

# **IDOC space mission data distribution services**

**Institut d'Astrophysique Spatiale – Orsay**

K. Dassas on behalf of the IDOC team

## Outlines

- Context
- IDOC data interfaces
- Tools behind
- Conclusion

## Environment



UMR (CNRS and Paris-Sud University) - Orsay France

OSUPS = IAS + GEOPS = Science of Universe Observatory Paris-Sud

Staff : 150 members

IDOC staff : 9 permanent members + 6 contractants

### Scientific Teams :

- Solar and Planetary systems
- Interstellar Matter and Cosmology
- Stellar and Solar Physics
- Astrochemistry and Origins

### Context :

- Space Mission
  - International Consortia
  - « Astronomical » budget
  - Long terms engagements
  - Time constraints
- Paris – Saclay ( P2IO, SPU )

## IDOC Integrated Data and Operation Center

IDOC technical head: [gilles.poulleau@ias.u-psud.fr](mailto:gilles.poulleau@ias.u-psud.fr)

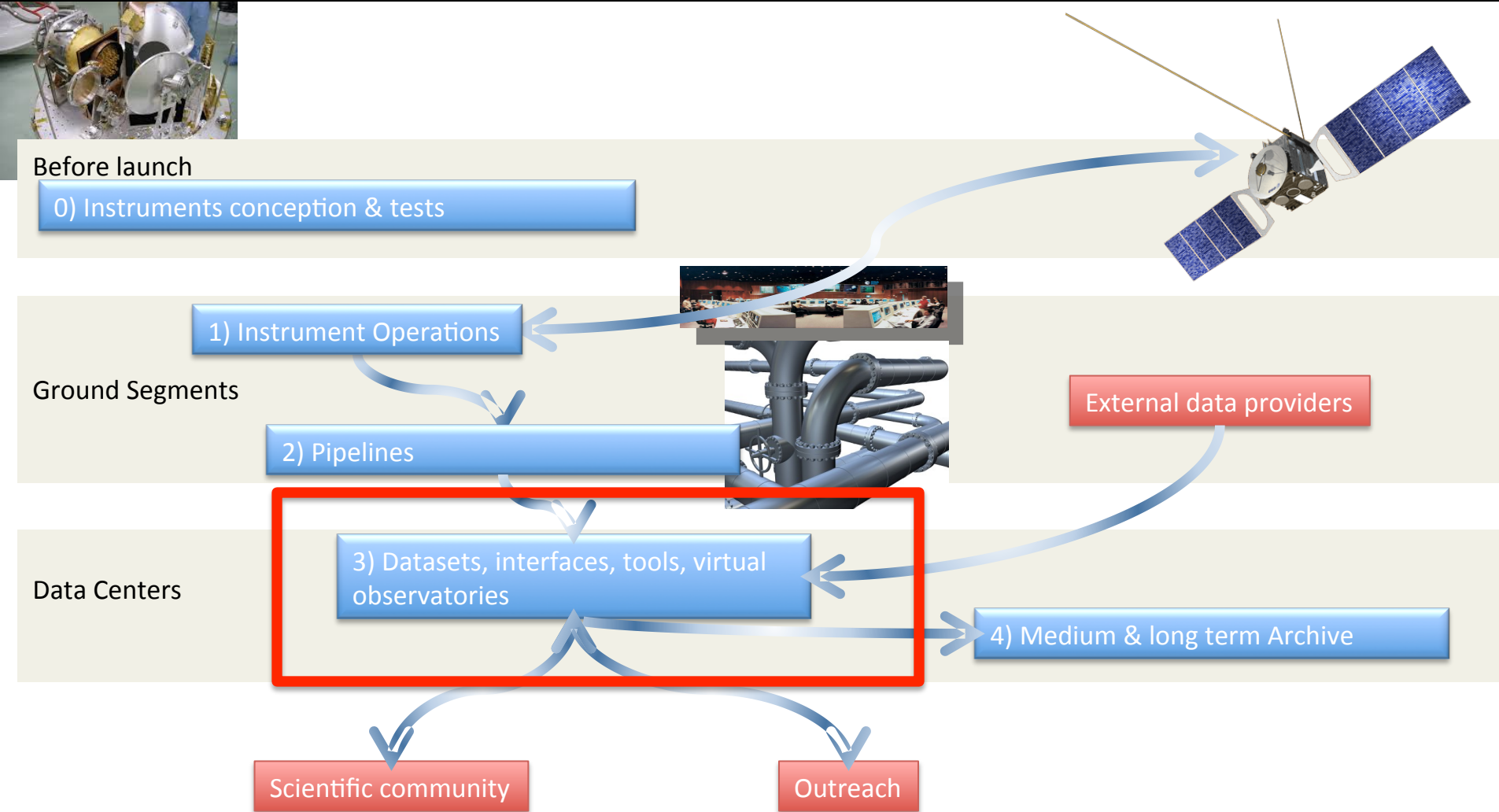
IDOC scientific head: [marian.douspis@ias.u-psud.fr](mailto:marian.douspis@ias.u-psud.fr)

<https://idoc.ias.u-psud.fr>

### Partners :

- Others laboratories French or foreign
- Space agencies : CNES, ESA, NASA, JAXA, CSSAR, FKA,...
- Industry (IT or Space)
- Airbus, Leonardo-Finemeccanica,Thales-Alenia...

## IDOC in the different space mission phases



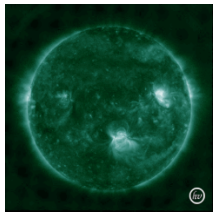
## Space Missions

IDOC Activity fields	Futures Mission	On-going	Past
Before flight			
0) Instrument design & tests	Euclid 0/2,		Rosetta 0/1/2,
Ground Segment			
1) Instrument Operations	JWST 2/3/4,	Mars-express 0/1/2/3/4,	CoRot 2/3/4,
2) Pipelines	Plato 2/3/4,	SoHo 0/1/2/3/4,	Planck 0/1/2/3,
Dataset Management			
3) Dataset interfaces, access and tools	Juice 0/1/2/3,	Stereo 3/4,	Herchel 3/4,
4) Medium and long term archive	Bepi-Colombo 0,	SDO 3/4,	Trace 3/4,
	Solar Orbiter 0/1/2/3/4	Fripon 1/2	Coronas 3/4,
			Picard 3/4,
			Iras 2/3/4



