
image	Titan	2009-01-23T19:18:47	2009-01-23T19:28:47	jb9z01071_proc.f
image	Titan	2009-01-23T19:31:05	2009-01-23T19:47:45	jb9z01081_proc.f
image	Titan	2009-01-23T19:51:23	2009-01-23T20:01:23	jb9z01091_proc.f
image	Titan	2009-01-23T16:09:22	2009-01-23T16:12:42	jb9z01a1q_proc.f
image	Titan	2009-01-23T16:21:40	2009-01-23T16:25:00	jb9z01a4q_proc.f
image	Titan	2009-01-23T16:33:40	2009-01-23T16:37:00	jb9z01a7q_proc.f
image	Titan	2009-01-23T16:37:40	2009-01-23T16:41:00	jb9z01a8q_proc.f
image	Titan	2009-01-23T17:46:54	2009-01-23T17:50:14	jb9z01aeq_proc.f
image	Titan	2009-01-23T17:59:12	2009-01-23T18:02:32	jb9z01ahq_proc.f
image	Titan	2009-01-23T18:11:12	2009-01-23T18:14:32	jb9z01alq_proc.f

Plotting tools

- TOPCAT
- Aladin
- VOSpec
- SPLAT

Plotting tools

- TOPCAT
- Aladin
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Example queries

- Saturn in March 2012

SELECTED DATA

1 selected data
- 1 : image

PREVIEW

First data services

- EPN-TAP services:

  Public services at VO-Paris:

  - APIS: Aurorae images/spectra data base (HST)
  - BDIP: Historical planetary images in Meudon (ground-based)
  - Encyclopedia of Extra-Solar Planets (compilation of published data)
  - Atmospheric profiles of Titan (Cassini/CIRS)
  - IKS / Halley (Vega-1), M4ast (asteroid spectrosc.)
  - BaseCom (comets from Nançay), Jupiter radio observations (from Nançay)
  - Solar feature catalogues (from HELIO program)

  Projects at VO-Paris (from existing databases):

  TNO data compilation, VIRTIS/VEx & /Rosetta, ***MASER*** *(radio service)*

  Other services in development: Rome, Toulouse, Graz

- Other targeted data centres/services (with specific interfaces):

  ESO archive, GhoSST, PSA (special Rosetta project), ***AMDA (CDPP)***

- Space data centres accessible by VESPA (via **PDAP**, limited):

  PSA and DARTS (ESA & JAXA archives, with minimal interface)

Visualization tools: IVOA

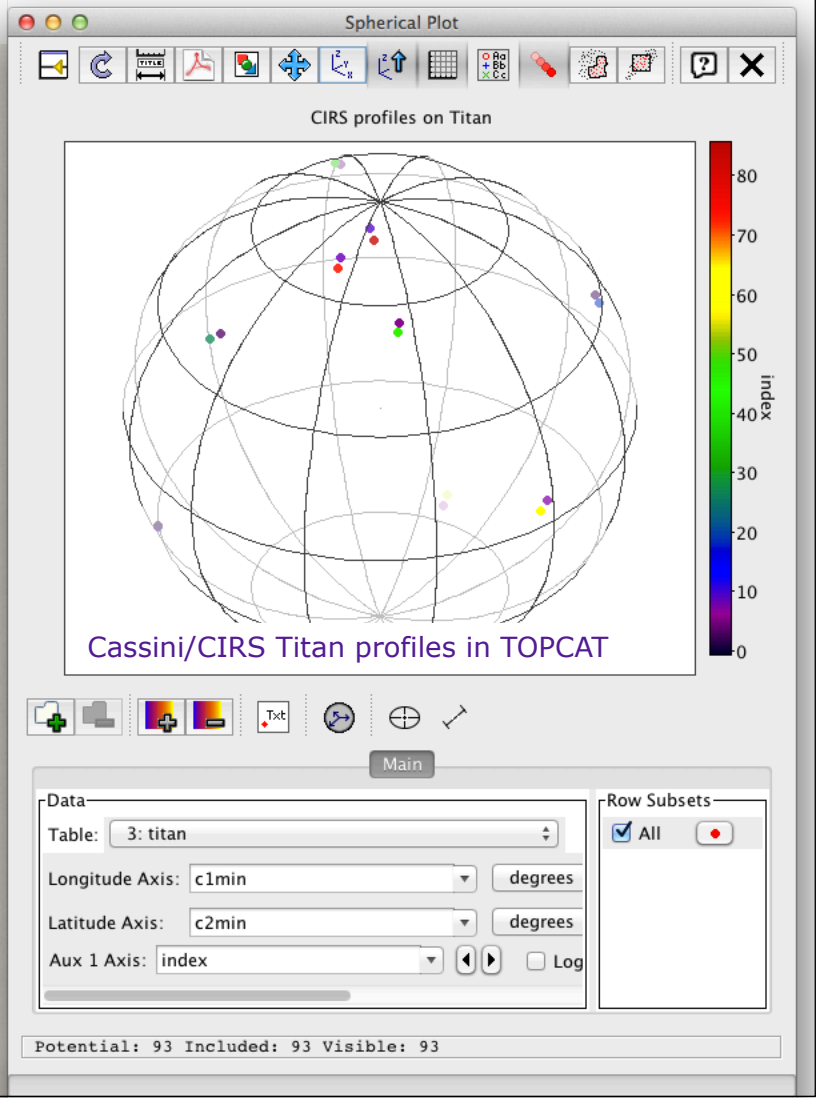
Aladin:

- plots images/cubes
- handles sky/spheroid coordinates

HST / Saturn image from APIS in Aladin

TOPCAT:

