



1st Innovation Day Project Overview

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Rome, 21 June 2022



Rome, 22 June 2022



PITHIA-NRF

Plasmasphere Ionosphere Thermosphere Integrated Research Environment and Access services: a Network of Research Facilities



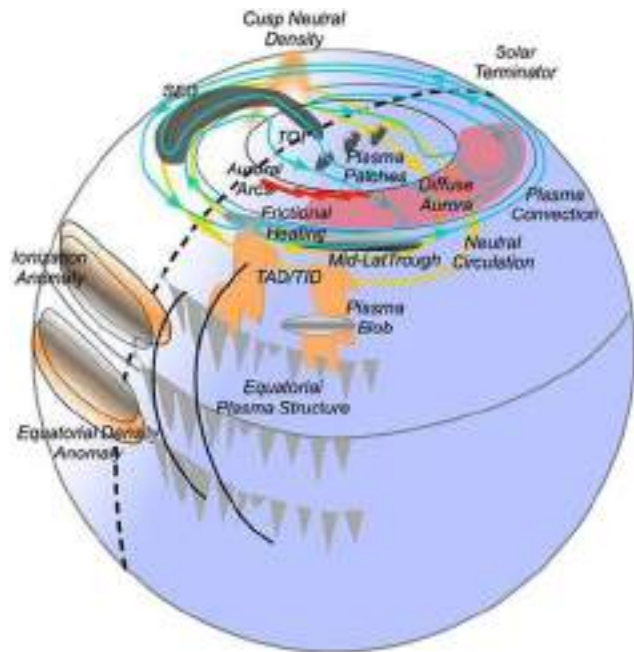
PITHIA-NRF is funded with 5.2M euro for 4 years (2021 – 2025)



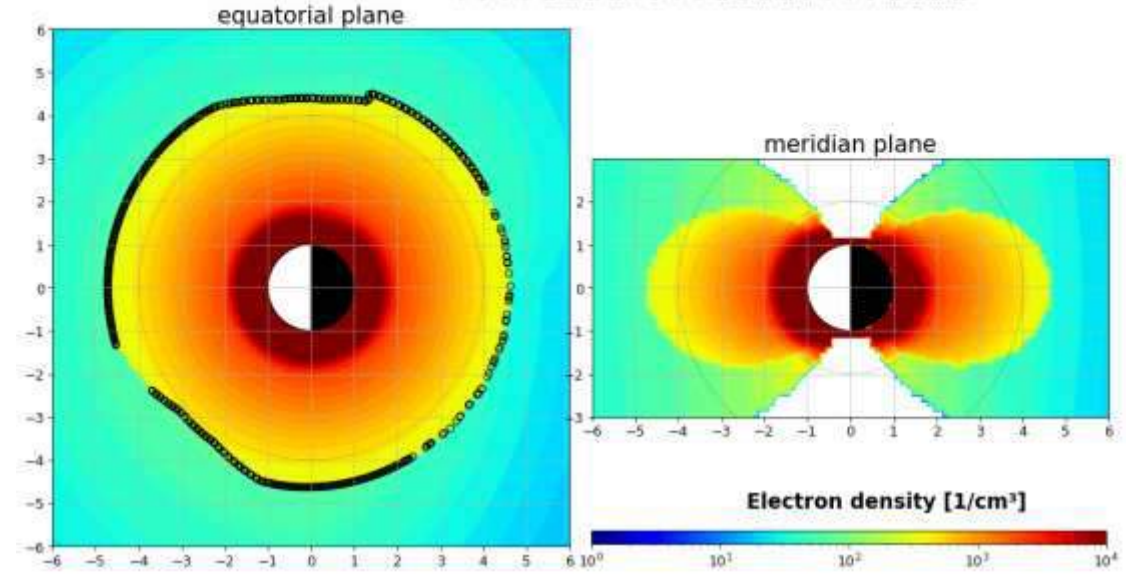
Scientific challenges

The Earth's Ionosphere, Thermosphere, and Plasmasphere is governed by the complex electrodynamic and photochemical system of the upper atmosphere coupled with variable electromagnetic fields and thermospheric winds.

