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SeaBIRD: A Flexible and Intuitive Planetary Datamining Infrastructure

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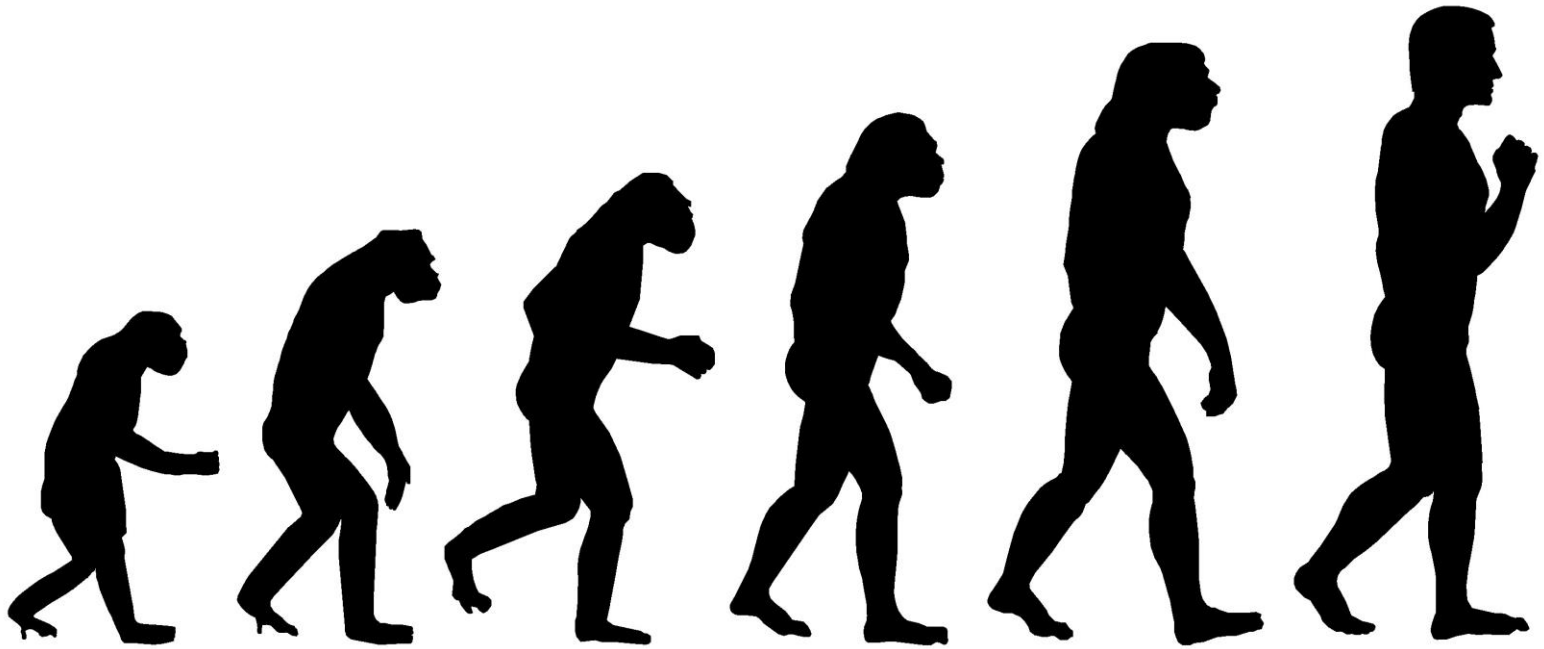
SeaBIRD

SeaBIRD (*Search-able and Brows-able Infrastructure for the Repository of Data*) is an infrastructure for the data distribution.