- Handles tables
- 2D/3D plots



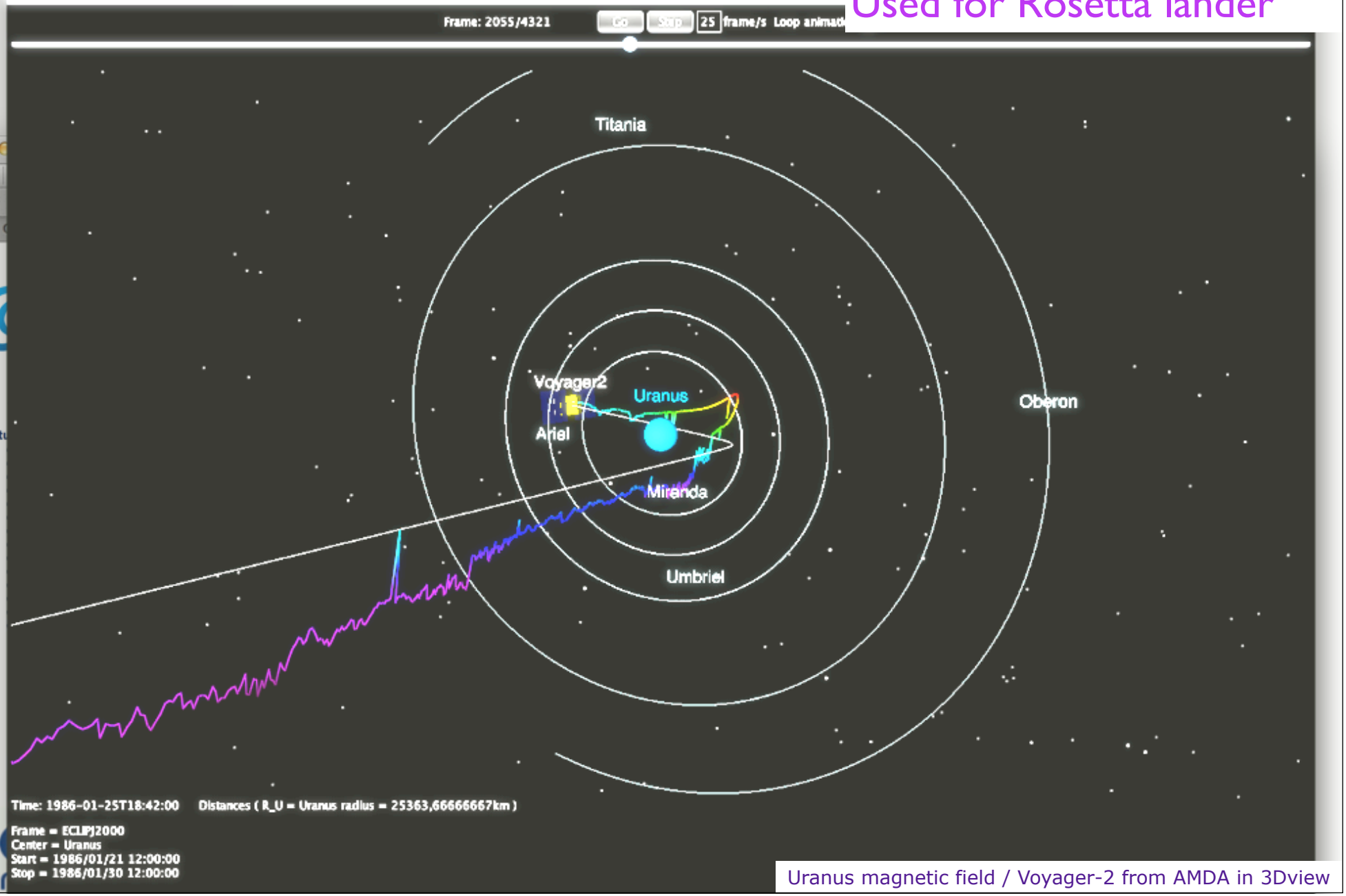
Cassini/CIRS Titan profiles in TOPCAT

Visualization tools: adapt other existing tools

3Dview / CNES:

Spacecraft trajectories+data

Used for Rosetta lander

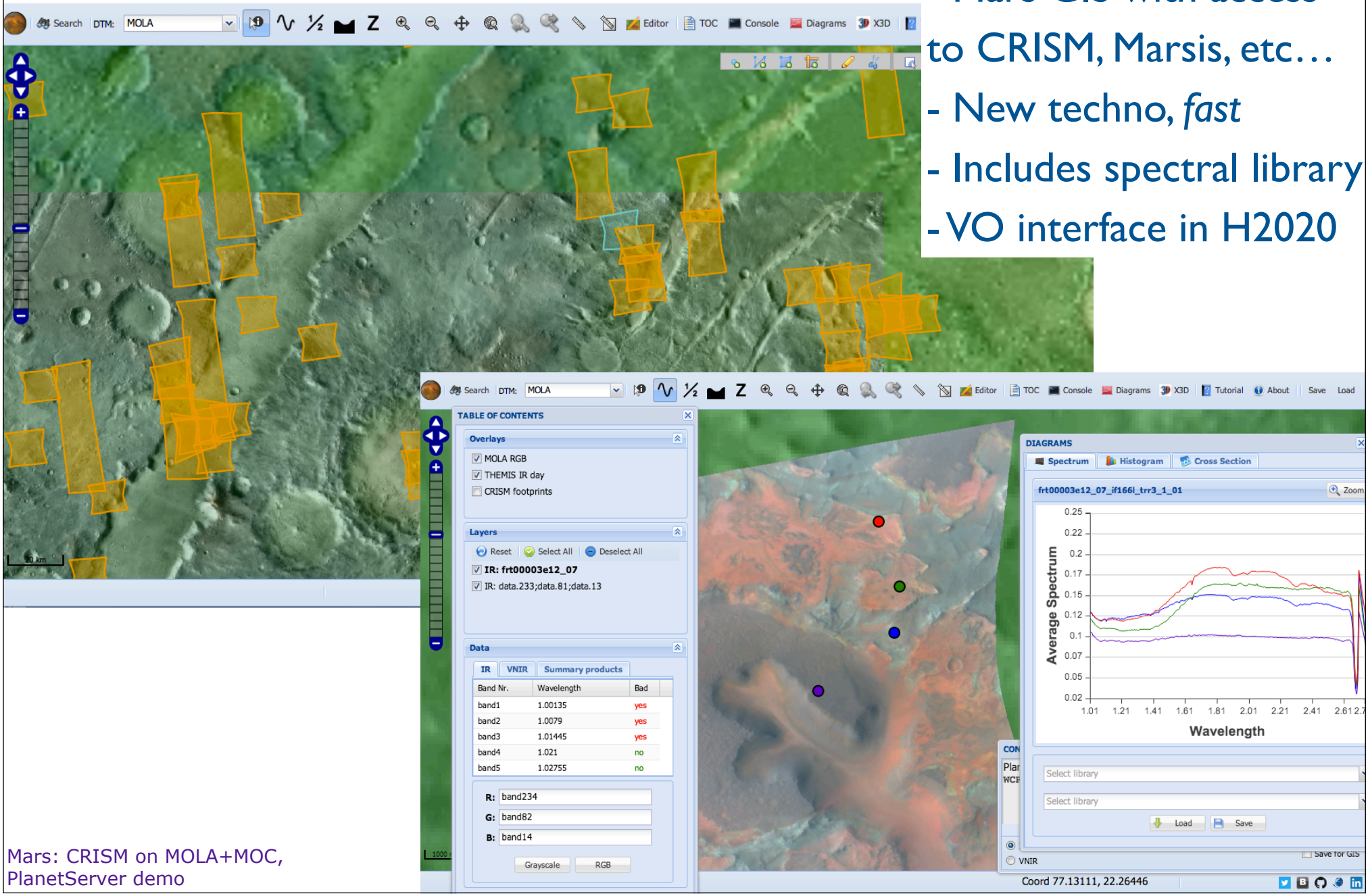


Uranus magnetic field / Voyager-2 from AMDA in 3Dview

Visualization tools / GIS

PlanetServer:

