



## 1. Context

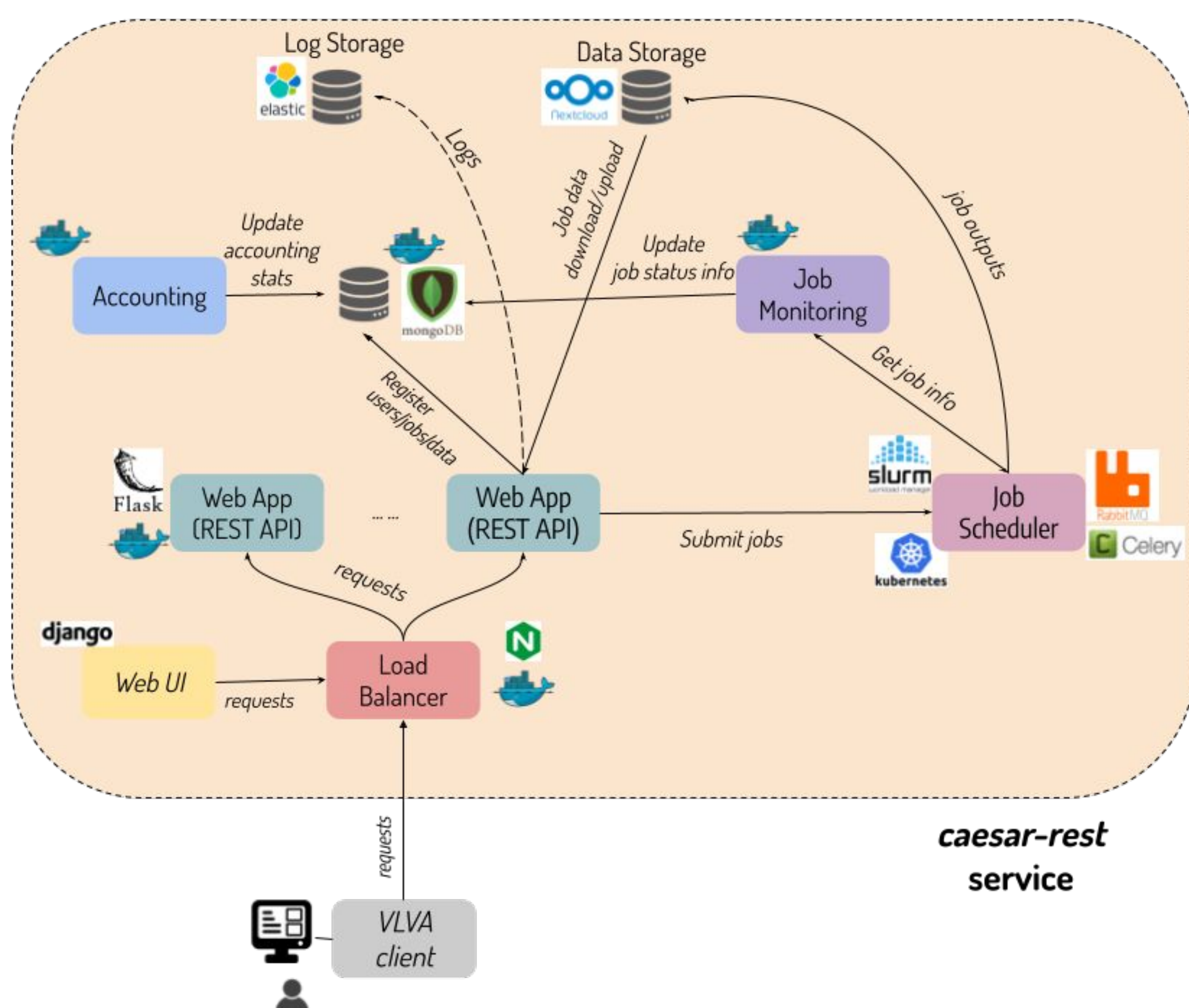


Credits: SKAO

**SKA: the world's largest and most sensitive radio observatory!**

- **SKA is currently in construction phase**
- **Advanced Data Products generation is a major challenge for SRCs**
  - Issues: increased data volume size, lack of tools, knowledge gaps
  - ADPs produced by science users and SKA Regional Center (SRC) staff
  - Requiring interactive visualisation and comparison to other data
  - Subjected to provenance/reproducibility policies and IVOA standards
- **Several science use cases being analyzed by SRC WGs**
  - Focusing on SKA science cases from Galactic science perspective