The first version of the infrastructure was delivered in 2010

The Evolution



SaeBIRD 1.0

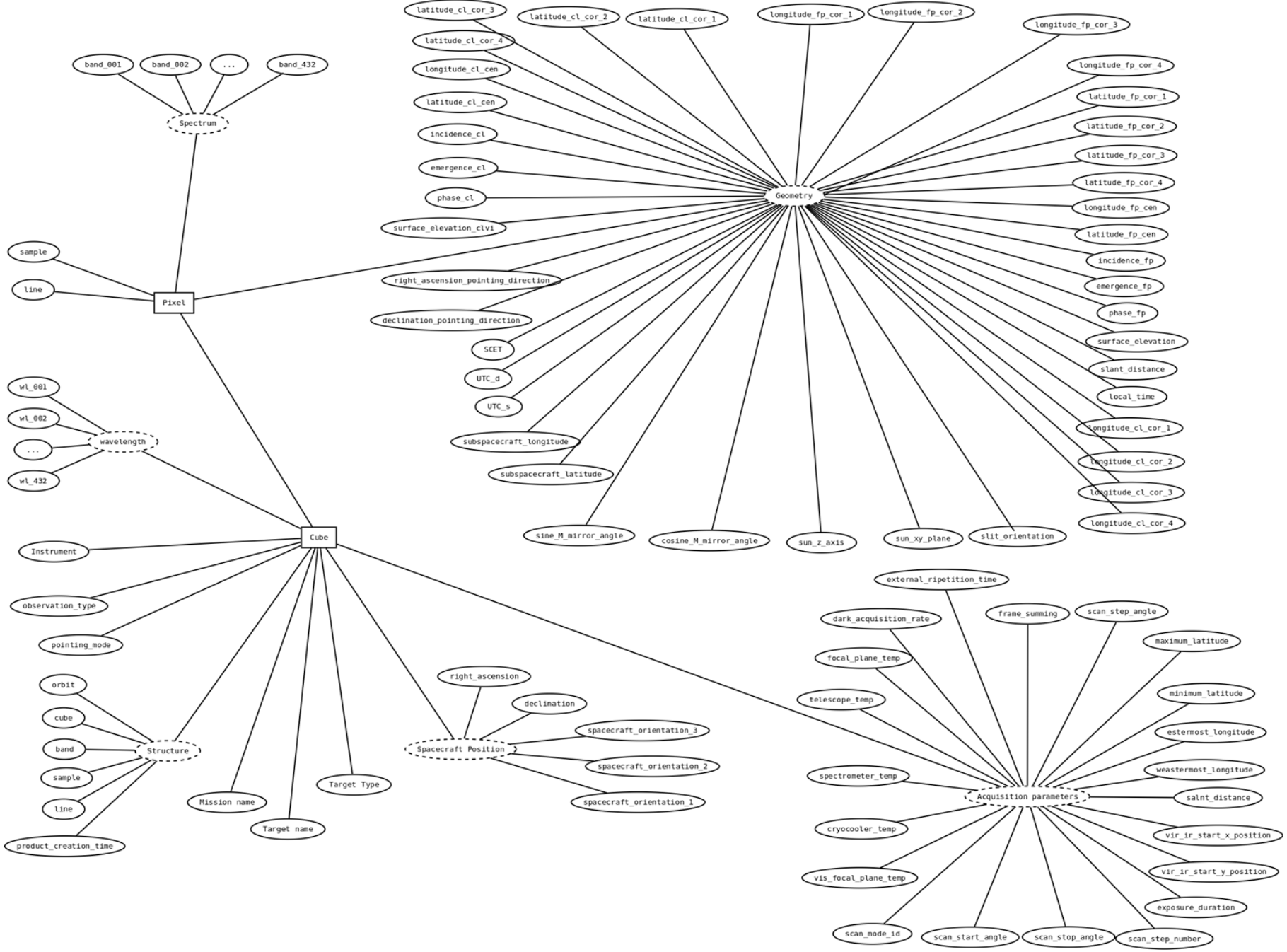
The first version was delivered in 2010 and it provides the Venus-Express VIRTIS files

The main feature was

- performing a selection on the PDS label parameters (PDS3)
- performing a selection on the geometry parameters