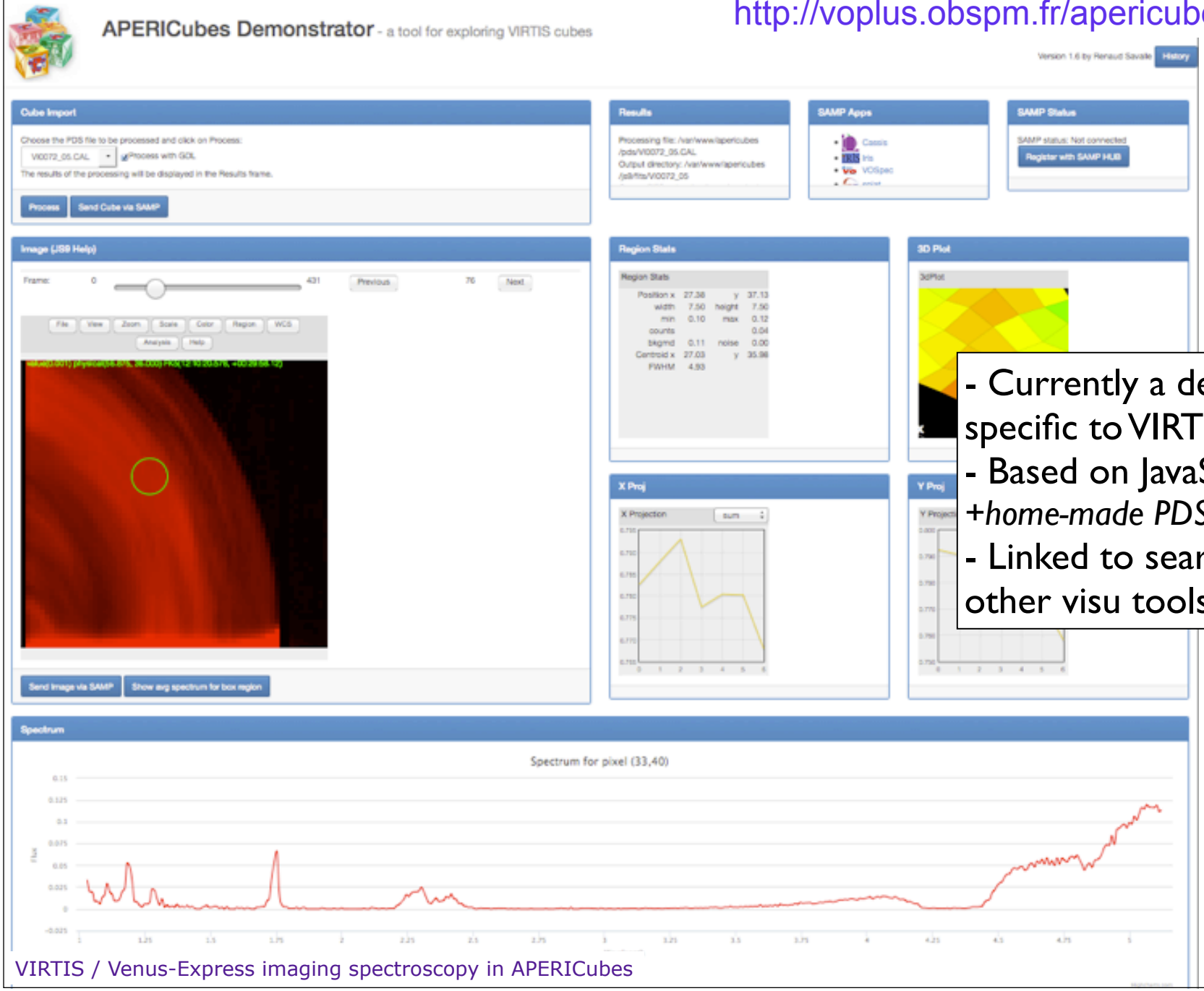
- Mars GIS with access to CRISM, Marsis, etc…
- New techno, *fast*
- Includes spectral library
- VO interface in H2020



Mars: CRISM on MOLA+MOC, PlanetServer demo

On-line visualization of spectral cubes

http://voplus.obspm.fr/apericubes/js9/demo.php



- Currently a demonstrator, specific to VIRTIS
- Based on JavaS version of DS9 +*home-made PDS to FITS conversion*
- Linked to search interface and other visu tools

VIRTIS / Venus-Express imaging spectroscopy in APERICubes

VESPA Architecture

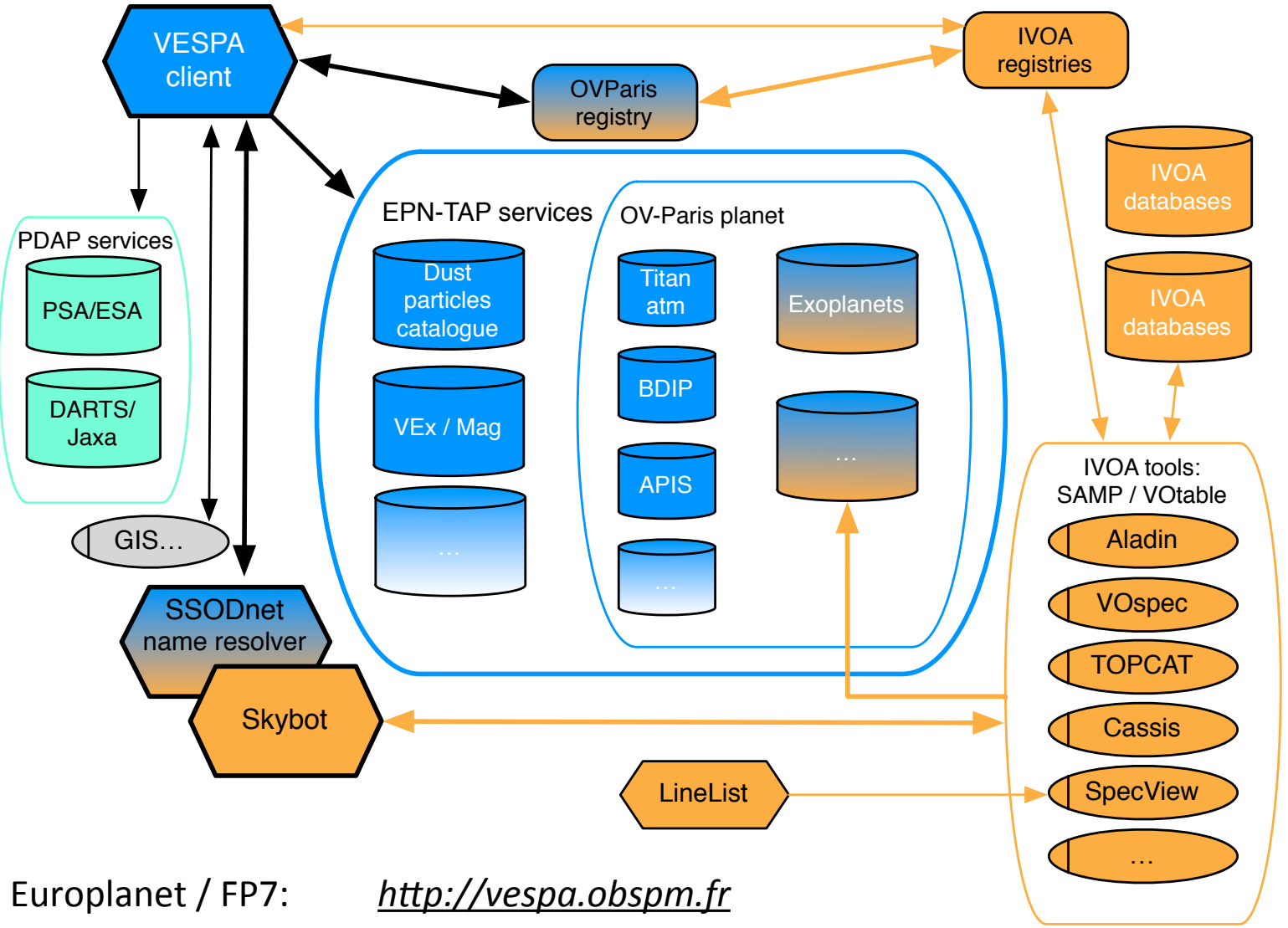
- Centered on data services
- Specific access protocol / user interface to query services together
- Connected to visualization tools from astro community
- All standards are maintained by world-wide alliances