## **Galaxy, INterstellar matter and Cosmology (GINCO)**

<https://idoc.ias.u-psud.fr/ginco>



## **Multi Experiment Data & Operation Center (MEDOC)**

National Center for Space Solar Physics Data

<https://idoc.ias.u-psud.fr/MEDOC>



## **Planetary Operation & Data Center (IPOD) new name : PSUP**

<https://idoc.ias.u-psud.fr/ipod>



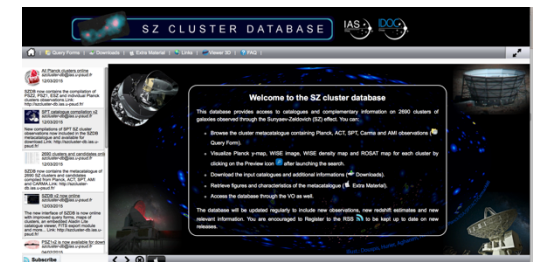
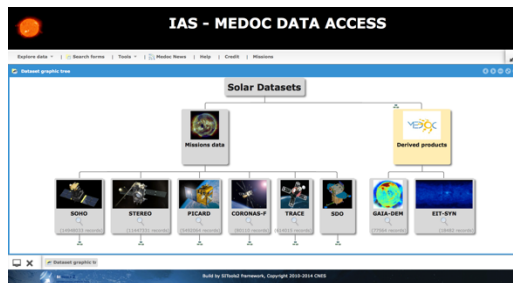
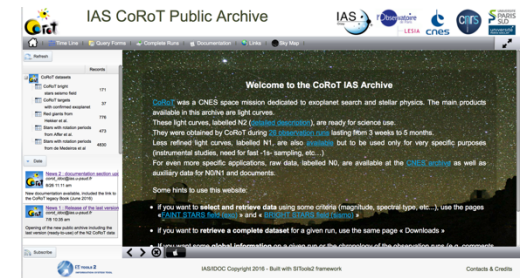
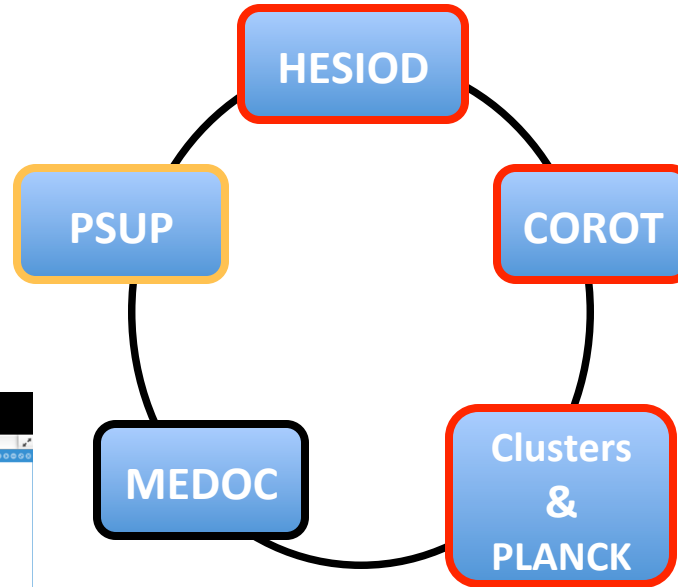
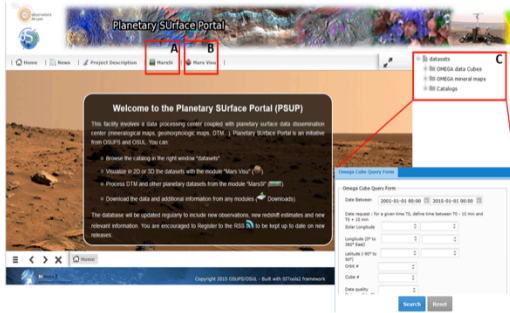
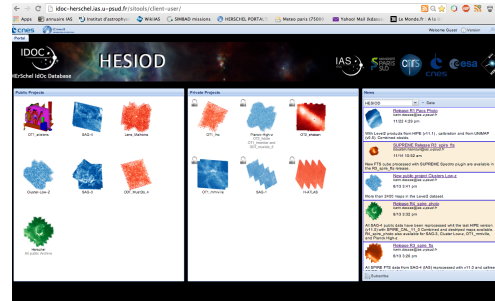
## **Stellar System Data (D2S)**

<https://idoc.ias.u-psud.fr/D2S>

# IDOC Data Interfaces

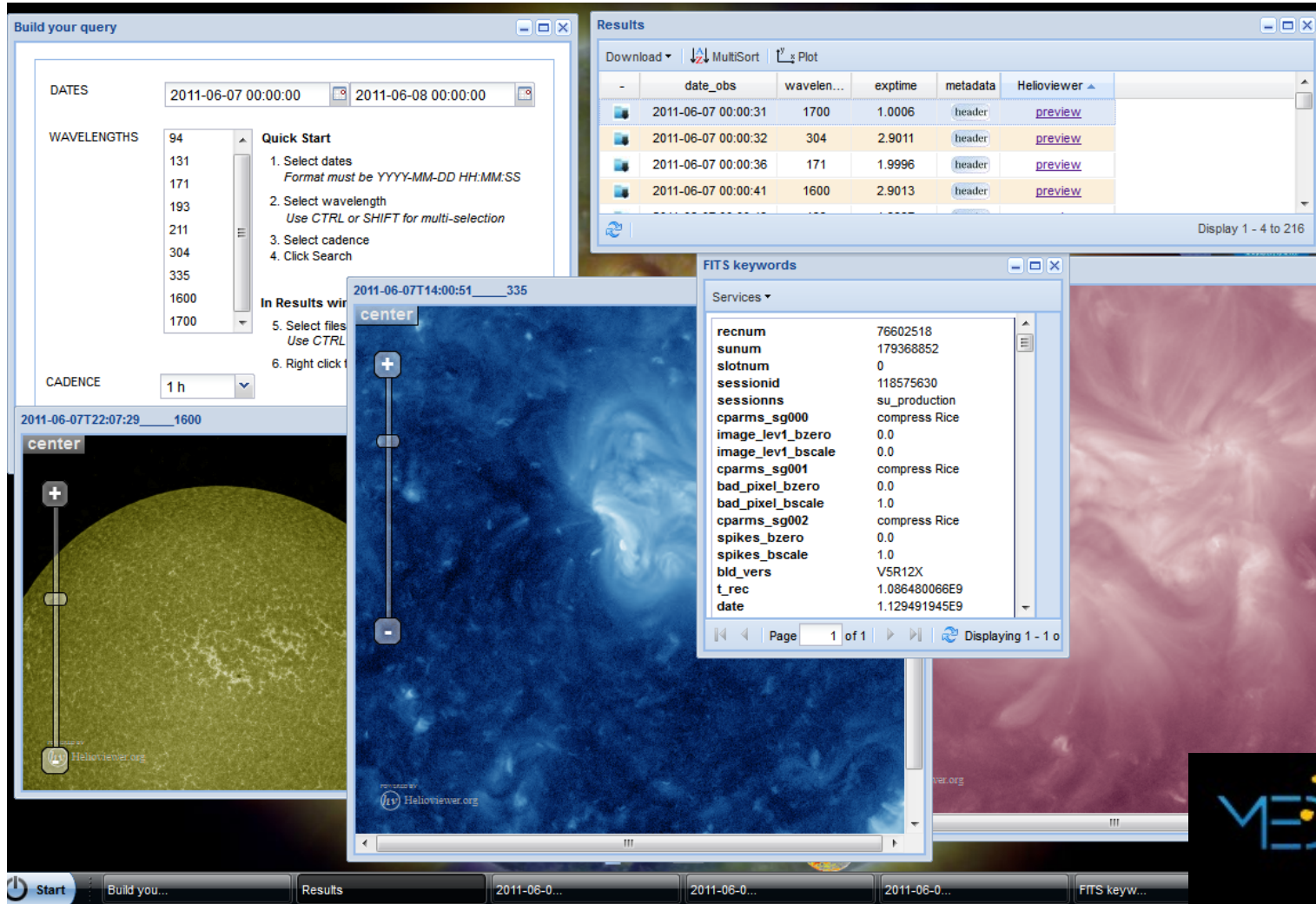
# Data Access and Visualization

<https://github.com/SITools2/SITools2-core/projects>





# Data Access and Vizualisation : <http://medoc-sdo.ias.u-psud.fr>



**Build your query**

DATES: 2011-06-07 00:00:00 to 2011-06-08 00:00:00

WAVELENGTHS: 94, 131, 171, 193, 211, 304, 335, 1600, 1700

Quick Start

1. Select dates  
Format must be YYYY-MM-DD HH:MM:SS
2. Select wavelength  
Use CTRL or SHIFT for multi-selection
3. Select cadence
4. Click Search

In Results window

5. Select files  
Use CTRL
6. Right click

CADENCE: 1 h

2011-06-07T22:07:29 1600

**center**

2011-06-07T14:00:51 335

**center**

**Results**

	date_obs	wavelen...	exptime	metadata	Helioviewer
	2011-06-07 00:00:31	1700	1.0006	header	<a href="#">preview</a>
	2011-06-07 00:00:32	304	2.9011	header	<a href="#">preview</a>
	2011-06-07 00:00:36	171	1.9996	header	<a href="#">preview</a>
	2011-06-07 00:00:41	1600	2.9013	header	<a href="#">preview</a>

Display 1 - 4 to 216

**FITS keywords**

```

recnum          76602518
sunum           179368852
slotnum         0
sessionid       118575630
sessionns      su_production
cparams_sg000  compress Rice
image_lev1_bzero 0.0
image_lev1_bscale 0.0
cparams_sg001  compress Rice
bad_pixel_bzero 0.0
bad_pixel_bscale 1.0
cparams_sg002  compress Rice
spikes_bzero   0.0
spikes_bscale  1.0
bld_vers       V5R12X
t_rec          1.086480066E9
date           1.129491945E9
    
```

Page 1 of 1 | Displaying 1 - 1 of 1

Start | Build you... | Results | 2011-06-0... | 2011-06-0... | 2011-06-0... | FITS keyw...