Return the **data files** or **part of them**

SeaBIRD
E-R Diagram



Search GUI


Cube parameters
Geometry parameters
Housekeeping parameters
Radiance parameters
Mission Parameters
Mission: VENUS EXPRESS Target Type: ANY Target: ANY
Observation Parameters
Channel: ANY Orbit: ANY Cube #: ANY Band: ANY Sample: ANY Line: ANY Product Creation time: ANY Start Time: ANY Stop Time: ANY Spacecraft Clock Start Count: ANY Spacecraft Clock Stop Count: ANY Science Case: ANY
Geometry Parameters
Observation Type: ANY Spacecraft Orientation X: ANY Spacecraft Orientation Y: ANY Spacecraft Orientation Z: ANY Pointing Mode: ANY Declination: ANY Right Ascension: ANY Maximum Latitude: ANY Minimum Latitude: ANY Esternmost Longitude: ANY Westernmost Longitude: ANY Slant Distance: ANY
Instrument Parameters
Instrument Mode: ANY Quality ID: ANY Compression Rate: ANY Compression Ratio: ANY Start X Position: ANY Start Y Position: ANY Scan Mode: ANY Scan Start Angle: ANY Scan Stop Angle: ANY Scan Step Angle: ANY Scan Step Number: ANY Exposure: ANY Frame Summing: ANY External Repetition Time: ANY Dark Acquisition Rate: ANY Frame Acquisition Rate: ANY Internal Repetition Time: ANY
Temperature Parameters
Focal Plane Temperature: ANY Telescope Temperature: ANY Spectrometer Temperature: ANY Grating Temperature: ANY Prism Temperature: ANY Cryocooler Temp: ANY
Show Fields
Show Query
screen
file
Submit
Reset

SeaBIRD 2.0

Database generalization.

Included data from **Rosetta VIRTIS** and **DAWN VIR**

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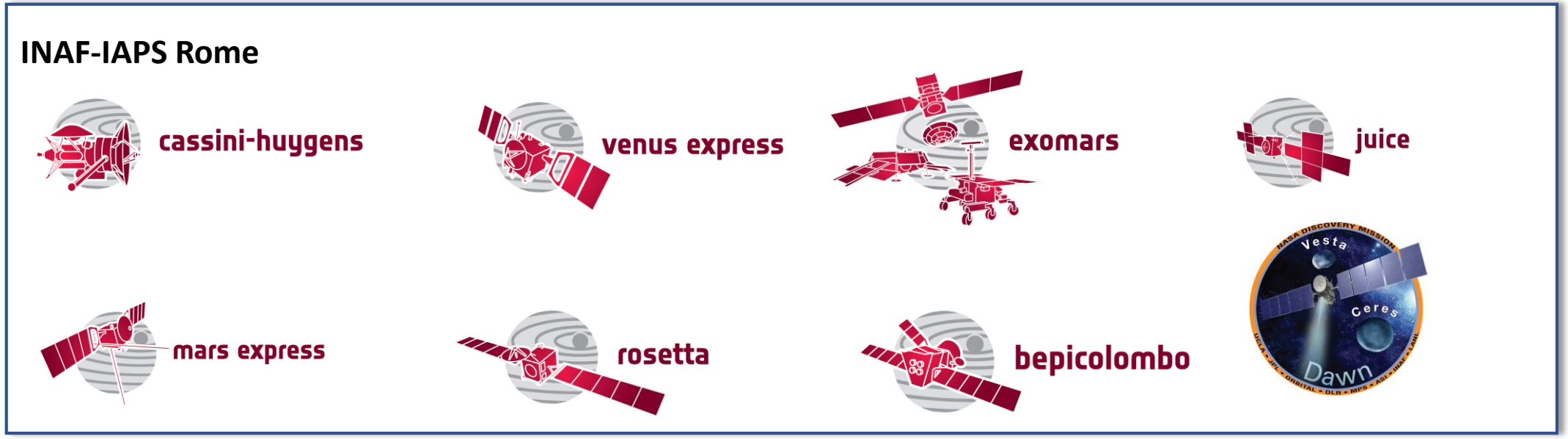

SeaBIRD 3.0 The present

We are reengineering the infrastructure.

- Changing scope

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Search  Filter

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  Search → Filter

- Changing language

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  Web Page → webApp/DaaS

From Search Engine to Filter

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"A **Search Engine** is an *information retrieval system* designed to help find information stored on a computer system."

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SeaBIRD, starting from a **data collection**, create a **new dataset** available for the **download / computation / attach**

Changing Language

Why Python?