EPN-TAP

PDAP

IVOA

OGC

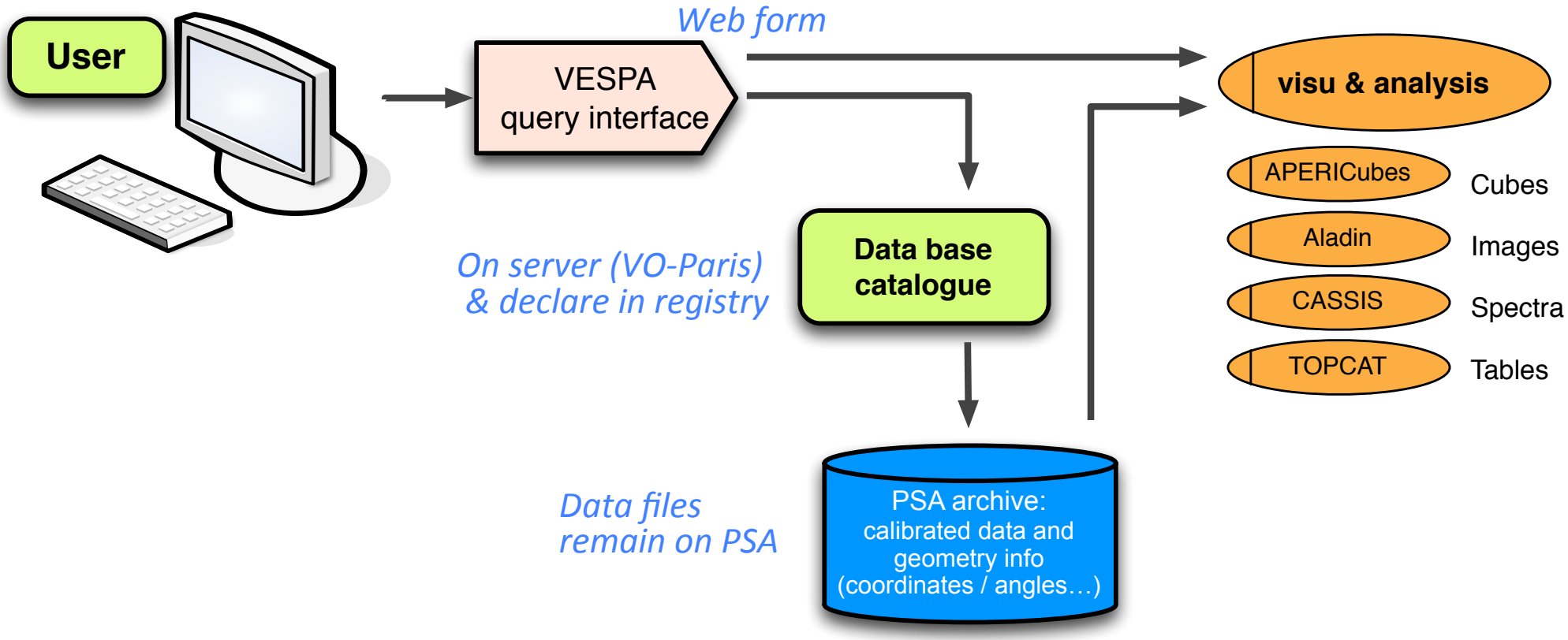


Existing prototype from Europlanet / FP7: *http://vespa.obspm.fr*

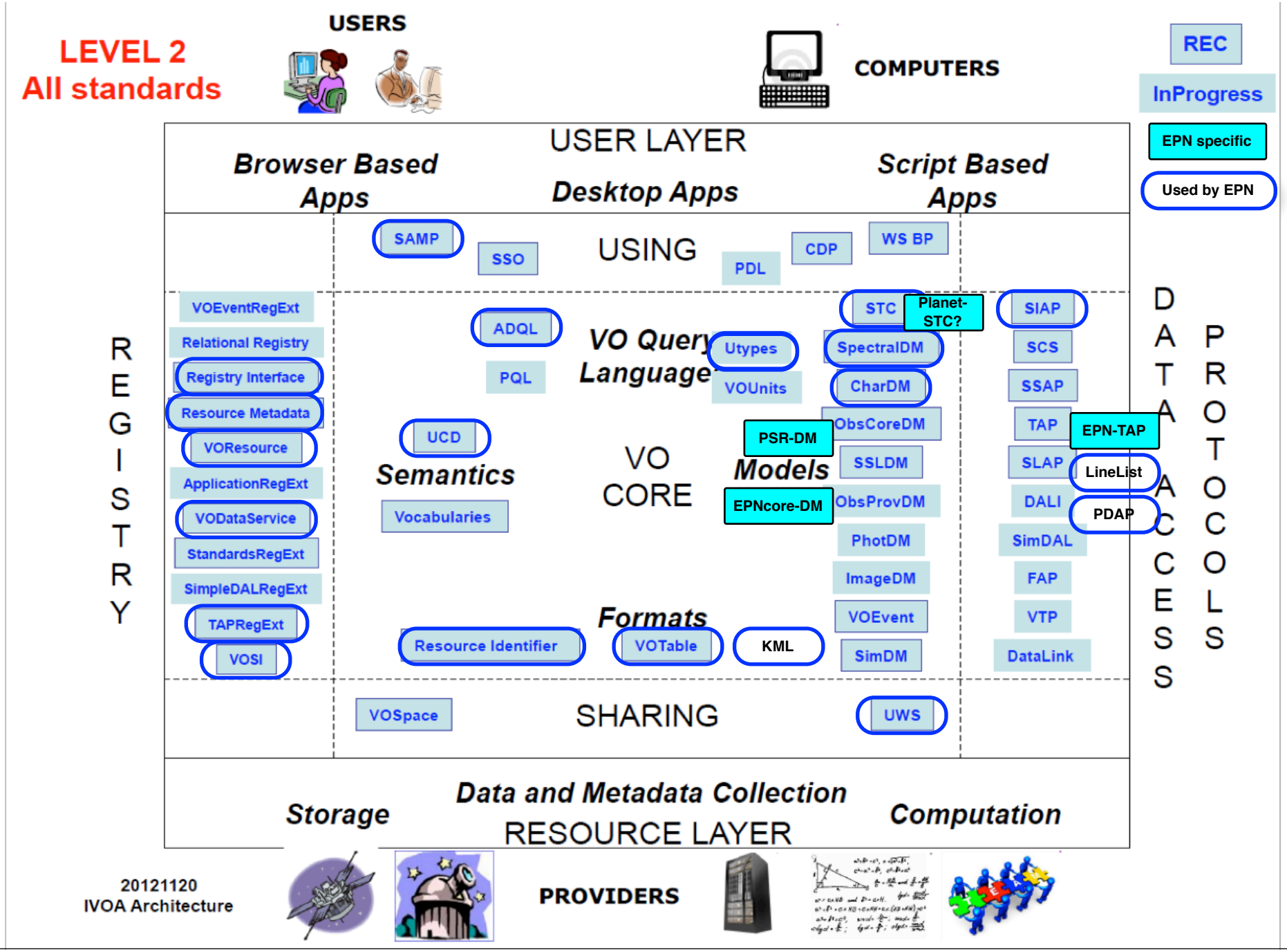
VO can easily provide search & visu functions to PDS (or other) datasets

Archive file VIRTIS_INDEX.TAB => turned to catalogue of the data service
• VESPA can readily use those as search parameters

- VO tools provide quick-look and basic analysis functions for images, spectra, tables
- A specific tool is being devised to analyse spectral cubes on-line (APERICubes)
- Data URL are sent directly from the search interface, no need to download