# PSUP 1/3

**Planetary Surface Portal**

Home | News | Project Description | MarsSi | Mars Visu

**Welcome to the Planetary Surface Portal (PSUP)**

This facility involves a data processing center coupled with planetary surface data dissemination center (mineralogical maps, geomorphologic maps, DTM...). Planetary Surface Portal is an initiative from OSUPS and OSUL. You can:

- o Browse the catalog in the right window "datasets"
- o Visualize in 2D or 3D the datasets with the module "Mars Visu"
- o Process DTM and other planetary datasets from the module "MarsSi"
- o Download the data and additional information from any modules (Downloads).

The database will be updated regularly to include new observations, new redshift estimates and new relevant information. You are encouraged to Register to the RSS to be kept up to date on new releases.

**datasets**

- o OMEGA data Cubes
- o OMEGA mineral maps
- o Catalogs

**Omega Cube Query Form**

Omega Cube Query Form

Date Between: 2001-01-01 00:00 | 2015-01-01 00:00

Date request : for a given time T0, define time between T0 - 10 min and T0 + 10 min

Solar Longitude: [ ] [ ]

Longitude (0° to 360° East): [ ] [ ]

Latitude (-90° to 90°): [ ] [ ]

Orbit #: [ ]

Cube #: [ ]

Data quality: [ ]

Search | Reset

## PSUP 2/3

The screenshot displays the 'Planetary SURface Portal' web interface. At the top, there is a navigation bar with links for Home, News, Project Description, MarsSI, and Mars Visu. A search bar on the right contains the text 'Olympus Mons'. On the left side, a 'Catalogs' panel is open, showing a list of features with checkboxes: 'Central peaks hydrated phases between Isidis and Hellas', 'Landing sites', 'crocus', 'Scalloped depression', 'Hydrated mineral sites' (checked), 'Valles Marineris low Calcium-Pyroxene' (checked), and 'Central peaks mineralogy south Valles Marineris'. Below this panel are expandable sections for 'Background Layers', 'Mineral Layers', 'MarsSI Data', and 'Other'. The main content area features a 3D globe of Mars with a color-coded thermal inertia map overlaid. A color scale legend at the bottom right indicates 'Mean thermal inertia (J/m<sup>2</sup>/K/s<sup>1/2</sup>)' ranging from 0 (purple) to 600 (red). Attribution text at the bottom right reads: 'Viking layer provided by Mars Dataset', 'Color background provided by Mars Dataset', and 'Layer provided by IAS'. The footer of the application includes navigation icons, a 'Home' button, and several 'Datasets : OMEGA ...' buttons, along with the text 'SI TOOLS 2 INFORMATION SYSTEMS 2000' and 'Copyright 2015 OSUPS/OSUL - Built with SITools2 framework'.

## PSUP 2/3 WMS, WCS, and WFS

Getting georeferenced Images :  
**WMS** requests to the IDOC Mapserver



Background Viking

<http://idoc-wmsmars.ias.u-psud.fr/wmsmap?WIDTH=1500&HEIGHT=750&STYLES=&FORMAT=image/png&TRANSPARENT=false&SERVICE=WMS&REQUEST=GetMap&VERSION=1.1.1&SRS=EPSG:4326&BBOX=0,-90,180,90&LAYERS=Viking>



ALBEDO Layer

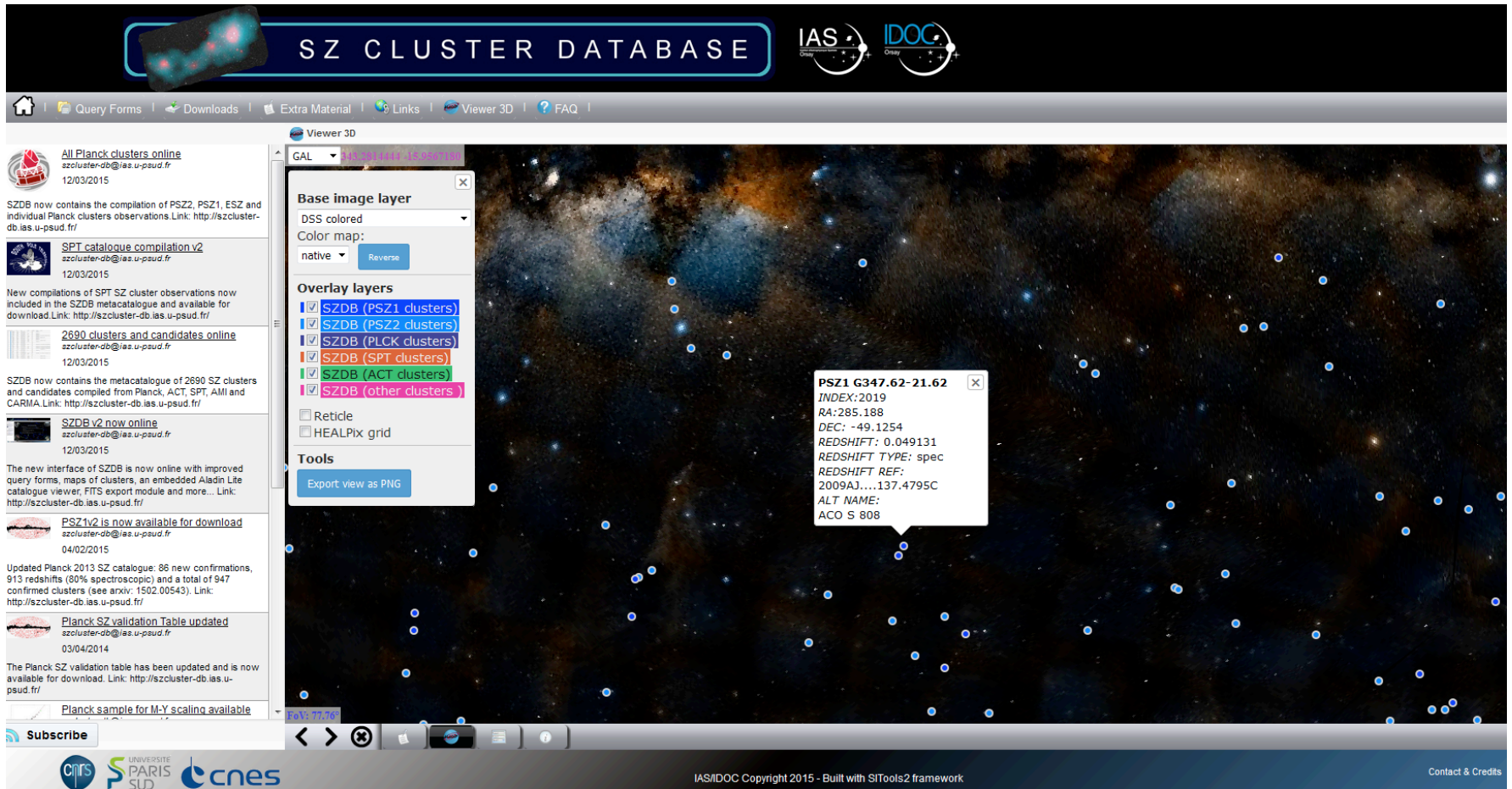
[http://idoc-wmsmars.ias.u-psud.fr/wmsmap?WIDTH=1500&HEIGHT=750&STYLES=&FORMAT=image/png&TRANSPARENT=false&SERVICE=WMS&REQUEST=GetMap&VERSION=1.1.1&SRS=EPSG:4326&BBOX=0,-45,180,45&LAYERS=OMEGA\\_solar\\_albedo](http://idoc-wmsmars.ias.u-psud.fr/wmsmap?WIDTH=1500&HEIGHT=750&STYLES=&FORMAT=image/png&TRANSPARENT=false&SERVICE=WMS&REQUEST=GetMap&VERSION=1.1.1&SRS=EPSG:4326&BBOX=0,-45,180,45&LAYERS=OMEGA_solar_albedo)

