



***The AC3 project:  
Driving the next generation of European computing infrastructure***

*C. Catalán-Torrecilla, M. Chamorro-Cazorla, S. Pascual, A. Gil de Paz, M. Cividanes, B. Capper, R. Carroll and R. Jenkins.*

*“This project has received funding from the European Union's Horizon Europe Research and Innovation programme under GA 101093129”*



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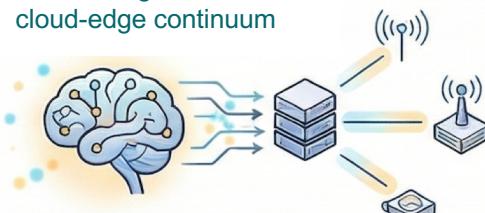
# What is AC<sup>3</sup> ?

## ***'Agile and Cognitive Cloud edge Continuum management'***

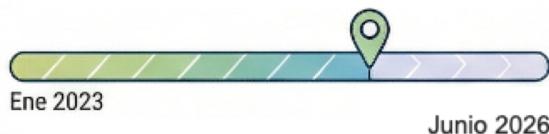


## What is AC3?

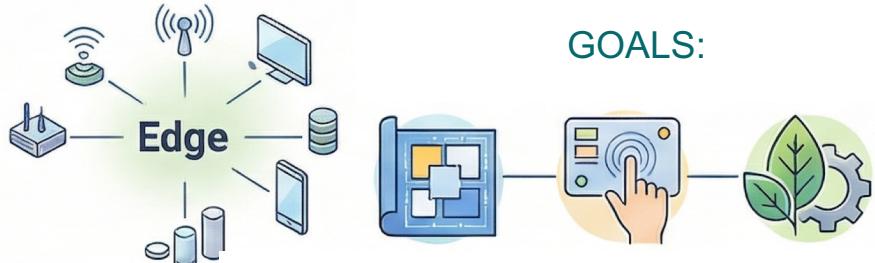
## Smart management of the cloud-edge continuum



Apply IA to predict resource usage & optimize the microservice location



Horizon Europe Research and Innovation Actions (RIA)



To develop a new architecture, zero-touch management and a sustainability-oriented configuration.

HORIZON-CL4-2022-DATA-01-02 - Cognitive Cloud: AI-enabled computing continuum from Cloud to Edge (RIA call). Total budget: 6M €.

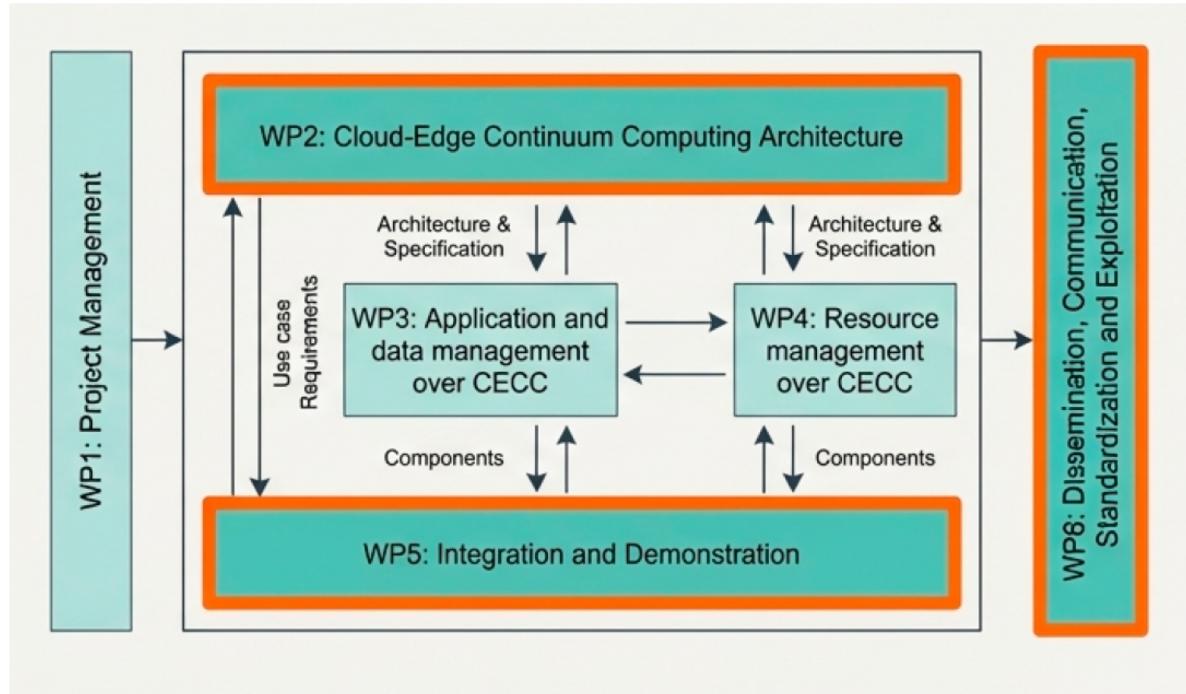
The AC<sup>3</sup> project will employ an AI/ML algorithm to predict CECC resources (i.e., Cloud/ Edge Computing resources, networking, and Data) usage as well as far edge availability, which when combined with application profiles, will help determine the optimal placement of the microservices that will run the application on the CECC infrastructure.