IVOA loan standards



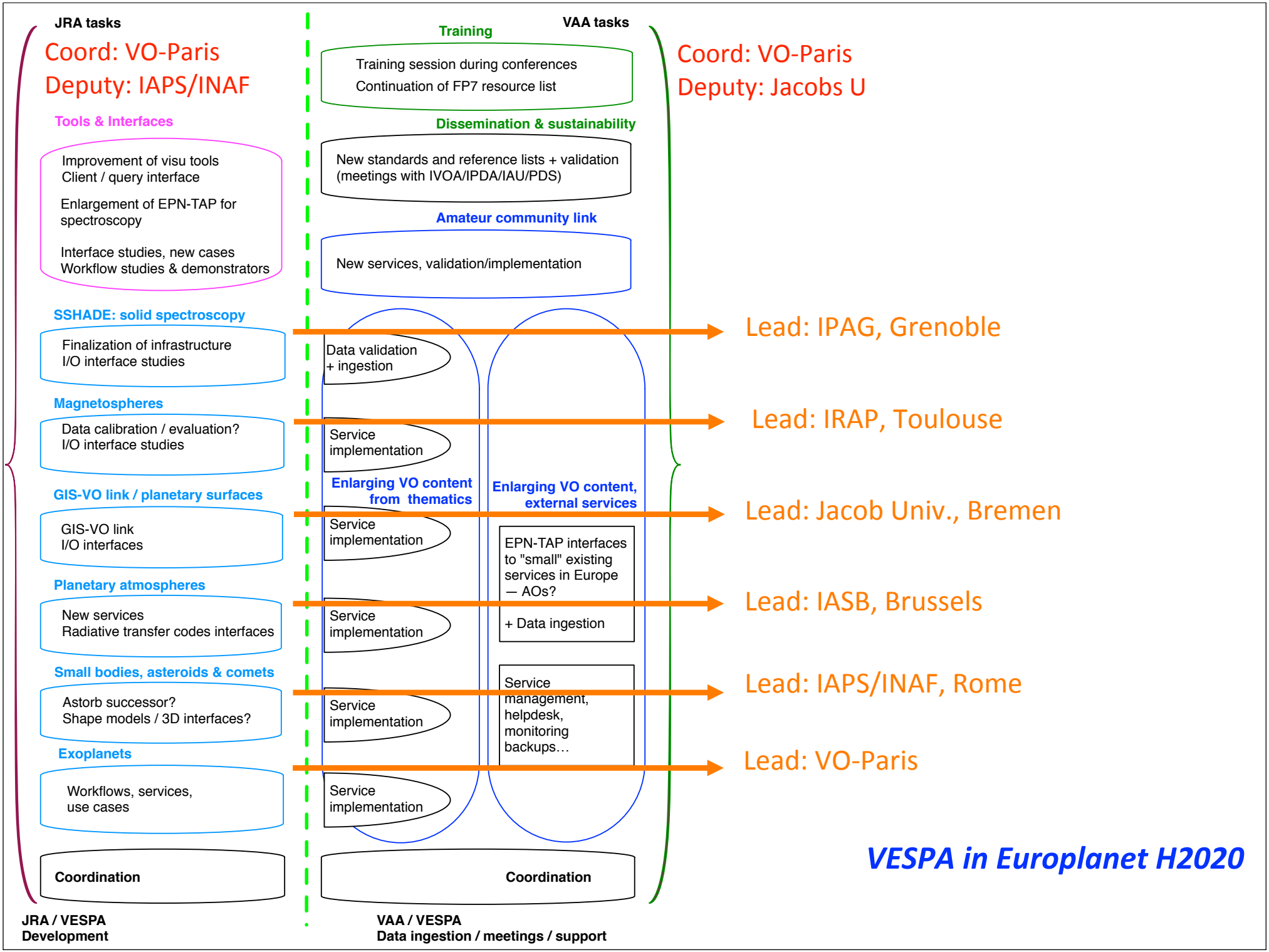
Altogether

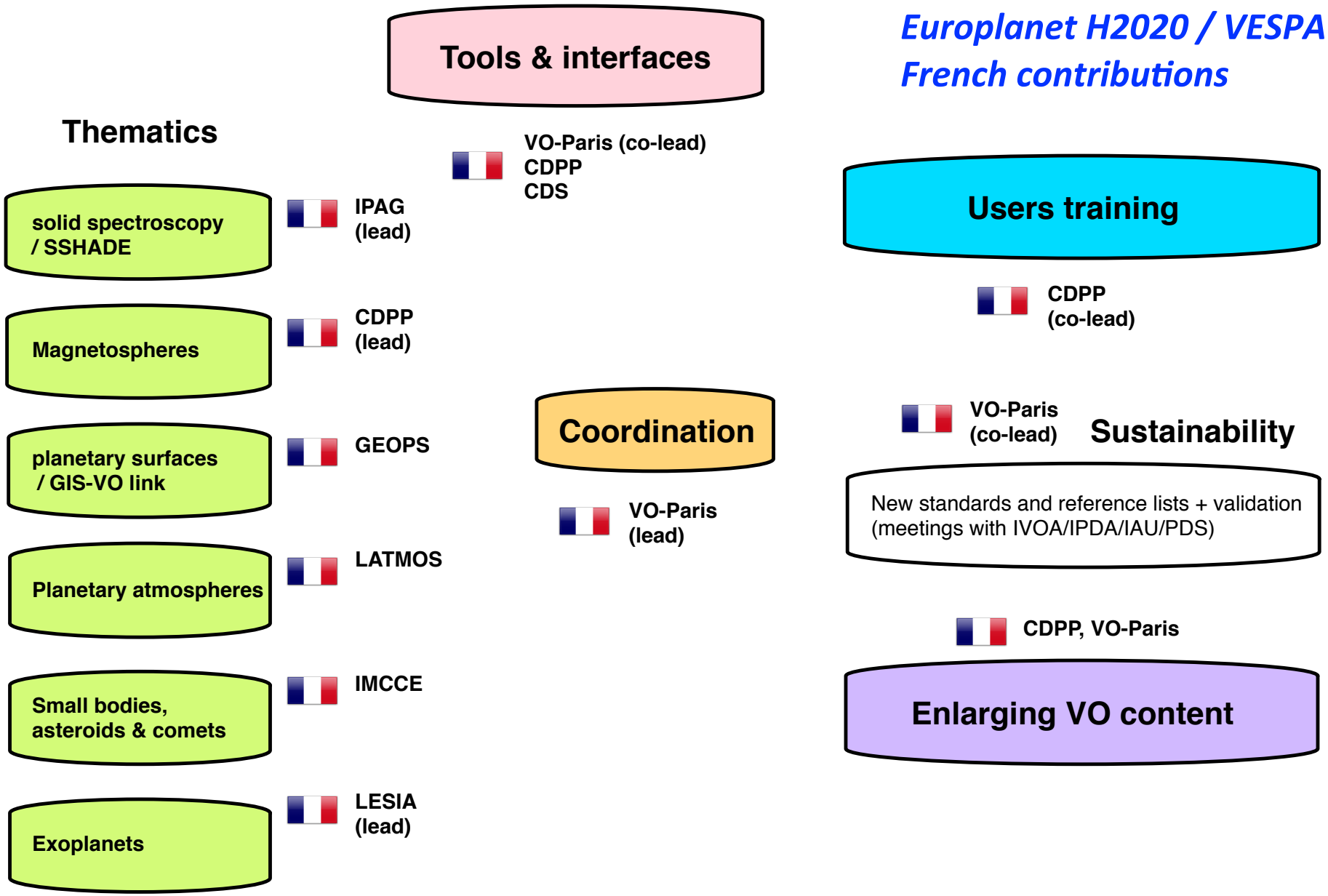
- Very efficient data mining & quick-look system
  - Planetary science supported from Europlanet developments
  - Based on IVOA standards & tools + IAU references
  - Some areas to be optimized in collaboration with IVOA / IPDA / IAU (e.g. description of coordinate systems)

- Science value increases with number of connected services
  - Related data services increase science coverage
  - Services can provide extra information on same objects (exoplanets), or same information on new objects (small bodies)
  - Need for reference laboratory data (e.g. mineral spectroscopy)
    + modeling (e.g. GCM)
    + ground support observations for space missions (Venus?)