Getting coverage :  
**WCS** requests to the IDOC Mapserver

Getting Footprints and metadata (geojson):  
**WFS** requests to the MArSIS Geoserver



# Planck – SZ cluster database



**SZ CLUSTER DATABASE**

IAS | IDOC

Home | Query Forms | Downloads | Extra Material | Links | Viewer 3D | FAQ

Viewer 3D

GAL: **Planck - PSZ1**

**Base image layer**

DSS colored  
Color map: native Reverse

**Overlay layers**

- SZDB (PSZ1 clusters)
- SZDB (PSZ2 clusters)
- SZDB (PLCK clusters)
- SZDB (SPT clusters)
- SZDB (ACT clusters)
- SZDB (other clusters)

Reticle  
 HEALPix grid

**Tools**

Export view as PNG

**PSZ1 G347.62-21.62**

INDEX: 2019  
RA: 285.188  
DEC: -49.1254  
REDSHIFT: 0.049131  
REDSHIFT TYPE: spec  
REDSHIFT REF: 2009AJ....137.4795C  
ALT NAME:  
ACO S 808

Subscribe

UNIVERSITE PARIS SUD | CNRS | CNES

IAS/IDOC Copyright 2015 - Built with SITools2 framework

Contact & Credits

# Planck – SZ cluster database

Home
Query Forms
Downloads
Extra Material
Links
Viewer 3D
FAQ

**All Planck clusters online**  
szcluster-db@ias.u-psud.fr  
12/03/2015

SZDB now contains the compilation of PSZ2, PSZ1, ESZ and individual Planck clusters observations. Link: <http://szcluster-db.ias.u-psud.fr/>

**SPT catalogue compilation v2**  
szcluster-db@ias.u-psud.fr  
12/03/2015

New compilations of SPT SZ cluster observations now included in the SZDB metacatalogue and available for download. Link: <http://szcluster-db.ias.u-psud.fr/>

**2690 clusters and candidates online**  
szcluster-db@ias.u-psud.fr  
12/03/2015

SZDB now contains the metacatalogue of 2690 SZ clusters and candidates compiled from Planck, ACT, SPT, AMI and CARMA. Link: <http://szcluster-db.ias.u-psud.fr/>

**SZDB v2 now online**  
szcluster-db@ias.u-psud.fr  
12/03/2015

The new interface of SZDB is now online with improved query forms, maps of clusters, an embedded Aladin Lite catalogue viewer, FITS export module and more... Link: <http://szcluster-db.ias.u-psud.fr/>

[Subscribe](#)

Preview

PSZ2 G062.94+43.69	
Index	1840
RA	247.156
DEC	39.5602
Redshift	0.0299
Redshift type	spec
Redshift ref.	2011A&A...534A.109P
Alt. Name	RXC J1628.6+3932 ACO 2199 RMJ162838.2+393304.5 PSZ1 G062.94+43.69
VO Link	

◀ ▶
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Contact & Credits

21/10/2016

IVOA meeting Trieste 2016

14

# Herschel – HESIOD <http://idoc-herschel.ias.u-psud.fr/>

cnes 
Welcome Guest [Version](#) [Login](#)

## HESIOD

### Public Projects

#### Main Public Project

**Herschel**  
All public  
Archive

#### Other Public Projects

OT1\_atielsens

Cluster-Low-Z

Lens\_Maihotra

SAG-3

SAG-4

DDT\_MustDo\_4

### Private Projects

OT2\_ehabart

OT1\_lho

OT1\_mmville

SAG-1

H-ATLAS

Planck-High-z  
OT2\_hdole

### News

**HESIOD** ▼ Date

**Release R6 PACS SPECTRO**  
*christophe.cossou@ias.u-psud.fr*  
6/24 3:21 pm

pac\_cal\_72\_0\_hipe\_v14.0.1 Level 2 products available. For each type of data file, here are the products it represents and a short description: Cube [HPS3DRR\_HPS3DBI\_Spectroscopy 3d cube context RebinnedCube [HPS3DRR\_HPS3DBI\_Spectroscopy rebinned 3d cube context ProjectedCube [HPS3DRR, H...

**Release R3 PACS Photo**  
*christophe.cossou@ias.u-psud.fr*  
5/3 9:24 am

With Level 2 products from HIPE (v14.0), calibration PACS\_CAL\_72\_ and UNIMAP (now directly included in HIPE).

**Release R7 spire photo**  
*christophe.cossou@ias.u-psud.fr*  
5/3 9:20 am

All SAG-4 public data have been reprocessed with the last HIPE version (v14.0) with SPIRE\_CAL\_14\_2 Combined and extended map available. R7 spire\_photo also available for SAG-3\_clusters\_lowz, DDT\_mustdo\_4, KEG1\_cwis001, OT1\_mmville, OT2\_hdole, DDT\_mustdo\_4, GT1\_baltieri, lens\_maihotra, OT1\_lm...

**Release FTS R6 spire fts**  
*karin.dassas@ias.u-psud.fr*  
4/25 3:34 pm

All SPIRE FTS data from SAG-4 (IAS and LAM) and OT1\_atielsens reprocessed with hipe v14 and calfree SPIRE\_CAL\_14\_2 Naive nearest and gridding cube projections available. Supreme Data are also available for all ineses products.

**PACS Photometer PSF available**  
*karin.dassas@ias.u-psud.fr*  
3/29 8:21 pm

[Subscribe](#)

# Herschel - HESIOD

The screenshot displays the HESIOD web interface. On the left, a table lists data levels for various instruments. The 'Spire Photometer' Level 2.5 is selected. A 'preview' window shows a large grayscale image of a nebula with a red 3D surface plot overlaid. Below the preview is a table of data rows.

Instrument	Level	Records	Description	Data	Cut Fits
Pacs Photometer	Level 1	72			
	Level 2	82			
Pacs Spectrometer	Level 1	599			
	Level 2	28			
Spire Photometer	Level 1	86			
	Level 2	426			
	Level 2.5	284			
Spire FTS	Level 1	2466			
	Level 2	666			
Previous Releases					