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- Open source
- High versatility
- Efficient code
- Universal

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Using the **django framework** we use the same language for the interface and the processing

The SeaBird Flow

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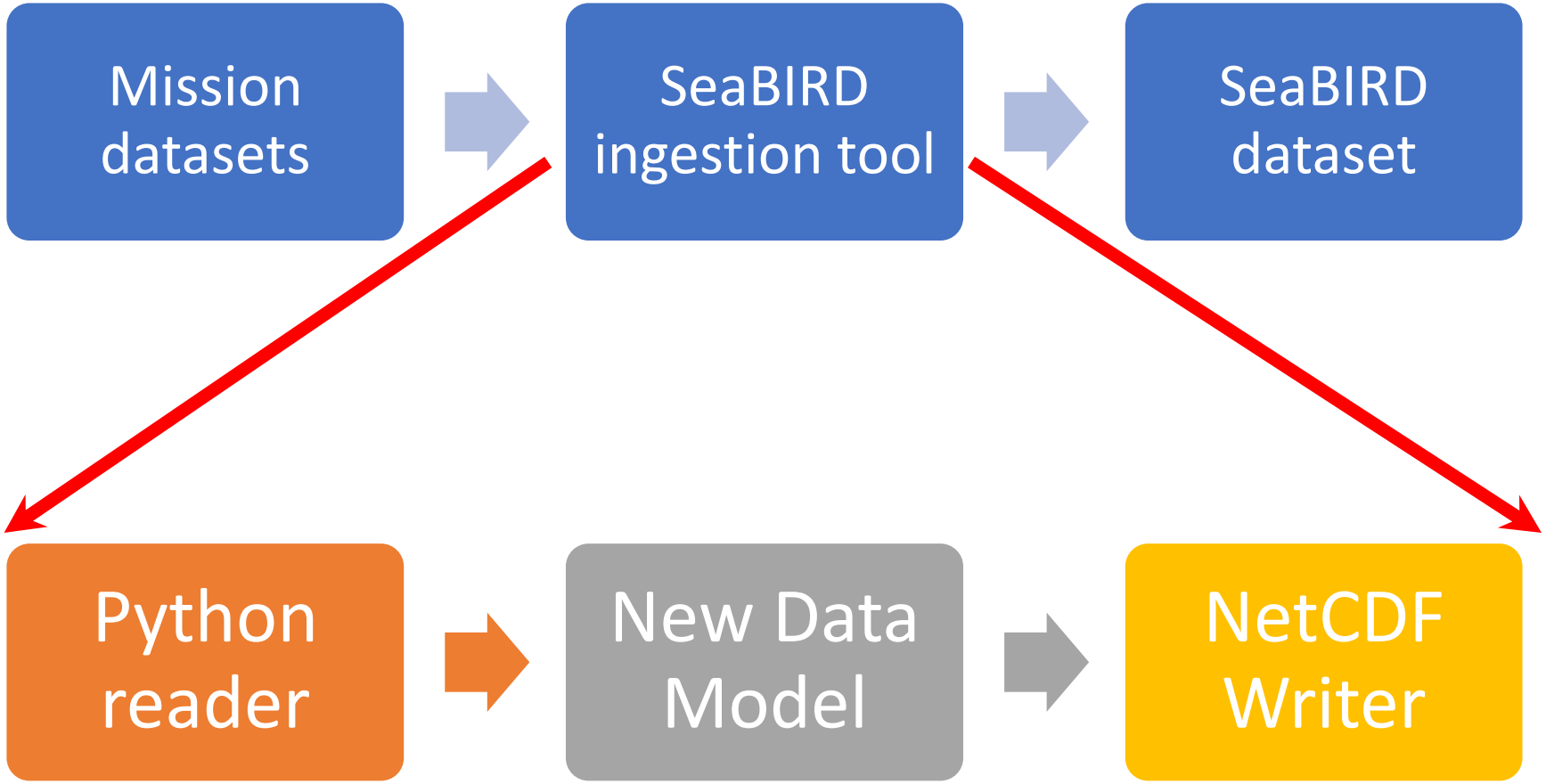

Python readers

Are a sub products of the SeaBIRD project.

Could be useful also in other project.