# A European Consortium (Industry + Academy)



Participant organisation name	Short name	Country
Athena	ATH/ISI	Greece
Eurecom	EUR	France
IBM	IBM	Ireland
Citrix	CTX	Greece
Hewlett-Packard Enterprise	HPE	Italy
Hewlett-Packard Enterprise - CDS	CDS	Italy
ARSYS	ARS	Spain
IONOS	ION	Germany
Red Hat	RHT	Israel
Spark Works	SPA	Ireland
Ubitech	UBI	Greece
Fingletek	FIN	Finland
Iquadrat	IQU	Spain
Universidad Complutense de Madrid	UCM	Spain
University of Piraeus Research Center	UPR	Greece

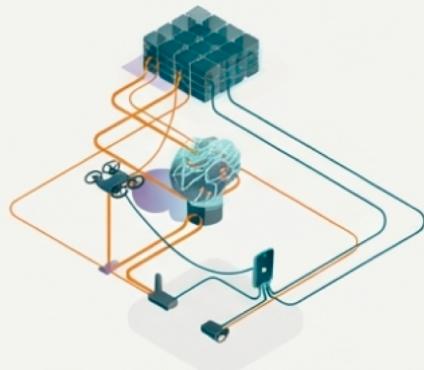
# Work Packages



Contribution: WP2, WP5 & WP6

# Proof of concept: Uses-Cases

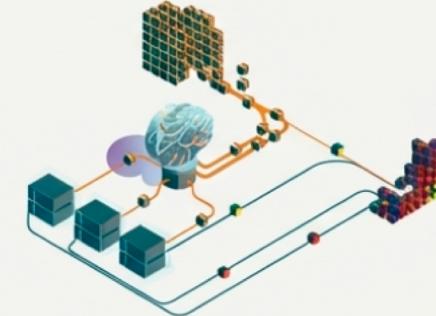
AC3 is validated through three scenarios that test its capabilities across different domains.