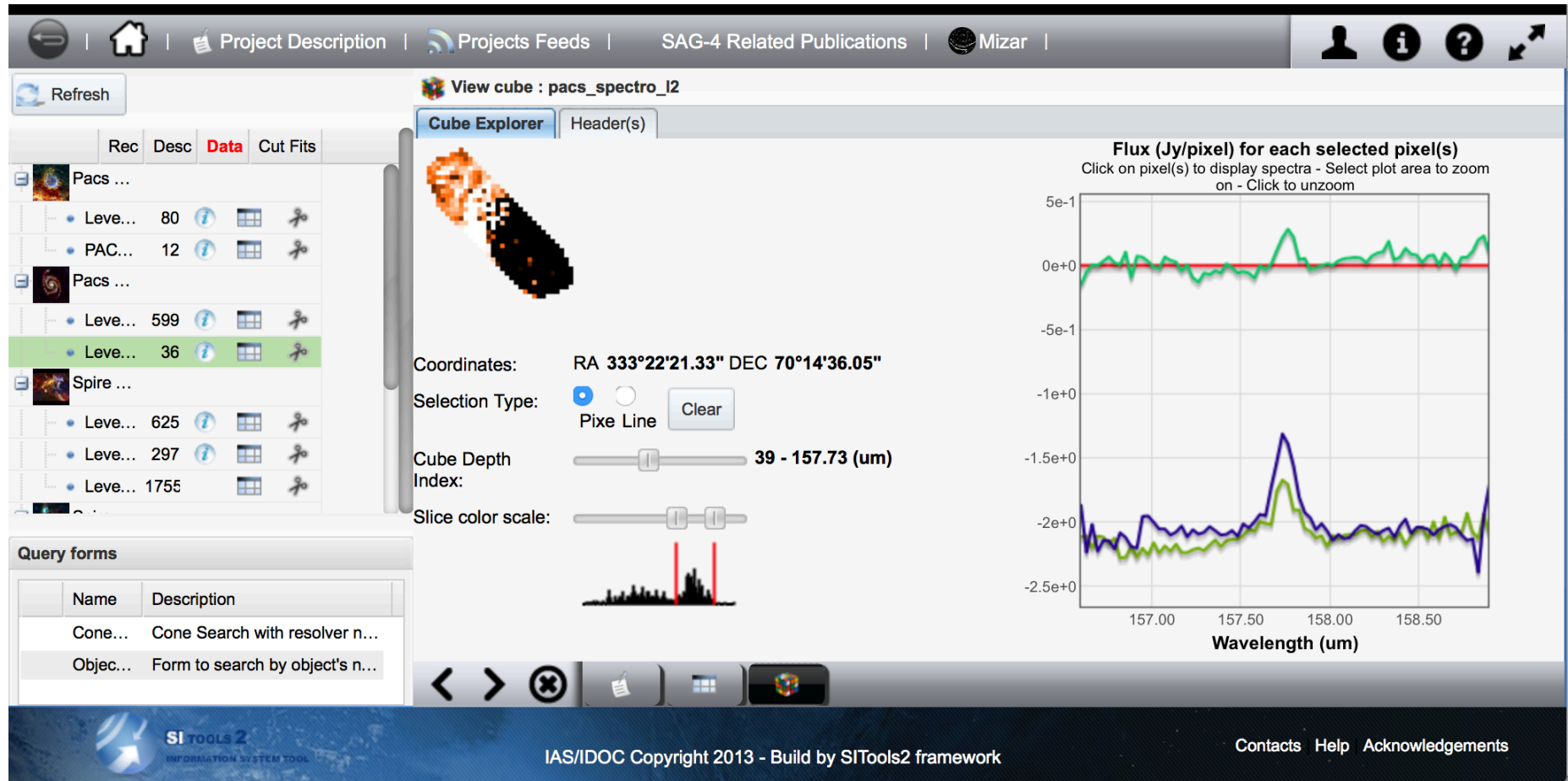
  

8.84	<a href="#">Header</a>	S3	SAG-3	HIPE	500.0	11.0.2934	R4_spire_p
46.6	<a href="#">Header</a>	S3	SAG-3	HIPE	250.0	11.0.2934	R4_spire_p

Display 26 - 38 to 264



## Herschel – HESIOD – Cube Explorer



The interface displays a spectral cube view for 'pacs\_spectro\_12'. The main panel shows a 2D spectral cube with a color scale from black to red. Below the cube, the coordinates are RA 333°22'21.33" and DEC 70°14'36.05". The selection type is 'Pixe Line' with a 'Clear' button. The cube depth index is set to 39 - 157.73 (um). The slice color scale is also adjustable. A zoomed-in plot shows the flux (Jy/pixel) for each selected pixel(s) versus wavelength (um). The plot shows a prominent emission line at approximately 157.75 um. The y-axis ranges from -2.5e+0 to 5e-1, and the x-axis ranges from 157.00 to 158.50 um.

**Flux (Jy/pixel) for each selected pixel(s)**  
Click on pixel(s) to display spectra - Select plot area to zoom on - Click to unzoom

Name	Description
Cone...	Cone Search with resolver n...
Objec...	Form to search by object's n...

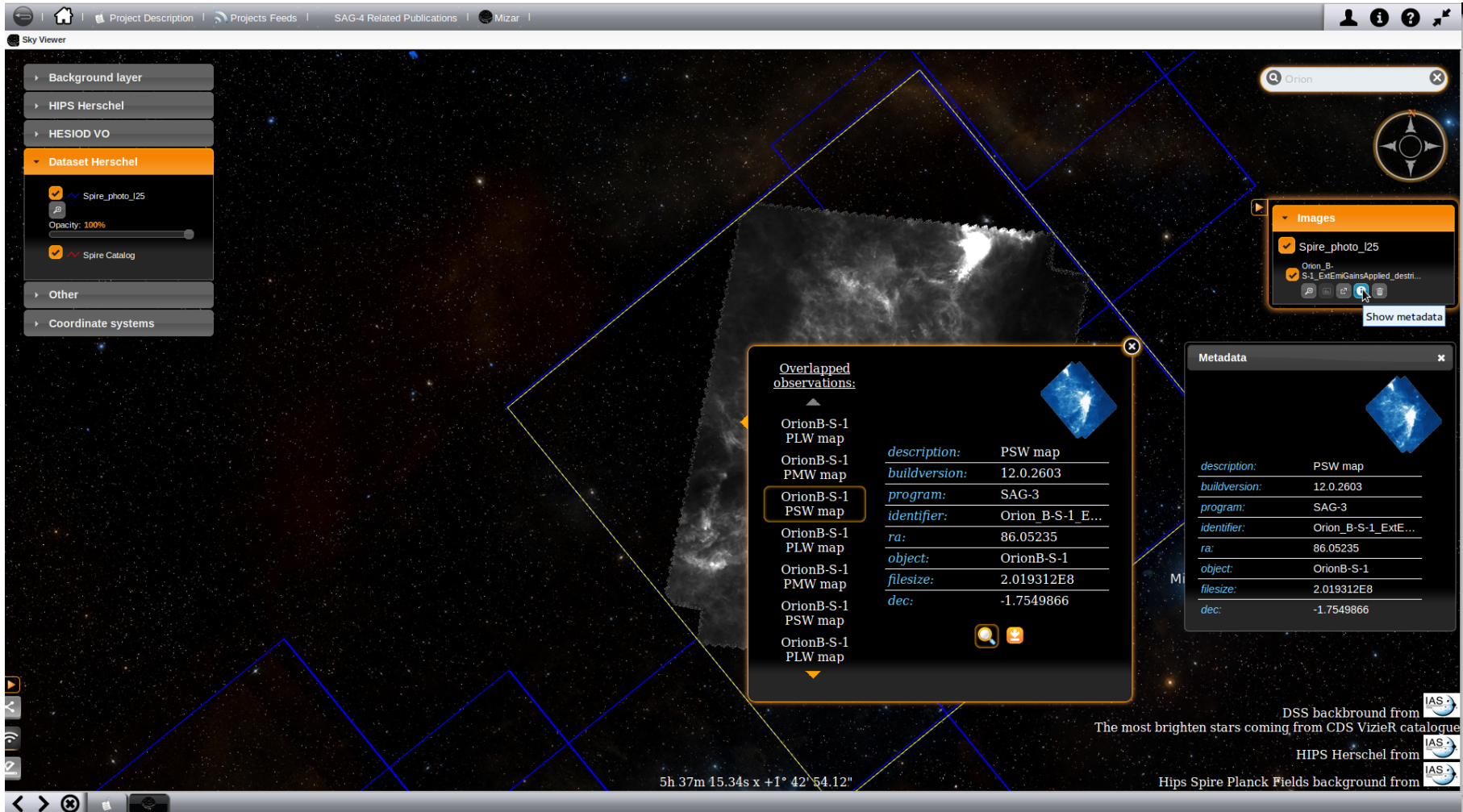
SI TOOLS 2  
INFORMATION SYSTEM TOOL

IAS/IDOC Copyright 2013 - Build by SITools2 framework

Contacts Help Acknowledgements

To be improved : data size management, genericity, robustness...