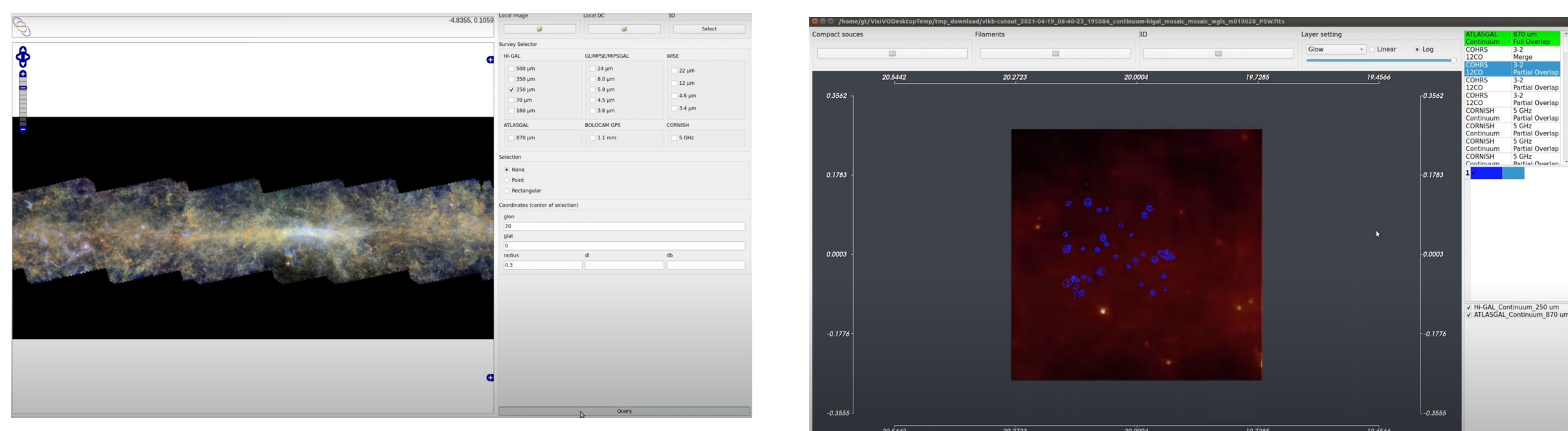
## 3. SFinder Services



### A Flask-based service for running CAESAR source finding jobs

- Deployed on GARR Kubernetes cluster (NEANIAS) + CIRASA resources
- Run strategies: Kube/Slurm Jobs (Docker, Singularity), Celery async tasks
- Integrated with NEANIAS EOSC services (AAI, Logging, Accounting)
- Supported applications (CAESAR, ASGARD, CUTEX, Aegean), others being integrated
- Integration with *ViaLactea* visualization client ongoing
- Available on the EOSC marketplace, accessible from Django web UI