These physical processes are the source of many **scientific, operational, societal, and environmental challenges** that affect the smooth and uninterrupted operation of critical technological systems and of research infrastructures.



While we understand the broad features of the coupled ionosphere thermosphere plasmasphere system response, we lack the depth of understanding of its variability in long- and short-time scales that would allow us to build **models with real predictive power**.



Courtesy: BIRA-IASB



PITHIA-NRF consortium

22 Beneficiaries
2 Third Parties
5 External Advisors



UNIVERSITY OF WESTMINSTER

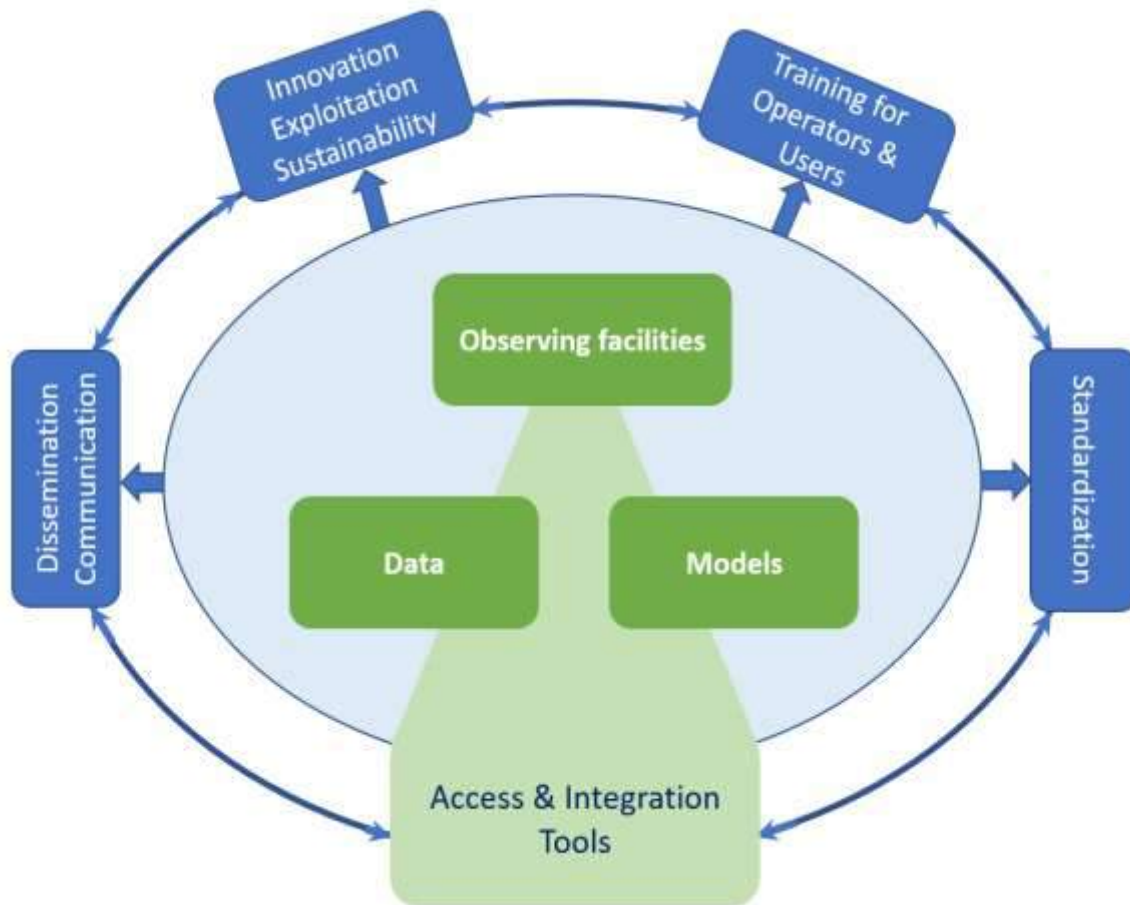


SPACEARTH Technology





Overview & Ambition



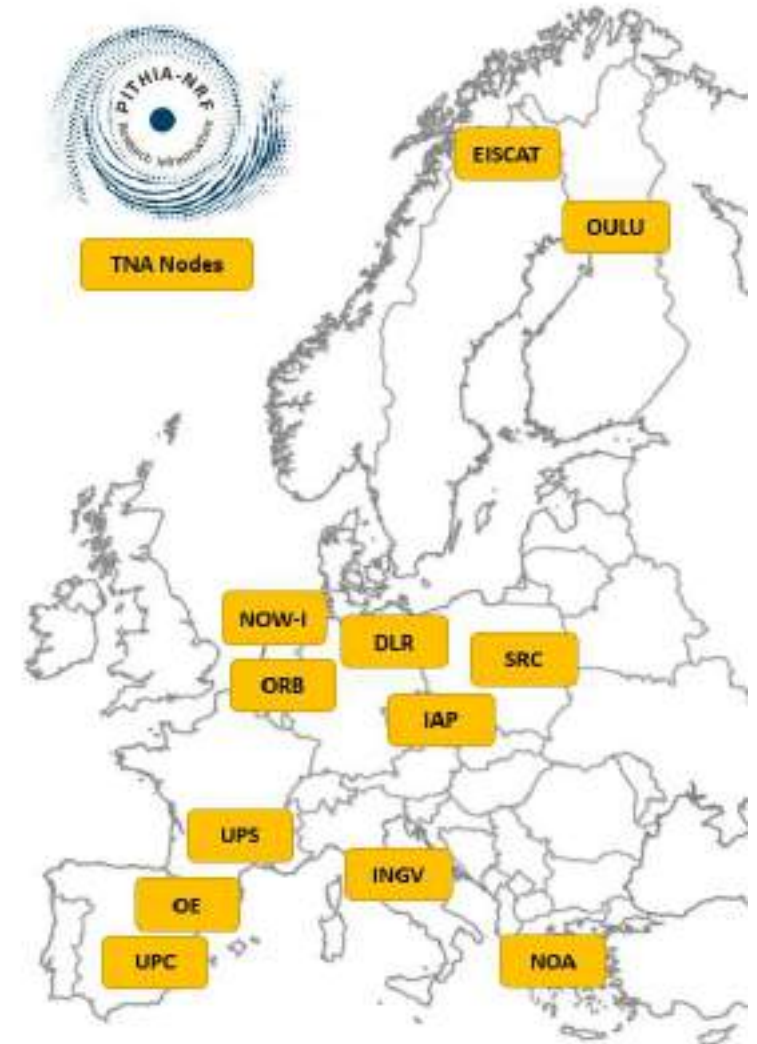
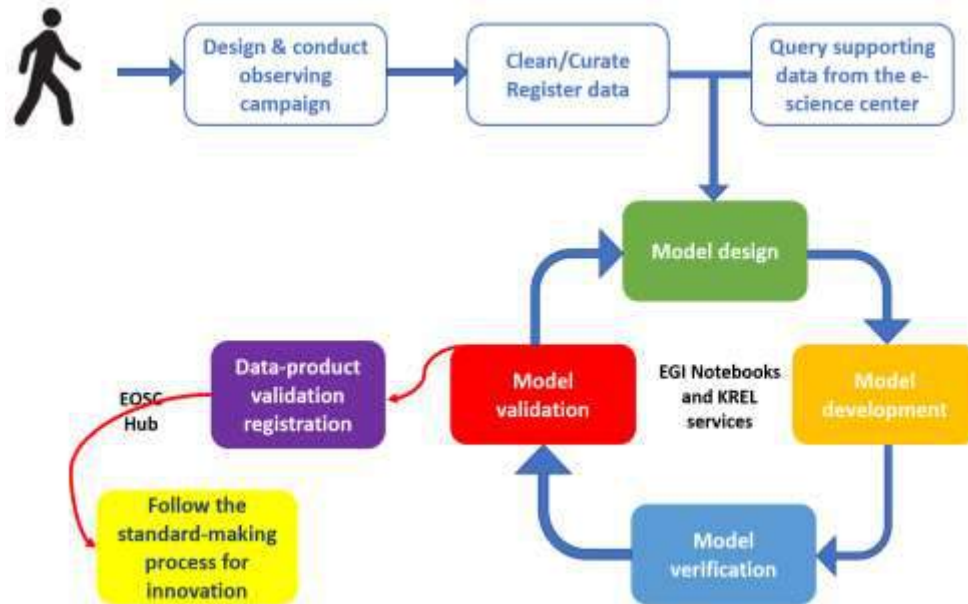
PITHIA-NRF has the ambition to become the European hub that will act as facilitator for coordinated observations, for data processing tools and modelling advances, and for software and data-products standardization; the project will advise on the transitioning of models from research to operations – R2O, providing e-Science supporting tools so that models can reach the desired accuracy and standards.