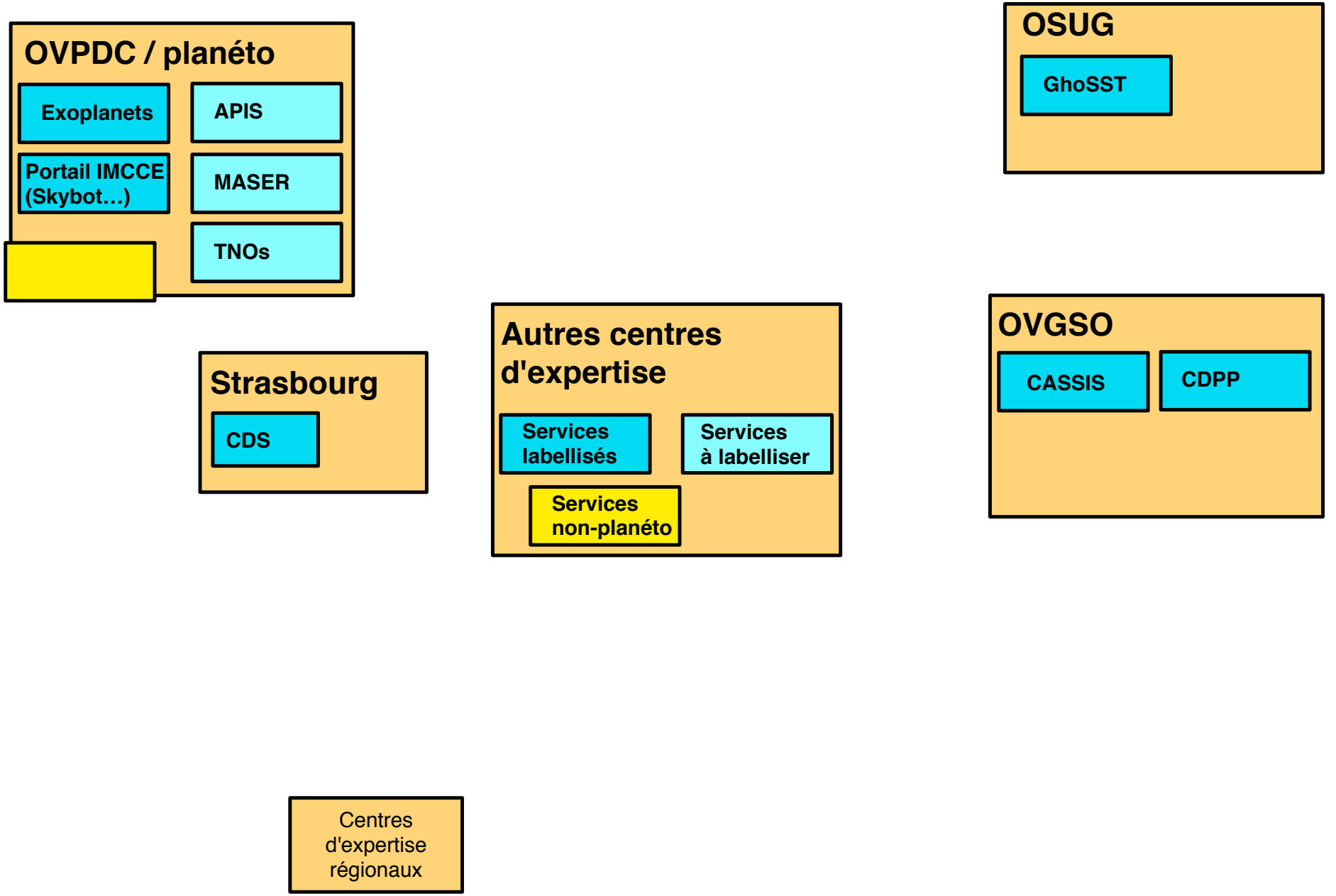
- New data services to be implemented

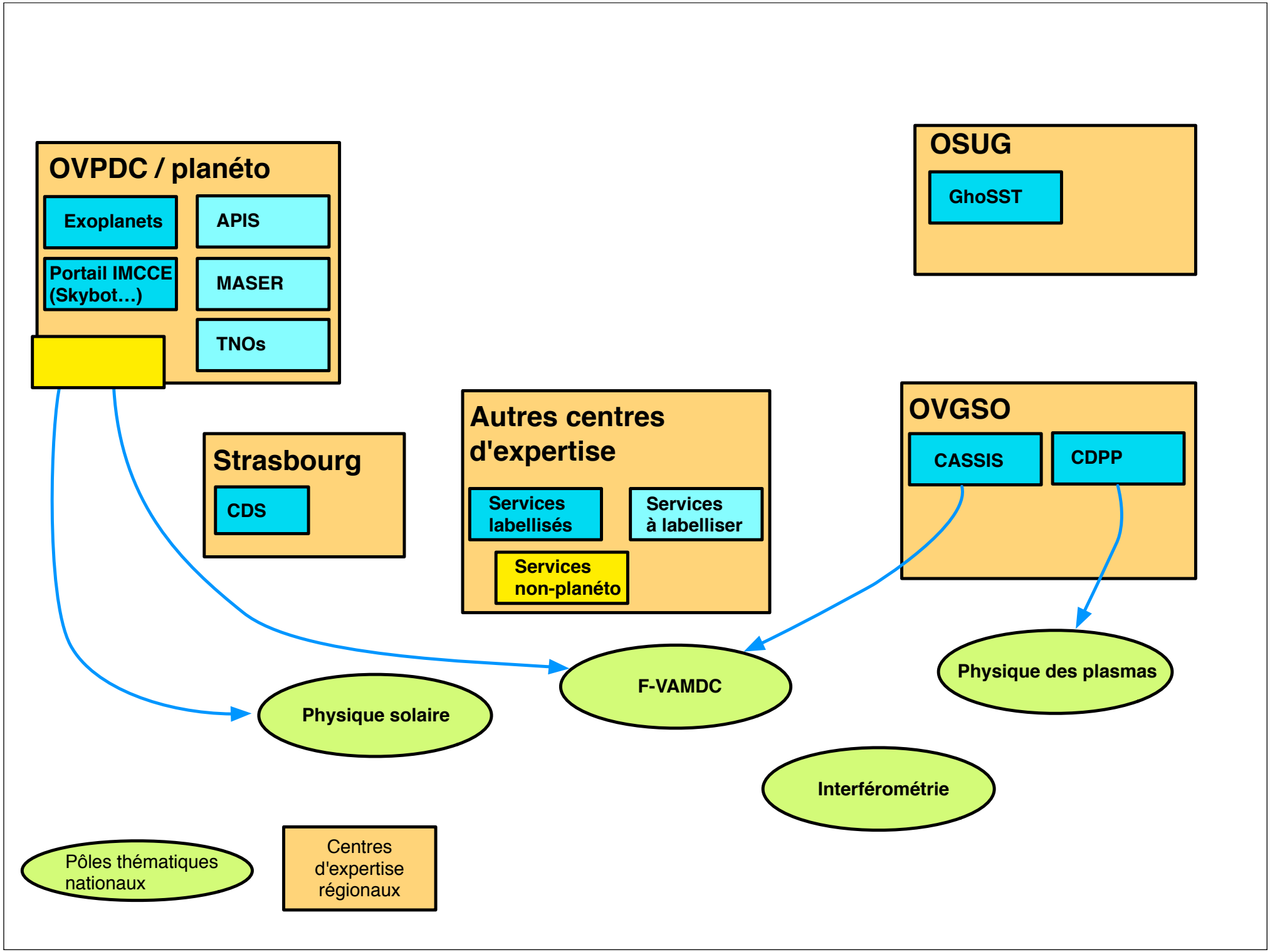
=> Europlanet #3 pgr being set up for Horizon 2020 (2015-2019?)
  - Europlanet/IDIS package to evolve into a full VO activity: ***VESPA***
  - Coordination: VO-Paris - new objectives / partners / activities