We are testing **VIRTISpy** reader for the instruments VIRTIS (M and H) on board the missions Venus Express and Rosetta.

https://github.com/VIRTIS-VEX/VIRTISpy

Is under develop the reader for instrument VIR on board the mission DAWN.

Why NetCDF

NetCDF is a set of software libraries and self-describing, machine-independent data formats that support the creation, access, and sharing of array-oriented scientific data.

Why NetCDF (1/3)

NetCDF is a set of **software libraries** and **self-describing**, **machine-independent** data formats that support the creation, access, and sharing of array-oriented scientific data.

The conversion of the VIRTIS-M VEX started for the project PlaNetCDF.

http://planetcdf.iaps.inaf.it)

Study of a new data model for the planetary data for the short or medium preservation (working copy)

Why NetCDF (2/3)

In one file all the information.

All the info are linked and structured:

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dimensions:
Bands = 432 ;
Samples = 64 ;
Lines = 78 ;

Why NetCDF (2/3)

In one file all the information.

All the info are linked and structured:

```
dimensions:
        Bands = 432 ;
        Samples = 64 ;
        Lines = 78 ;
variables:
        float qube(Lines, Samples, Bands) ;
                qube:long_name = "Radiance" ;
                qube:short_name = "Rad." ;
                qube:valid_range = 0.f, 4.357592f ;
                qube:units = "W/m^2/sr/micron" ;
                qube:_CoordinateSystems = "lat-lon lat-GeoX" ;
        float Latitude(Lines, Samples) ;
                Latitude:long_name = "Latitude" ;
                Latitude:short_name = "Lat." ;
                Latitude:valid_range = -90.f, 90.f ;
                Latitude:units = "degree" ;
                Latitude:_CoordinateAxisType = "Lat" ;
        float Bands(Bands) ;
                Bands:long_name = "Wavelength" ;
                Bands:short_name = "Wave" ;
                Bands:units = "micron" ;
```

Why NetCDF (3/3)

Possibility to grouping the info/variables

```
group: Geometric\ Info {
  variables:
        float Surface_Elevation(Lines, Samples) ;
                Surface_Elevation:long_name = "Surface Elevation" ;
                Surface_Elevation:short_name = "SurfElev" ;
                Surface_Elevation:units = "Km" ;
        float Slant_Distance(Lines, Samples) ;
                Slant_Distance:long_name = "Slant Distance" ;
                Slant_Distance:short_name = "SlantDist" ;
                Slant_Distance:units = "Km" ;
```

From Web page to Web App /DaaS

The Web Page perform a selection for the download.

The Web App create a new dataset real or virtual. This dataset could be used by a computation dataset or as DaaS (Data as a Serivce).

You can mount the dataset as a disk in your computation infrastructure (classical or cloud infrastructure) or attach the DaaS to a SaaS (Software as a Service).