# Herschel - HESIOD



Background layer  
HIPS Herschel  
HESIOD VO  
Dataset Herschel  
Spire\_photo\_I25  
Spire Catalog  
Other  
Coordinate systems

Orion

Images  
Spire\_photo\_I25  
Orion\_B-S-1\_ExtEmGainsApplied\_destri...

Show metadata

Metadata

Overlapped observations:

- OrionB-S-1 PLW map
- OrionB-S-1 PMW map
- OrionB-S-1 PSW map
- OrionB-S-1 PLW map
- OrionB-S-1 PMW map
- OrionB-S-1 PSW map
- OrionB-S-1 PLW map

<i>description:</i>	PSW map
<i>buildversion:</i>	12.0.2603
<i>program:</i>	SAG-3
<i>identifier:</i>	Orion_B-S-1_E...
<i>ra:</i>	86.05235
<i>object:</i>	OrionB-S-1
<i>filesize:</i>	2.019312E8
<i>dec:</i>	-1.7549866

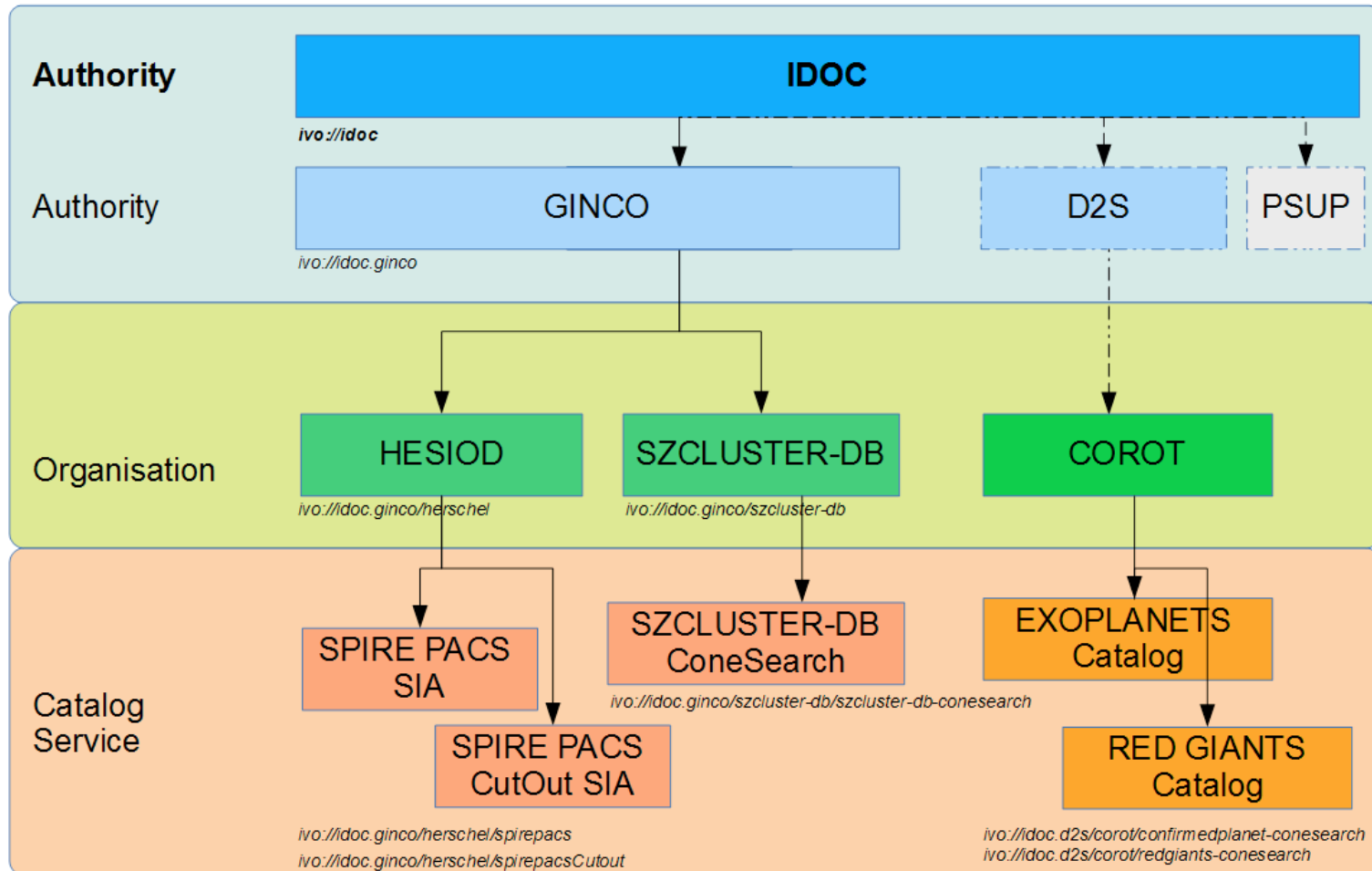
5h 37m 15.34s x +1° 42' 54.12"

DSS background from IAS  
The most brightest stars coming from CDS VizieR catalogue  
HIPS Herschel from IAS  
Hips Spire Planck Fields background from IAS

## IDOC VO registered services summary

### IDOC Virtual Observatory (euro-vo)

IVOA identifier



# MAGYC : Multi wAvelength GalXY Clusters

Job Manager Results

### Job launcher

Search a given region of the sky for Galaxy Clusters in optical galaxy surveys.  
Coordinate system is decimal Equatorial (J2000 ICRS).

Supported surveys :  
SDSS DR12

Right Ascension  
RA (degrees)

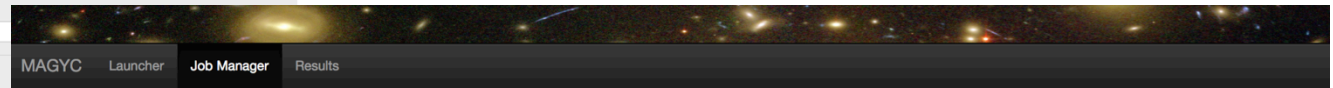
Declination  
DEC (degrees)

Search radius  
RADIUS (arcminutes)

OR

Upload a list of coordinates  
Choose file no file selected

OCA  
C.Benoist, C.Ordenovic, E.Slezak  
IAS  
M.Douspis, A.Beelen, H. Balans, F. Lefebvre  
CDS  
T.Boch, P.Fernique, A.Schaaff



## Jobs Manager

Refresh  Do not refresh

Search:

RA	DEC	RADIUS	Survey	Type	Created	Started	Elapsed	Remove	Phase	Action
197.87	-1.33	5	SDSS	wazp	20/10/2016 18:36:24	20/10/2016 18:36:24	4m 23s	Remove	Download	Results
197.87	-1.33	5	SDSS	dummy	20/10/2016 18:36:11	20/10/2016 18:36:11	15s	Remove	Download	N/A
197.87	-1.33	5	SDSS	hproj	20/10/2016 18:36:11	20/10/2016 18:36:12	31s	Remove	Download	Preview
197.87	-1.33	5	SDSS	catalogs	20/10/2016 18:36:08	20/10/2016 18:36:08	16s	Remove	Download	Properties
197.87	-1.33	5	SDSS	images	20/10/2016 18:36:08	20/10/2016 18:36:08	1m 28s	Remove	Download	Preview
247.15	39.5602	5	SDSS	wazp	20/10/2016 15:26:05	20/10/2016 15:26:06	4m 27s	Remove	Download	Results
247.15	39.5602	5	SDSS	hproj	20/10/2016 15:25:56	20/10/2016 15:25:56	36s	Remove	Download	Preview
247.15	39.5602	5	SDSS	dummy	20/10/2016 15:25:54	n/a	n/a	Remove	PENDING	