Specific Objective 1

PITHIA-NRF provides **effective and convenient access** to the best European research facilities (nodes) for the upper atmosphere.

The access is subsidized through the Transnational Access (TNA) programme, and gives the possibility for external research teams to perform their own projects working in the PITHIA-NRF nodes.

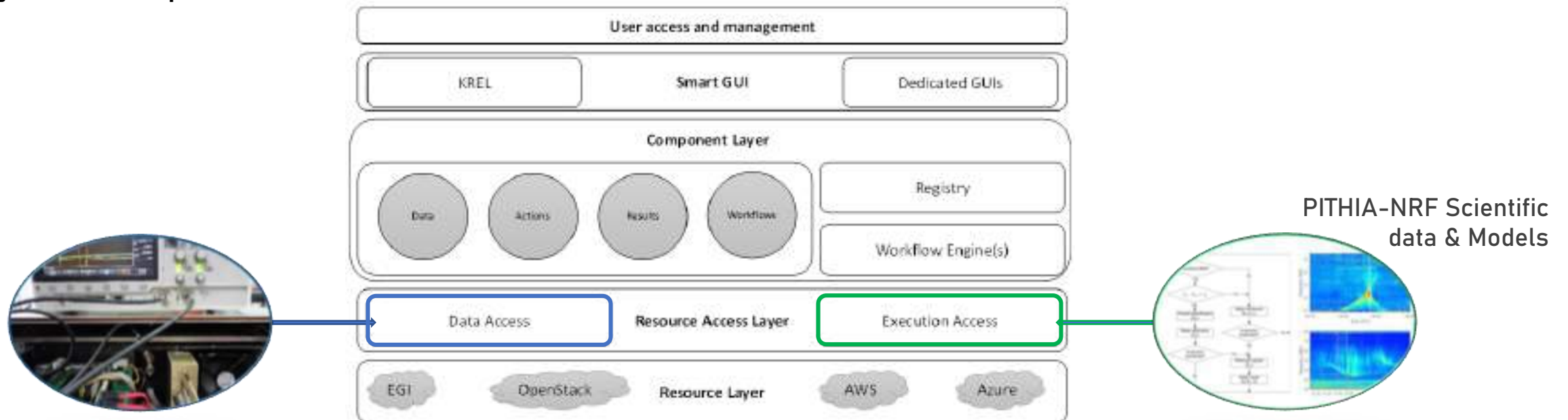




Specific Objective 2

PITHIA-NRF develops **integration tools** that enable the establishment of a comprehensive Research Infrastructure. The integration is achieved **through standardization** using as tools:

- the PITHIA-NRF e-science center, a dedicated knowledge hub for open access to FAIR data and higher-level data-products;
- the workshops for the optimization of observing strategies (WOOS) targeting to the optimal use and joint development of the PITHIA-NRF observing facilities.