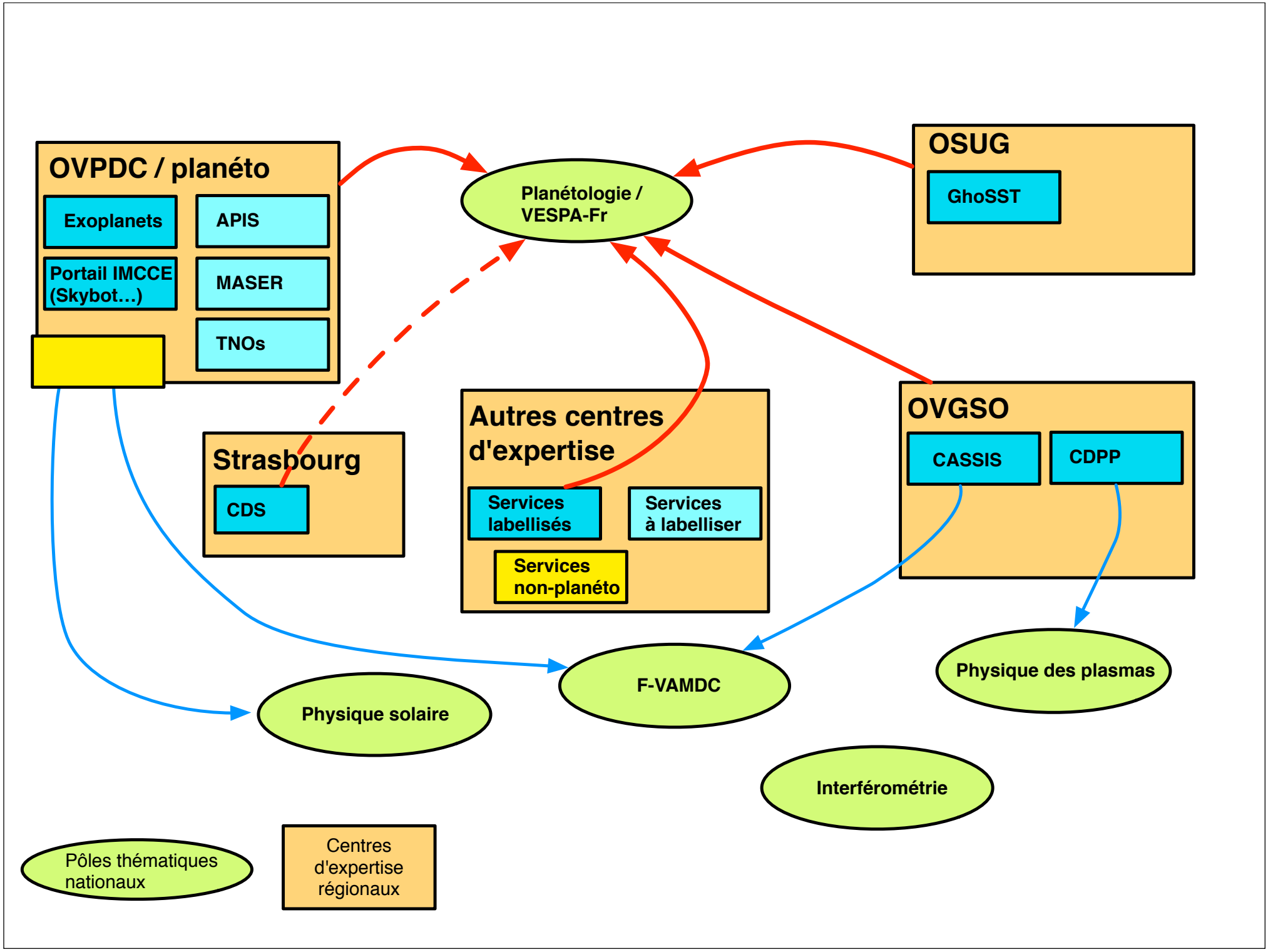

JRA tasks
Coord: VO-Paris
Deputy: IAPS/INAF
Tools & Interfaces
Improvement of visu tools
Client / query interface
Enlargement of EPN-TAP for spectroscopy
Interface studies, new cases
Workflow studies & demonstrators
SSHADE: solid spectroscopy
Finalization of infrastructure
I/O interface studies
Magnetospheres
Data calibration / evaluation?
I/O interface studies
GIS-VO link / planetary surfaces
GIS-VO link
I/O interfaces
Planetary atmospheres
New services
Radiative transfer codes interfaces
Small bodies, asteroids & comets
Astorb successor?
Shape models / 3D interfaces?
Exoplanets
Workflows, services,
use cases
Coordination
JRA / VESPA
Development
VAA tasks
Training
Training session during conferences
Continuation of FP7 resource list
Dissemination & sustainability
New standards and reference lists + validation
(meetings with IVOA/IPDA/IAU/PDS)
Amateur community link
New services, validation/implementation
Data validation
+ ingestion
Service
implementation
Enlarging VO content
from thematics
Service
implementation
Service
implementation
Service
implementation
Enlarging VO content,
external services
EPN-TAP interfaces
to "small" existing
services in Europe
— AOs?
+ Data ingestion
Service
management,
helpdesk,
monitoring
backups…
Coordination
VAA / VESPA
Data ingestion / meetings / support
Coord: VO-Paris
Deputy: Jacobs U
Lead: IPAG, Grenoble
Lead: IRAP, Toulouse
Lead: Jacob Univ., Bremen
Lead: IASB, Brussels
Lead: IAPS/INAF, Rome
Lead: VO-Paris
VESPA in Europlanet H2020


Tools & interfaces
VO-Paris (co-lead)
CDPP
CDS
Europlanet H2020 / VESPA
French contributions
Thematics
solid spectroscopy / SSHADE
IPAG (lead)
Users training
CDPP (co-lead)
Magnetospheres
CDPP (lead)
Coordination
VO-Paris (co-lead)
Sustainability
planetary surfaces / GIS-VO link
GEOPS
VO-Paris (lead)
New standards and reference lists + validation (meetings with IVOA/IPDA/IAU/PDS)
Planetary atmospheres
LATMOS
CDPP, VO-Paris
Small bodies, asteroids & comets
IMCCE
Enlarging VO content
Exoplanets
LESIA (lead)

Organisation nationale




OVPDC / planéto
Exoplanets
APIS
Portail IMCCE (Skybot…)
MASER
TNOs
OSUG
GhoSST
Strasbourg
CDS
Autres centres d'expertise
Services labellisés