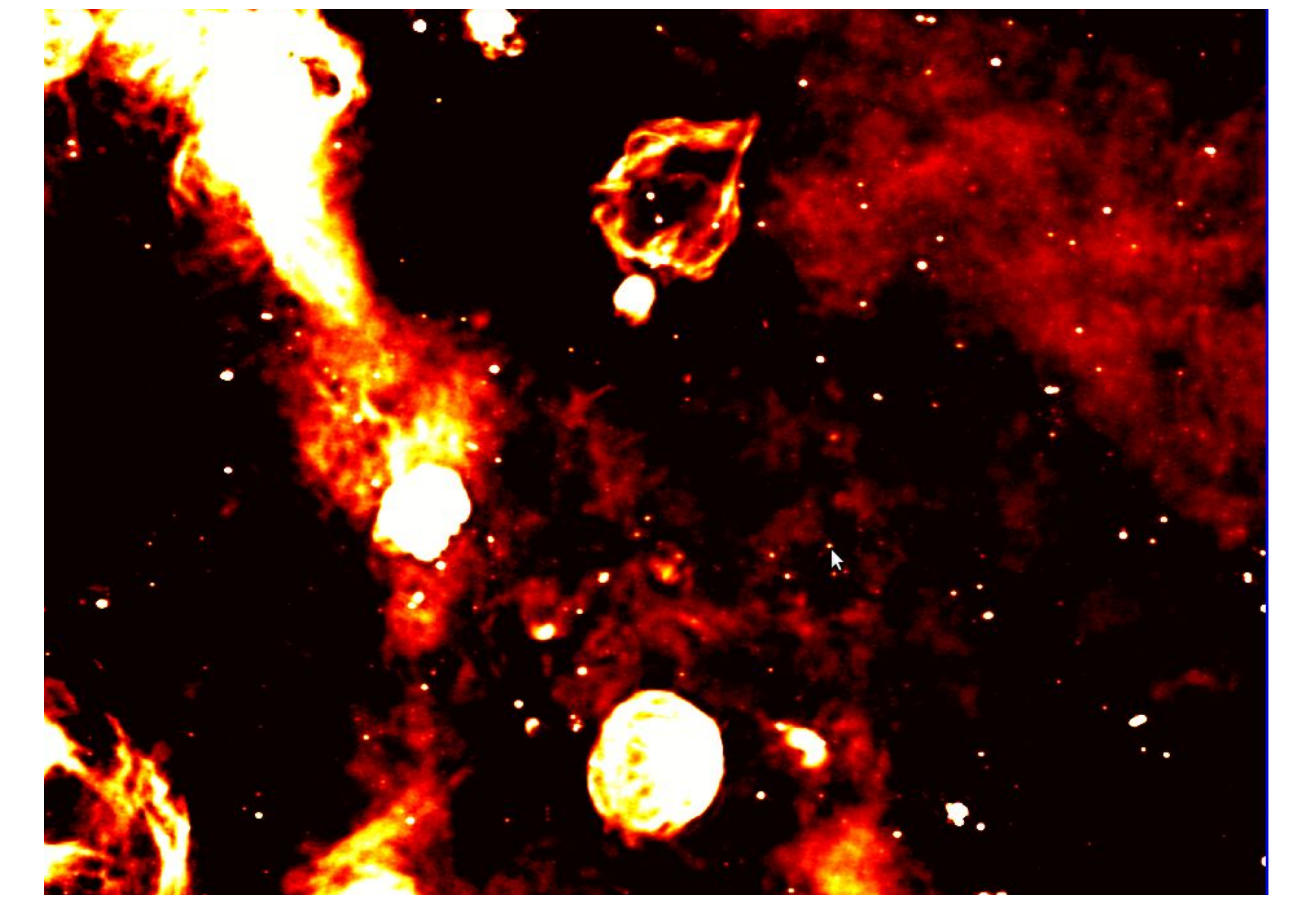