SeaBIRD in the Cloud

From this point of view SeaBIRD move the data to the cloud technology

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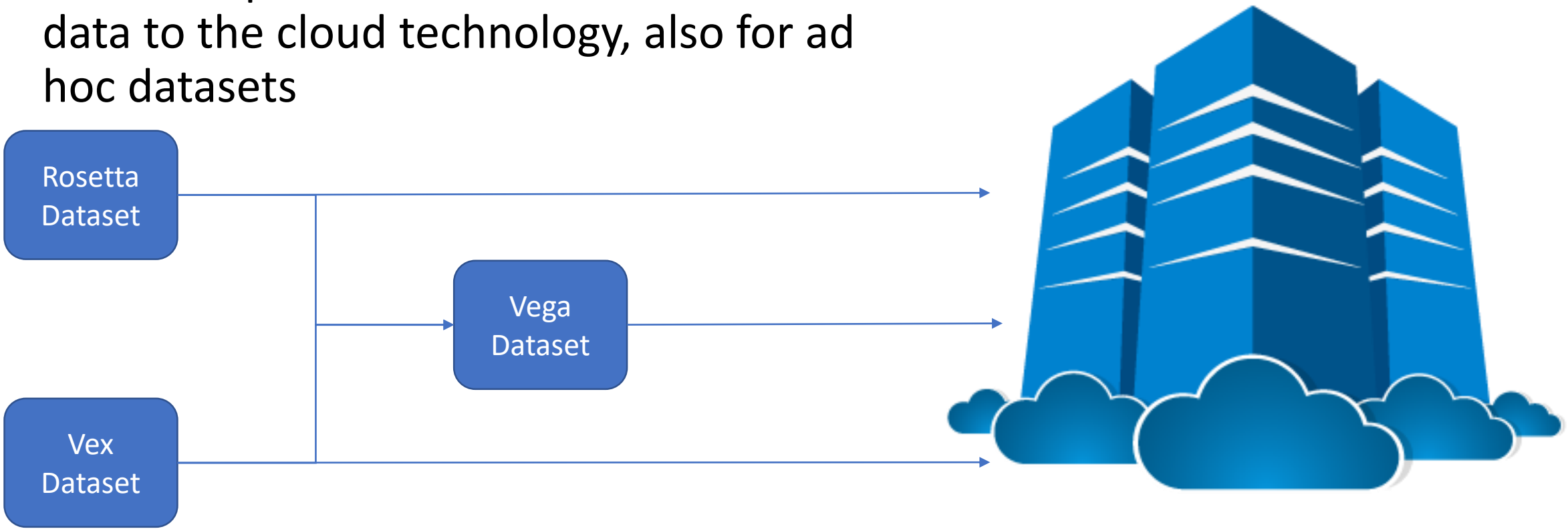
Rosetta Dataset

Vex Dataset

SeaBIRD in the Cloud

From this point of view SeaBIRD move the data to the cloud technology, also for ad hoc datasets



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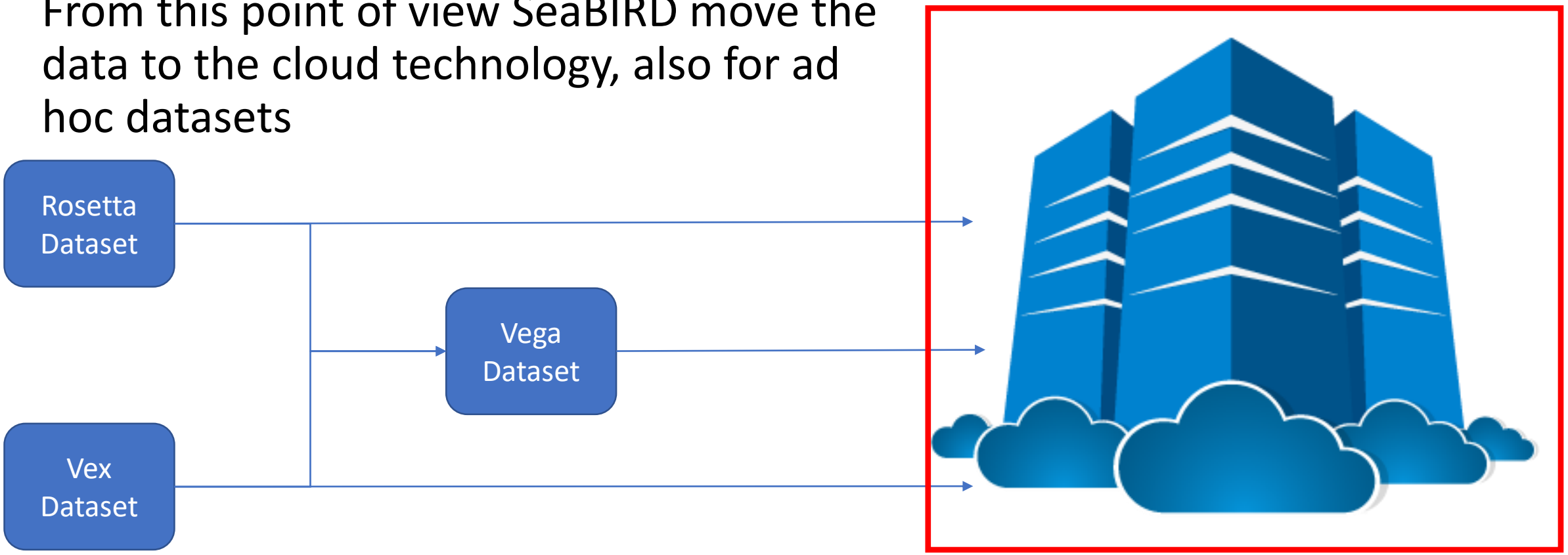