Use-Case 1: IoT and Data

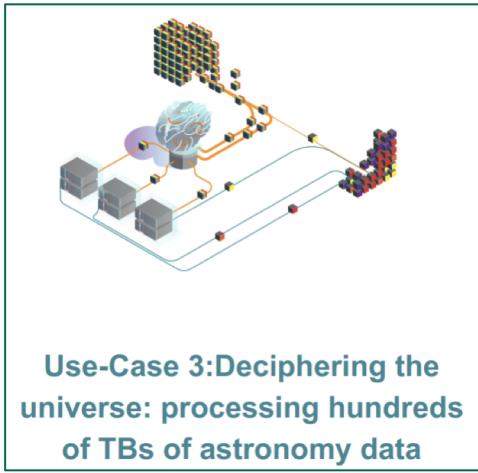


Use-Case 2: Smart Monitoring System using UAV



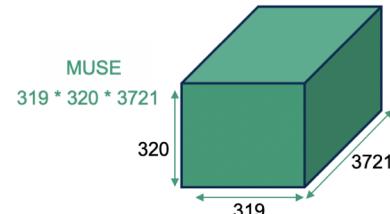
Use-Case 3: Deciphering the universe: processing hundreds of TBs of astronomy data

# Use-Case 3



Use-Case 3: Deciphering the universe: processing hundreds of TBs of astronomy data

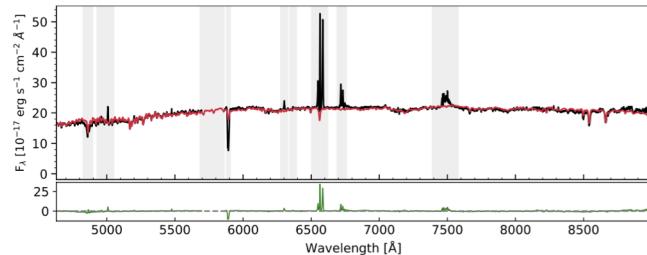
- To demonstrate the CECCM's capabilities to deploy and run astronomical software to process data cubes.
- To integrate scientific applications that will take advantage of hybrid cloud native infrastructures to optimize the computation process.
- To enable the whole astronomy community to accelerate the analysis of the novel data gathered from newer IFS instruments.



More than 100000 spectra per galaxy!!!

Methodology: Full spectrum fitting

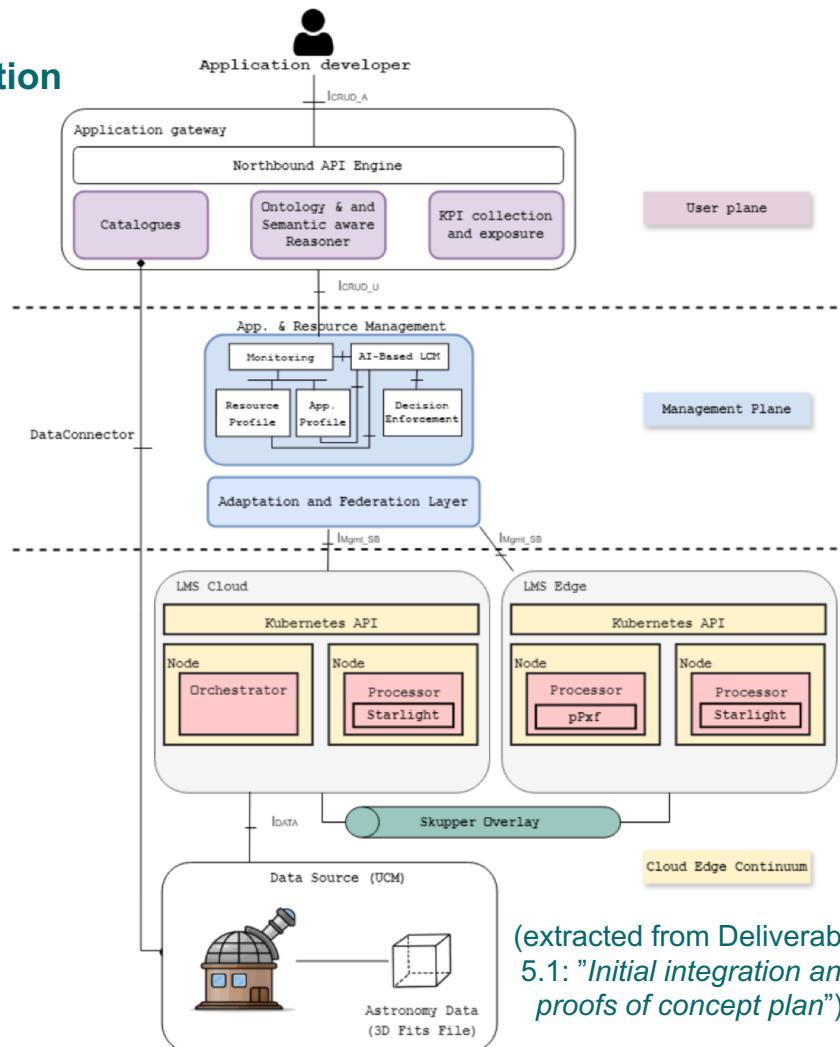
$$M_{\lambda} = \left[ \sum_{j=1}^N x_j b_{j,\lambda} r_{\lambda} \right] \otimes G(v_*, \sigma_*)$$