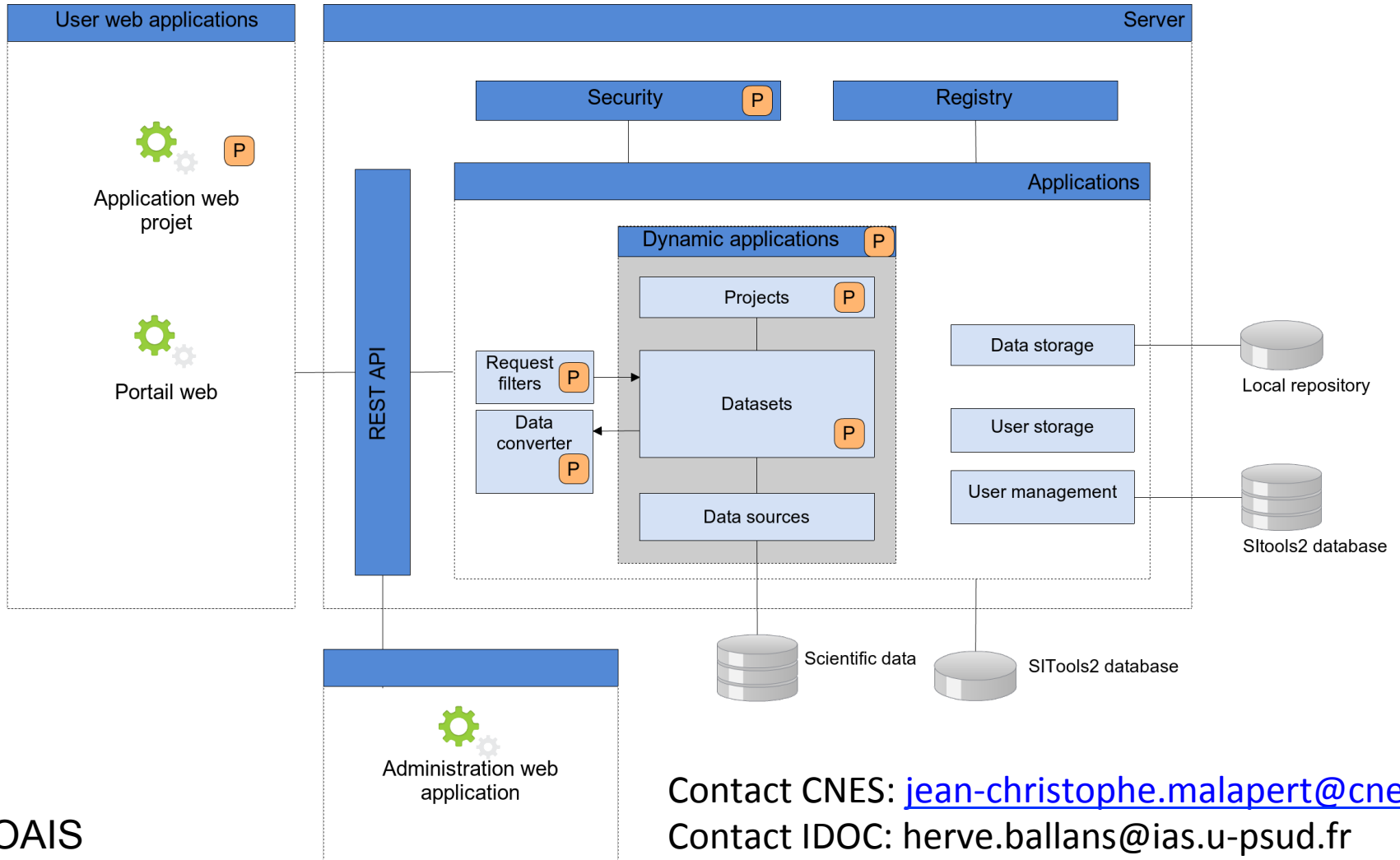
2 UWS servers  
(Library Gregory Mantelet CDS  
UWS 1.0)

SkyView, SkyServer  
Aladin Lite

Wazp at OCA  
Hproj at IAS

# Tools behind

## SItools 2



OAIS

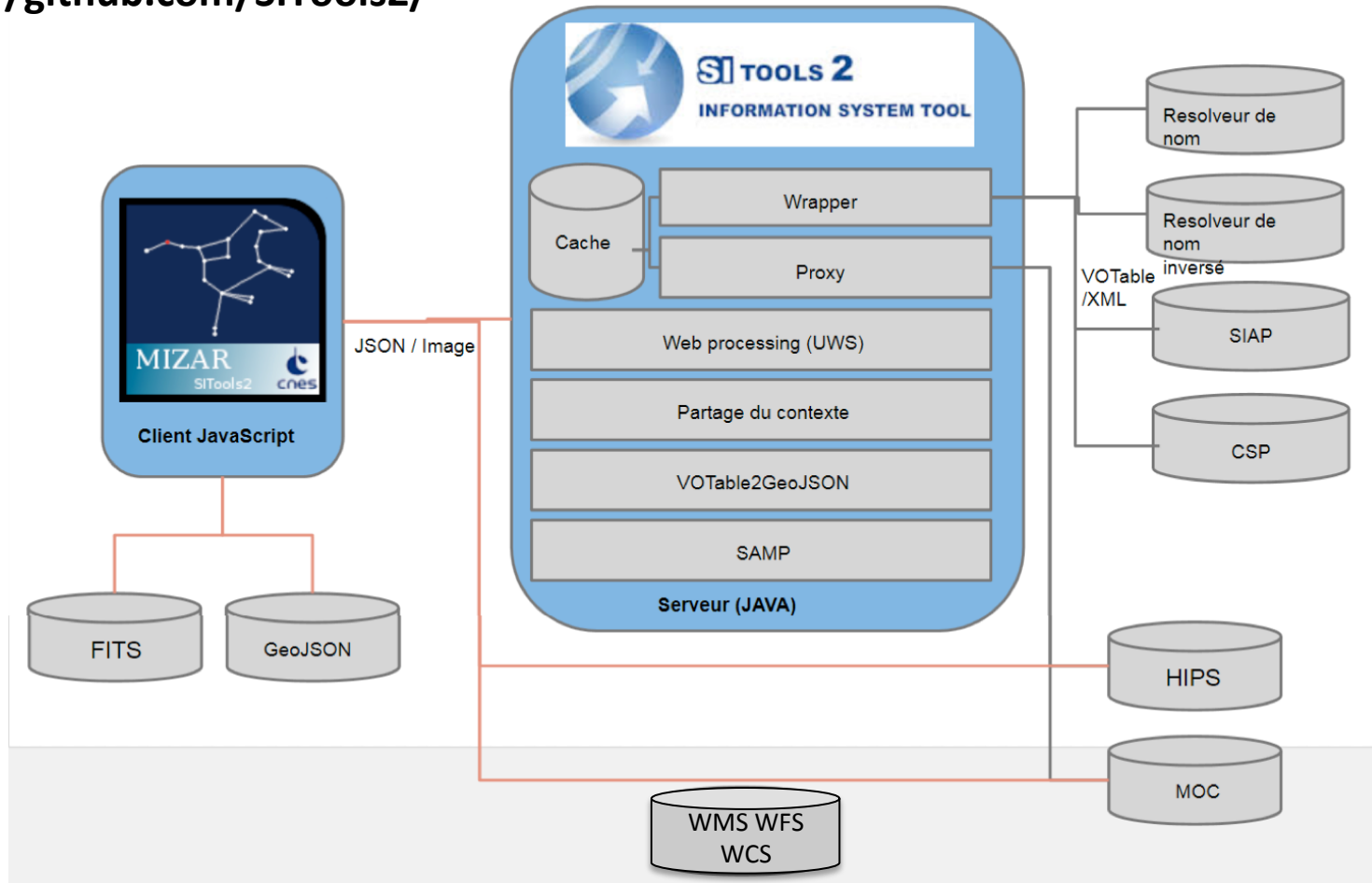
Contact CNES: [jean-christophe.malapert@cnes.fr](mailto:jean-christophe.malapert@cnes.fr)