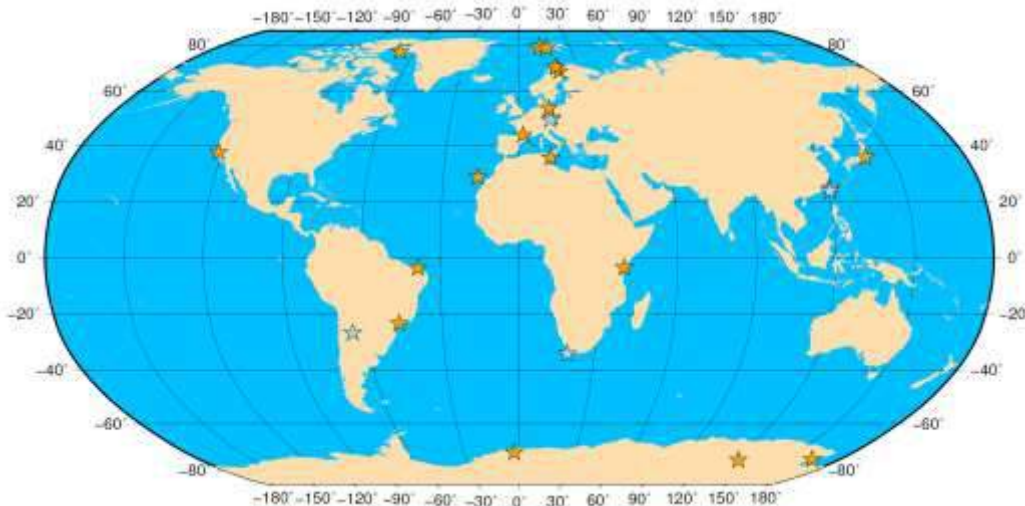
PITHIA-NRF Nodes
Scientific Instrumentation