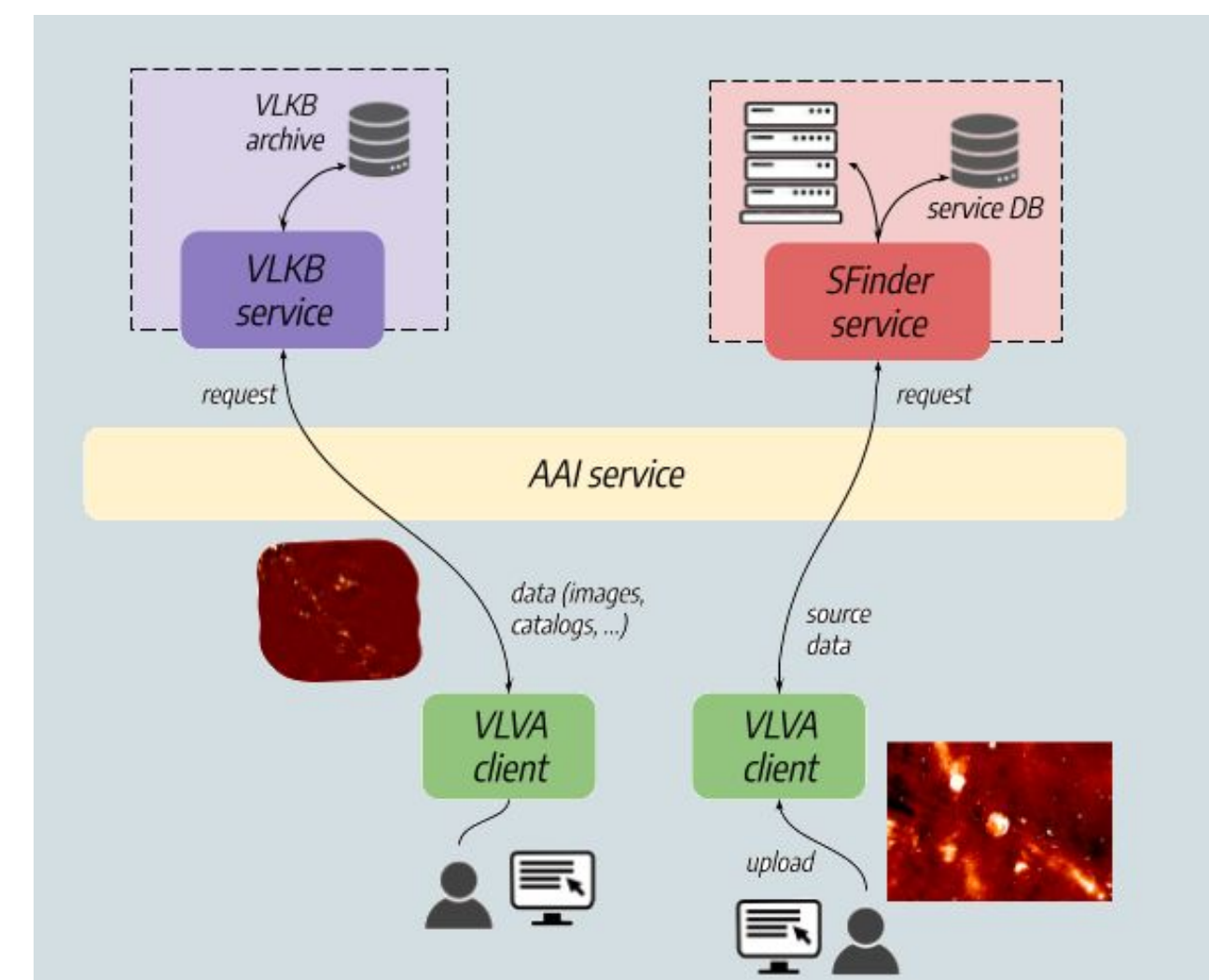
## 5. Visualization Tools (VLVA)