Services à labelliser
Services non-planéto
OVGSO
CASSIS
CDPP
F-VAMDC
Physique solaire
Physique des plasmas
Interférométrie
Pôles thématiques nationaux
Centres d'expertise régionaux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Interférométrie
Pôles thématiques nationaux
Centres d'expertise régionaux

Rôle et structure des pôles thématiques

Définition

- Rassemble des services de données *labellisés* dans un domaine
  La granularité attendue se déduit des pôles existants

Rôles

- Ouvrir un espace de discussion entre fournisseurs de données
  Notamment concertation sur les services à contributions multiples

- Pilotage des services, priorités de développement ?
  Pas clair: - Pas de moyens propres
  - L'implémentation est dans les centres d'expertise / OSU

- Veiller à l'interopérabilité dans le domaine
  - Registry communs
  - Protocoles compatibles => interface de recherche commune (VESPA)
  - Sortie en VOtable => outils de visu/traitement dispo immédiatement via VESPA

  => Seul moyen de gérer les interfaces thématiques !!
  (surfaces/atmosphères, surfaces/petits corps, etc)

Rôle et structure des pôles thématiques

Structure

- Direction: responsable scientifique + chef de projet / adjoint technique

- Comité de gestion (science et administration)
  - Responsables des services labellisés
  - Représentants des centres d'expertise / OSU associés
    (fournissant des services de données)
  - Représentant INSU (et/ou PNP, CNES… ?)

- Comité utilisateur
  - 1 ou 2 personnes / sous-thématique planéto ?
    Surfaces / Atmosphères / Petits Corps / Exoplanètes / Intérieurs, etc
    => intégrer les fournisseurs de "petits services" (non-labellisables par l'INSU)
  - Correspondants de pôles en interaction ?
    Solaire, Plasma, VAMDC ?
  - Ateliers + système de gestion de tickets
    Utilisateurs de base

Services de référence en planéto

- Existants:
  CDPP, CASSIS (OVGSO)
  GhoSST (OSUG DC)
  Encyclopédie des planètes extrasolaires, portail IMCCE (VO-Paris)
    + Lien avec services solaires via EPN-TAP => lien avec le pôle solaire ?

- En développement (et proposés à labellisation en 2015):
  APIS, TNOs are cool, MASER (VO-Paris)
  MP3C (OCA)
    + autres ?

Proposition d'organisation nationale