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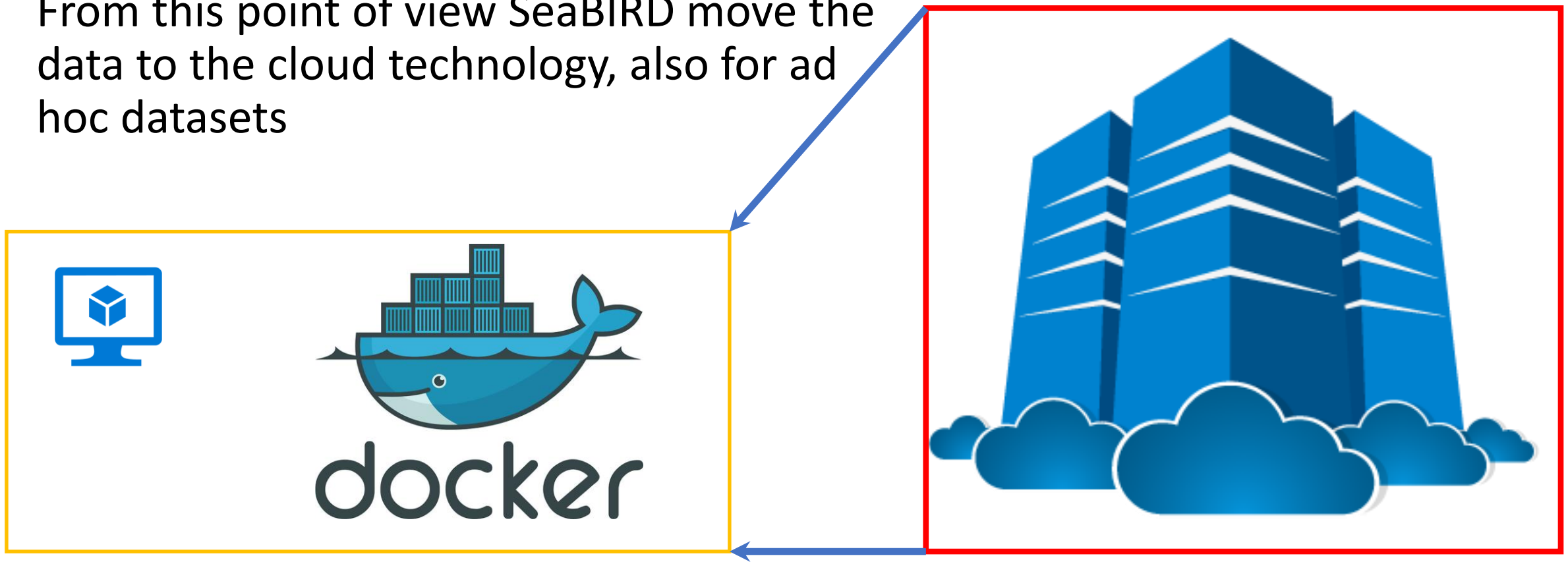

Road Map

- Data Model
  - ✓VIRTIS VEX (M) data model ready – data available in NetCDF on PlaNetCDF
    - ➢ http://planetcdf.iaps.inaf.it
  - ❑ VIRTIS Rosetta (M) data model under develop
  - ❑ Laboratory data data model under develop – examples on Exact web App
    - ➢ http://exact.iaps.inaf.it
- Interface
  - ❑ Alpha release ready – under debug
  - ❑ API for software integration – under debug

Road Map

- Access Policy
  - ❑ Access for download – Registration for statistics and data tracing;
  - ❑ DaaS – under discussion;
- Integration with other SW
  - ❑ VESPA – Integration plug-in under definition;
  - ❑ MATISSE – Under definition the parameters for the integration layer.

DELIVERY

Version 1.0RC1 will be delivered in the first half 2019

(after the BepiColombo NE operaions)


Thank You
For the actention