- **A desktop QT application for:**
  - visualization of 2D/3D data (vol. renderings, slices) (local or VLKB)
  - Sed fitting through remote or local services
  - Source extraction through SFinder remote services, source visualization and manipulation/filtering
- Developments ongoing for efficient offscreen visualisation on remote server

→ See G. Tudisco's poster

## 2. The CIRASA Project

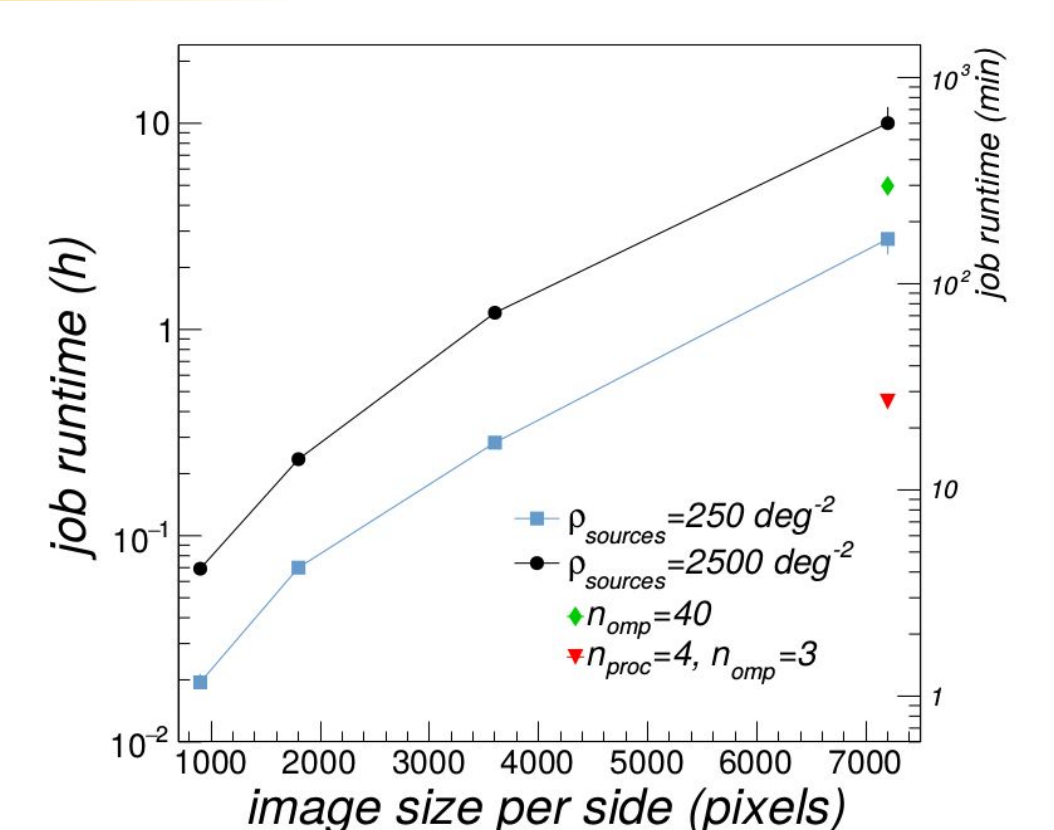


- **Tech goals**
  - Develop a visual analytic platform through integration of source finding (SFinder), visualization (VLVA), and knowledge base (VLKB) services
  - Develop and integrate new ML-based source finders in the platform
  - Develop proto SRC solutions, scalable to larger infrastructures
- **Science/Data processing goals**
  - Post-processing of ASKAP EMU & MeerKAT GPS data
  - Speed-up the source cataloguing process for SKA

