

# ASTERICS-OBELICS

## contributions to EOSC

Giovanni Lamanna  
LAPP-CNRS

Cambridge, 25 October 2018

Preamble:

**“The consolidation of ESFRI clusters as EOSC thematic platforms, and the articulation of these platforms with the EOSC-hub will be critical for the success of EOSC...”** (*Per Oster – EOSC-hub magazine, issue 2*)

Main topics :

- Articulation of Clusters and EOSC
- Contributions of the ASTERICS-OBELICS results to setting-up the EOSC.
- EOSC mission in the operation phase of large research infrastructures.



- Astronomy ESFRI & Research Infrastructure Cluster  
in response to Horizon 2020 Work Programme INFRADEV-4-2014 Call –  
**“Implementation and operation of cross-cutting services and solutions  
for clusters of ESFRI and other relevant research infrastructure initiatives”**
- Lasting 4 years (1/5/2015-30/4/2019)
- 22 partners in 6 countries:  
ASTRON, CNRS, INAF, UCAM, JIVE, INTA, UEDIN, UHEI, OU, FAU, VU,  
CEA, UVA, UGR, FOM, IEEC, IFAE, UCM, INFN, STFC, DESY, SURFnet.

Focus of ASTERICS: SKA, CTA, KM3NeT; close links to ELT, EGO, LSST.



**Radio**

**Infrared**

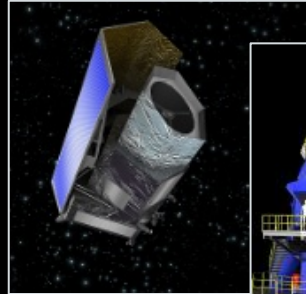
**Visible light**

**X-rays**

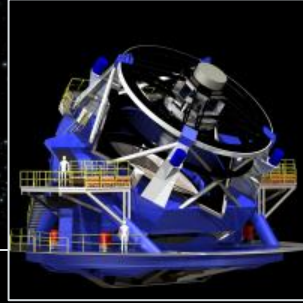
**Gamma rays**



**LOFAR**



**EUCLID**



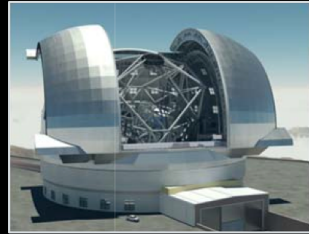
**LSST**



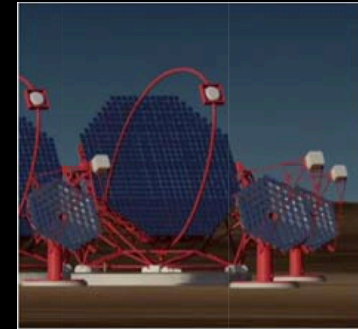
**HESS**



**SKA**



**ELT**



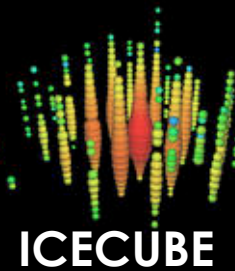
**CTA**

**Gravitational Waves**

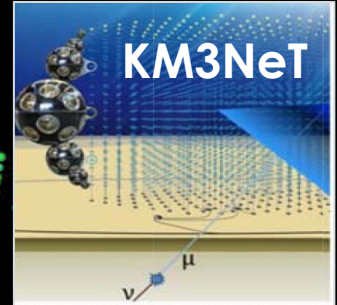


**Cosmic-rays Neutrinos**

**LIGO & VIRGO**



**ICECUBE**

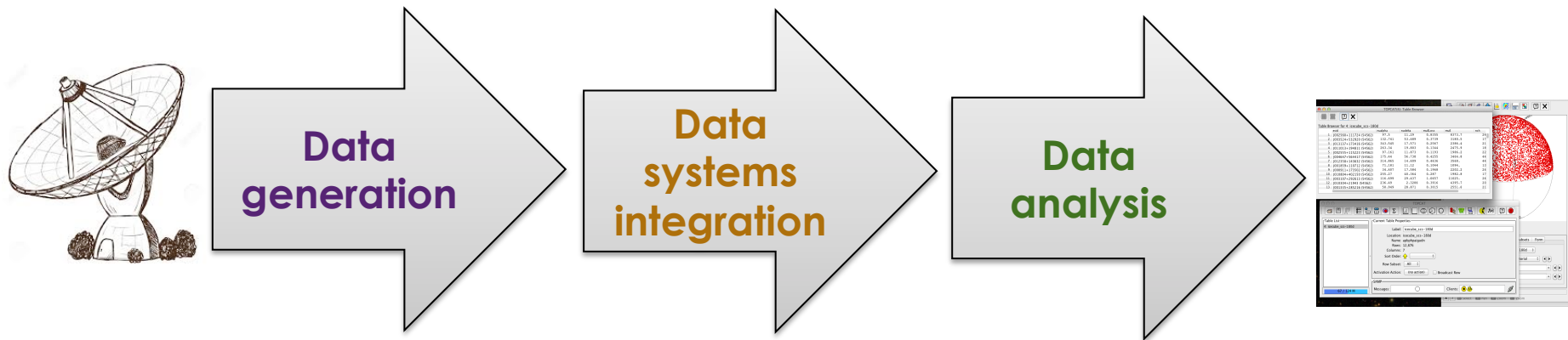


**KM3NeT**



OBELICS targets common ESFRI-projects  
« Data Challenges » in Astronomy and Astroparticle Physics

Building a collaborative framework (scientists and ICT experts) and  
along the data flow from observations to scientific data products.