Contact IDOC: [herve.ballans@ias.u-psud.fr](mailto:herve.ballans@ias.u-psud.fr)

<https://github.com/SITools2/>

## SItools 2

<https://github.com/SITools2/>



## Coming next : Regard

### Needs

OAIS main  
functions

OAIS data  
preservation

Software  
multitenancy

Interoperability :  
OGC & IVOA

Modular OAIS  
functions  
& adaptable

Scalability

SSO

Development kit

### Solutions

Microservice  
architecture

Each microservice  
Is adaptable :  
plugins

REST API

ElasticSearch

### Targets

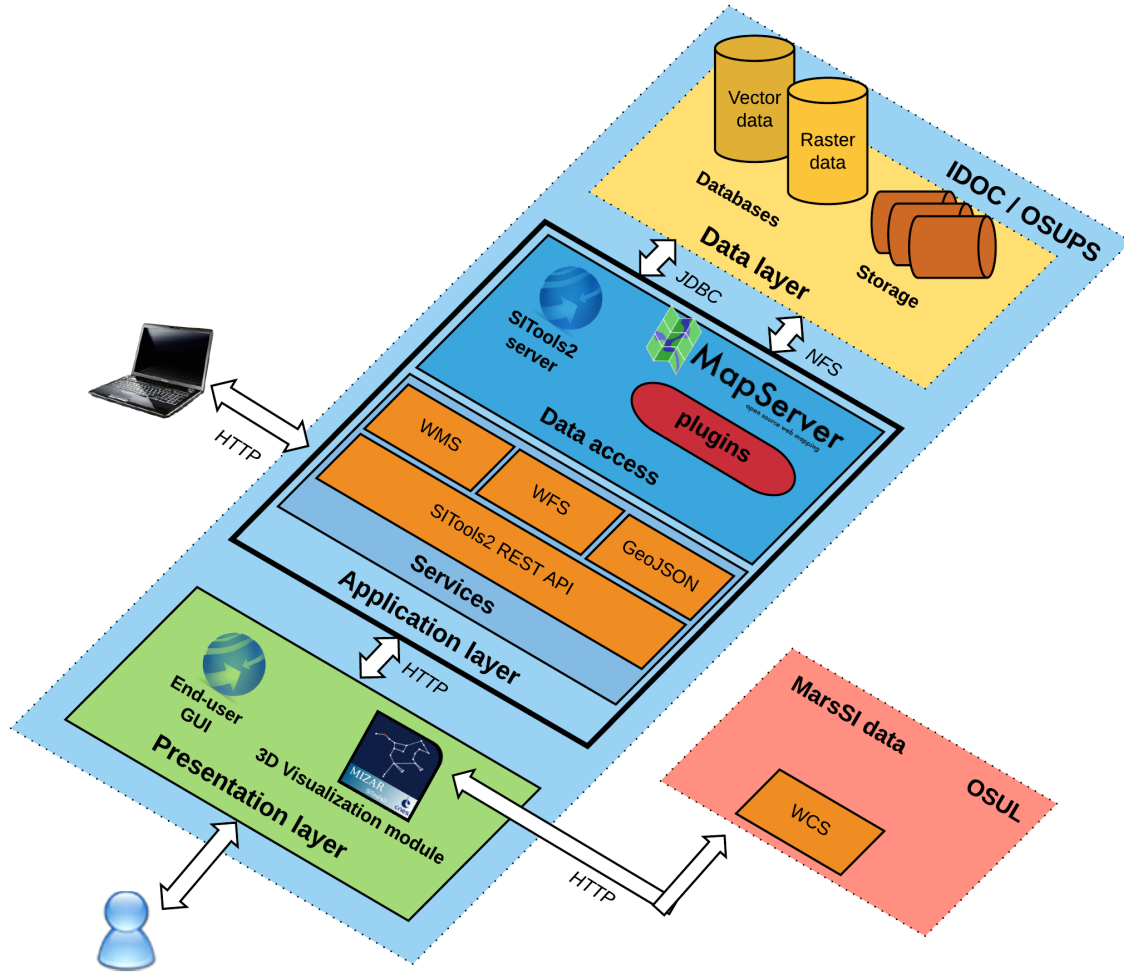
About 20 projects in different fields : astronomy, solar system, oceanography, ISS experiences, ...



## Conclusion

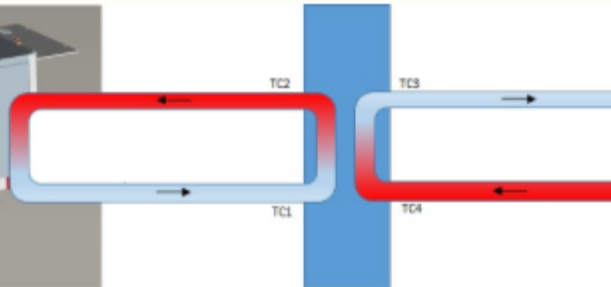
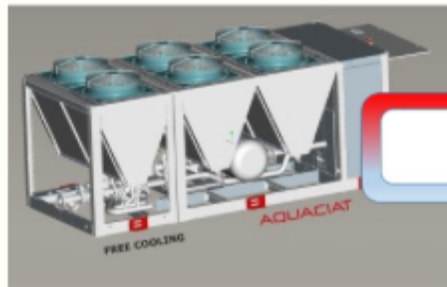
- Plan to publish new data into the VO (for current and next missions)
- TAP and EPN-TAP for the planetary portal
- UWS
- PROV
- New interfaces with Regard (end 2017)

Thank you for your attention !



## Labex P2IO « Vallée » computer room

- Shared by 8 laboratories (LAL, IPN, CSNSM...)
- Project realization : 2013
- Joint developments of competencies networks
- Governance documents
- Phase II (x2) already started : goal 2017
- 500 physical servers, 8000 cores, 5 PO of data.

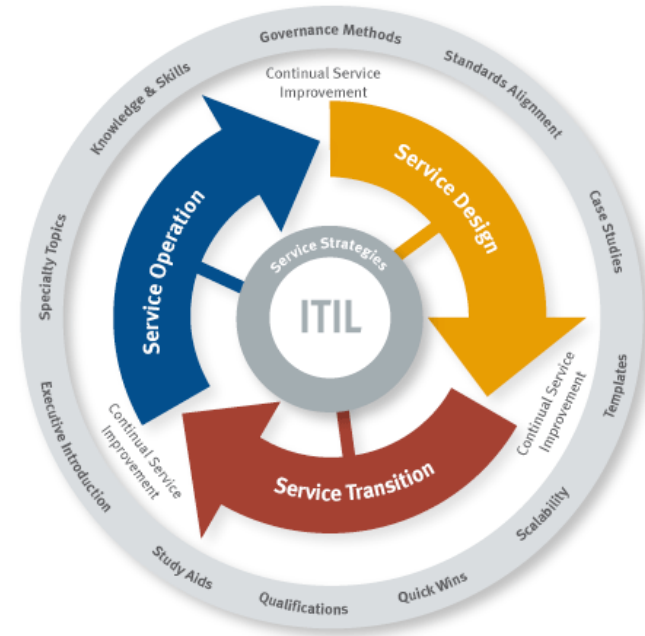


Budget : 1<sup>st</sup> phase 1M€  
2 more planned phases  
ROI : 3 years

Computer room  
sharing (green IT)

## Formalization

- OAIS : Open Archival Information System
- ITIL : Information Technology Infrastructure Library ( « best practices » )
- Label DSA : Data Seal of Approval



21/10/2016



IVOA meeting Trieste 2016



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