## 4. SFinder Applications

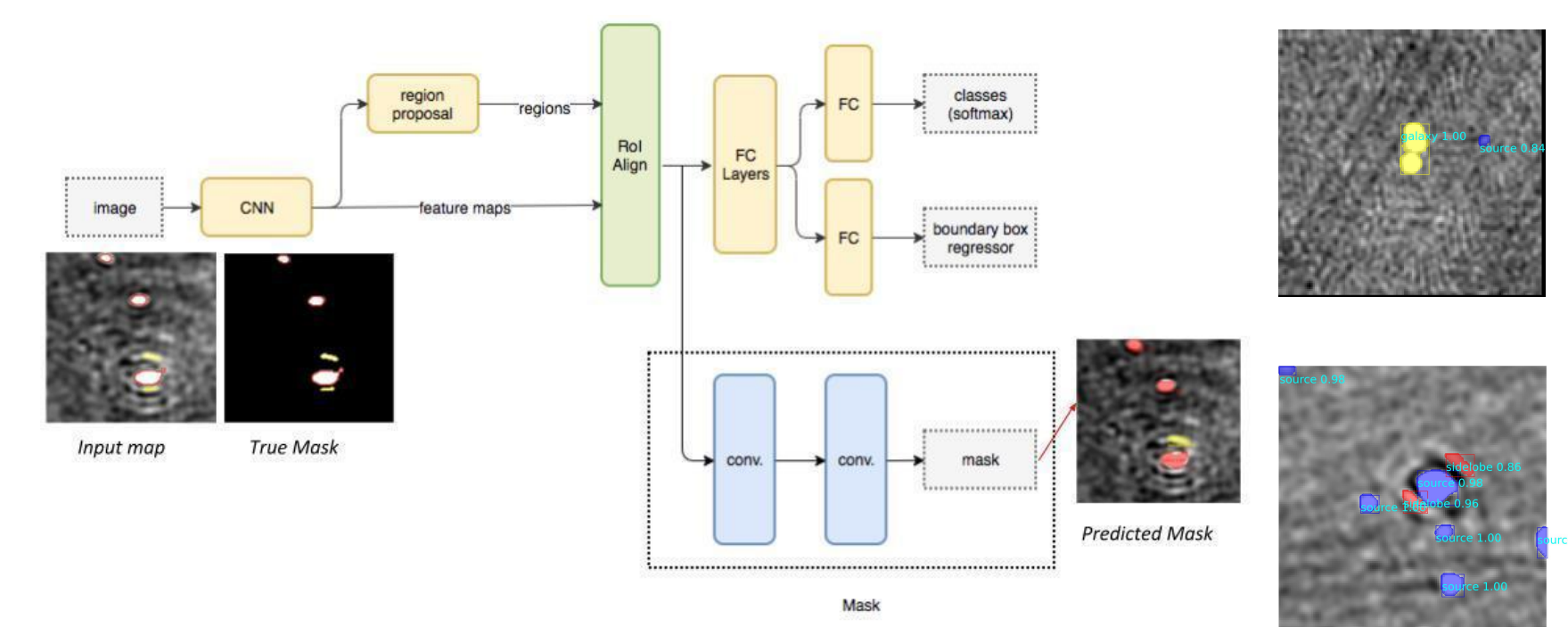
### CAESAR

- Providing algorithms for both compact & extended sources
- Parallel processing (OpenMP + MPI)
- Integrated with SFinder service & VLVA client
- Similar tools (AEGEAN, CUTEX) also integrated



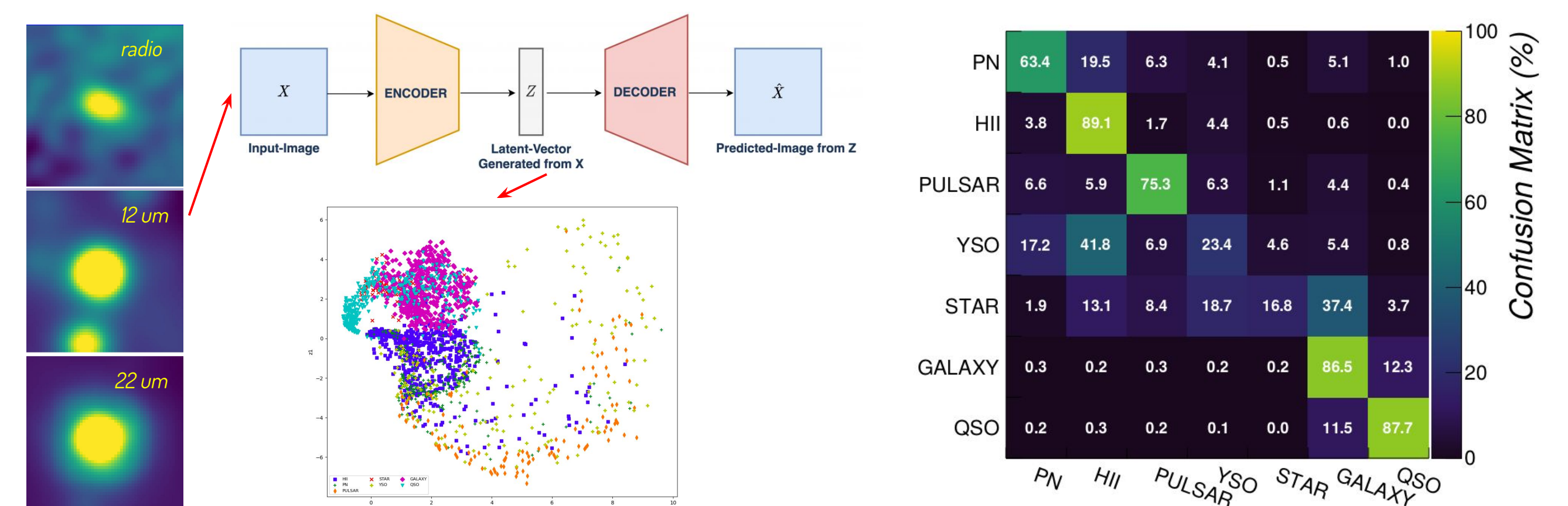
### ASGARD

- Based on Mask R-CNN framework
- Detection and classification of point-sources, sidelobes and extended sources
- Trained on different survey images
- MPI parallel version in alpha version



### COMPACT SOURCE CLASSIFIER

- identify compact Galactic vs extragal. objects, and individual Galactic classes
- discover unexpected or anomalous objects
- employing radio & IR data at different wavelengths
- using several ML methods (autoencoder, advanced decision trees, clustering, iForest)



## 6. Knowledge Base Services (VLKB)

- **A large (2TB+) archive of infrared/radio/molecular survey data and catalogues (compact sources, filaments, numerical SED models) stored in database collections**
  - Provides data access REST services (*search*, *cutout* and *merge*) through a Virtual Observatory (VO) enabled infrastructure (employing the TAP protocol)
  - Fully integrated with VLVA client tool (desktop and web)
  - Secured under Authentication and Authorization Infrastructure (AAI)

→ See M. Molinaro's poster