The architecture of UC3 following the AC3 general architecture paradigm

The UC implementation will make use of a set of containerized specific-use analysis tools to process the data that is distributed by the CECC manager. The tools that will be integrated are different spectral synthesis software assets.

Use Case 3: a multi-disciplinary collaboration between Red Hat & UCM





# GUI Data Management Console

AC3 Pipeline

FILE UPLOAD

SELECT DATASET

NGC7025

Dataset Name (eg: NGC7025)

pPXF Configuration

Redshift: 0.016571 Velocity Dispersion (km/s): 200

Wave Start (Å): 5200 Wave End (Å): 6150

SPS Model: EMILES

Create Cancel

UPLOAD FILES

Drop files here or click to browse

Supports: .fits, .txt, .csv, .log, .in files

FILES LIST

No files selected

Add files using the upload area above

DATASET MANAGEMENT

DATASETS

NGC7025

INPUT

No input available

OUTPUT

No output available

PIPELINE PROGRESS

NGC7025 pPXF

Ready for processing

Ready to start

Ready

The screenshot displays the AC<sup>3</sup> GUI Data Management Console interface. The top navigation bar includes the AC<sup>3</sup> logo, a 'Maps' button, a 'Pipeline' button, and dropdown menus for 'FITS', 'SDSS9', and a search bar containing 'ngc7025'. The main content area shows a star field with several bright stars highlighted by color-coded velocity vectors. A sidebar on the left lists 'AVAILABLE MAPS' (Stellar Velocity, Stellar Velocity Error, Velocity Dispersion, Velocity Dispersion Error, H3, H4), 'STELLAR POPULATIONS' (Age (Lum. Weighted), Age (Mass Weighted), Metallicity), and 'PPXF ANALYSIS' (PPXF Fitting). A 'DISPLAY OPTIONS' section includes a 'Coordinate Grid' checkbox. A detailed 'STELLAR VELOCITY (1)' panel shows a heatmap of stellar velocity with a color scale from blue to red, overlaid on the star field. The bottom status bar shows the mouse position as 'RA 317.0017°, Dec 16.3585°' and provides keyboard shortcuts: F: Format, S: Survey, G: Go to object, and Click: Center & zoom.

AC<sup>3</sup>

Maps Pipeline

FITS SDSS9 ngc7025

AVAILABLE MAPS

KINEMATICS

Stellar Velocity

Stellar Velocity Error

Velocity Dispersion

Velocity Dispersion Error

H3

H4

STELLAR POPULATIONS

Age (Lum. Weighted)

Age (Mass Weighted)

Metallicity

PPXF ANALYSIS

PPXF Fitting

DISPLAY OPTIONS

Coordinate Grid

STELLAR VELOCITY (1)

Stellar Velocity

Mouse: RA 317.0017°, Dec 16.3585°

F: Format • S: Survey • G: Go to object • Click: Center & zoom



<https://ac3-project.eu/>



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