Twelve international partners cooperating around  
three main steps of data pipelines  
of major ESFRI and world-class projects in Astronomy.

# OBELICS pillars

- Similar/aligned Big-Data challenges in Astronomy and Astroparticle Physics can be addressed through cross-fertilisation approach
- The multi-wavelength scientific analyses and data-interoperability required by researchers imply important common developments.
- Synergies with Data Centres, e-infrastructures, consortia are needed in support of the implementation of ESFRI and world-class projects.
- Training initiatives for scientists involved in these challenges will help to adopt/explore new solutions.
- Industrial cooperation brings professional contributions in software and services development and facilitates innovation.

# Achievements



## Workshops



## Surveys

Project	ESFRI	Field	Type of data
CTA	Yes	Cherenkov observatories for gamma-ray astronomy	Events
H.E.S.S.	Pathfinder for CTA	Cherenkov telescope array for gamma-ray astronomy	Events
MAGIC	Pathfinder for CTA	Cherenkov telescope array for gamma-ray astronomy	Events
KM3NeT	Yes	Neutrino telescope	Events
IceCube	Pathfinder for KM3NeT	Neutrino telescope	Events
ANTARES	Pathfinder for KM3NeT	Neutrino telescope	Events
ELT	Yes	Ground-based optical/near-infrared telescope	Images
LSST	No	Optical telescope	Images
EUCLID	No	Satellite mission to map the dark Universe	Images
SKA	Yes	Radio telescope arrays	Signals
e-EVN	Pathfinder for SKA	e-VLBI network for radio astronomy	Signals
LOFAR	Pathfinder for SKA	Radio interferometric array	Signals
Advanced LIGO	No	Gravitational wave detectors	Signals
Advanced Virgo	No	Gravitational wave detector	Signals

Table 1: Projects included in this data format survey. Observatories are classified according to the type of data that they produce.

## Cooperation with enterprises



## Software repository

## Schools



### WELCOME TO THE OBELICS REPOSITORY

OBELICS activities aim at encouraging common developments and adoption of common solutions for data processing, archive, analysis and access among ESFRI and world class projects in Astronomy and Astroparticle Physics, such as CTA, SKA, KM3NeT, EUCLID, LSST, EGO-Virgo, E-ELT. This website contains the main developments of the OBELICS workpackage in three different areas involving:

- **Task 3.4 Data Analysis Interpretation (D-ANA)**: The ASTERICS/OBELICS/D-ANA task is developing software libraries for statistically robust analysis of Petabyte-scale datasets in astronomy. The primary outputs of this task are these software libraries which are all released as open source software. The primary purpose of this page is to act as the canonical and long-term repository for released versions of these libraries so that they remain permanently available to the public.
- **Task 3.3 Data systems INTegration (D-INT)**: The task D INT aims at studying the challenges in the data management of the large ESFRI infrastructures. A non-exhaustive list of those challenges could be the data transfer, the data storage and preservation and their data retrieval in large databases.
- **Machine learning**: This section will be soon updated with the ASTERICS latest development in Machine Learning.

The OBELICS Repository does not require registration: users can browse through the repository and download softwares without registering.

FOLLOW US ON FACEBOOK

Tweets by @asterics2020



<http://repository.asterics2020.eu/>

The ASTERICS-OBELICS repository has a threefold purpose:

- Collection of new software for scientific analysis (potentially of transversal application)
- Software services / middleware either originally developed, customized or simply in use in the RIs.
- A flexible project web platform to collect software under development, including lessons learned, publications and forums for discussions.

Future plans exist (e.g. ESCAPE) to sustain the repository.

Its sustainability should be part of the EOSC mission.

Expected commitment from the community depends on EOSC engagement.

- Implementing Science Analysis Platforms for EOSC researchers to stage data collections, analyse them, access ESFRIs' software tools, bring their own custom workflows.
- Supporting “scientific software” as a major component of ESFRI data to be preserved and exposed in EOSC through dedicated catalogues.
- Implementing a community foundation approach for continuous software shared development.
- Further involving SMEs and society in knowledge discovery.
- Training new generation researchers is a key component for the success of the cluster and EOSC
  - for new services adoption
  - for continuous software development
  - for extending FAIRness standards and tools for data access and preservation.

# More EOSC challenges

Most of the ASTERICS ESFRI RIs are:

- Big-data generators.
- Early adapters of the latest ICT and data-management developments.
- Constantly pushing the envelope of the current state-of-the-art.
- Data Openness and FAIRness are already required by the “Observatory” and “Facility” type of RI operations as well as by the multi-messenger science.

Cluster will commit in EOSC, if the role of EOSC has impact on these ESFRI RI:

- Would EOSC plan and manage investments to guarantee preservation and access to the large volume of ESFRI-RI data ?
- Would EOSC be an open virtual environment aiming to support the cluster transversal cooperative actions, including continuous training, innovation and forums ?
- Will the EOSC and ESFRI clusters synergies be also organized following regional or national missions/roles/centres/operations ?
- Are EOSC rules of engagement adapted and compliant with RI “Observatory” and “Facility” operations rules and services ?

# Thank you !

Acknowledgement:

H2020-Astronomy ESFRI and Research Infrastructure Cluster (Grant Agreement number: 653477).