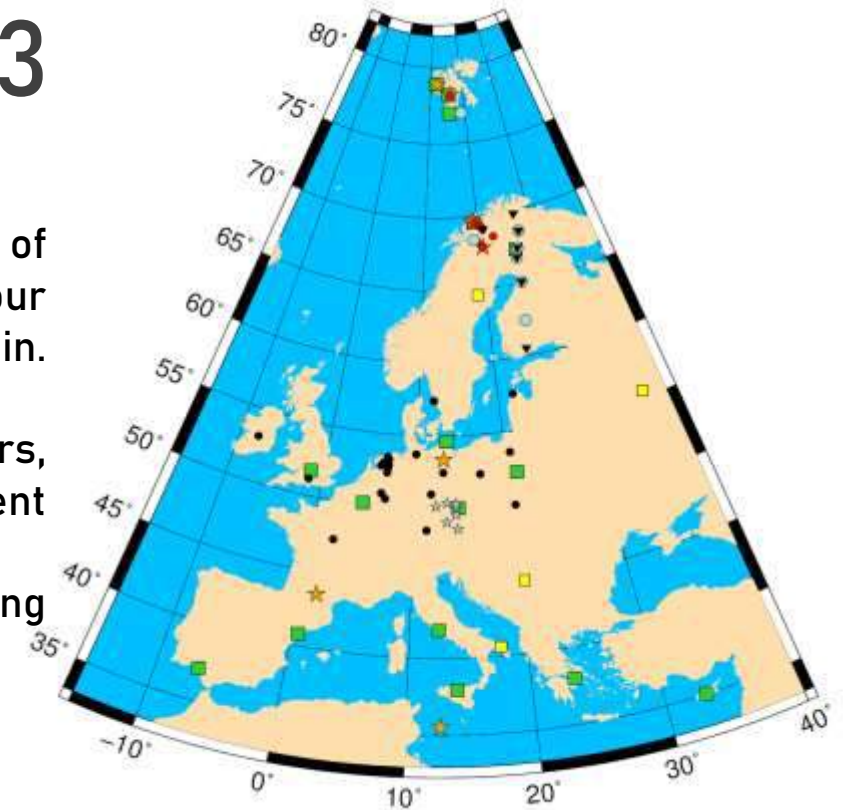
Specific Objective 3

Through connection with the European Open Science Cloud, the e-science center of PITHIA-NRF provides **long-term observational data**, required for advancing our knowledge in the Ionospheric, Thermospheric and Plasmaspheric research domain. Access is provided to:

- data from ground-based instruments (GNSS ground based receivers, Ionosondes, Digisondes, Dynasondes, Doppler Sounders, Incoherent Scatter Radars, Riometers, All Sky Imagers, and the LOFAR radio telescope)
- data from satellite experiments (Radio Occultation and Topside Sounding observations including rockets and cube sat missions).



The World map shows GNSS high sampling rate and CDSS sites only.



- ionosondes with real-time data delivery ■
- ionosondes without real-time data delivery ■
- IAP CDSS transmitters and receivers (on both maps) ★
- INGV + DLR GNSS scintillation receivers (on both maps) ★
- EISCAT transmitters and receivers light blue circles: SGO riometer chain ●
- SGO pulsation magnetometer chain ▼
- LOFAR sites and sites associated with LOFAR ●

GNSS sites of standard networks (such as EUREF and IGS) are too numerous to be shown. The ionosondes (mostly Digisondes) with near real-time data provision are owned or operated by consortium partners or outside the consortium but offer free data access.

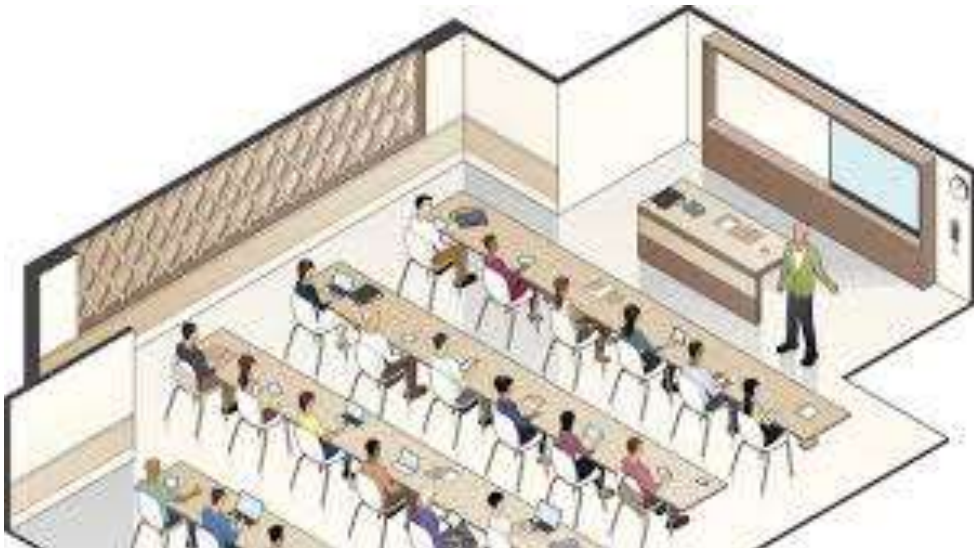


Specific Objective 4



PITHIA-NRF provides **organized and systematic training** on the use of observing facilities and of the integration tools.

- Training towards project partners in the use of integration tools
- Training towards external users, in particular students, scientists from countries with no tradition in space research, engineers from the R&D departments of private companies and large organizations.



- Training is provided through workshops, schools and webinars.
- To get access to PITHIA-NRF nodes, successful participation to on-site sessions is required.



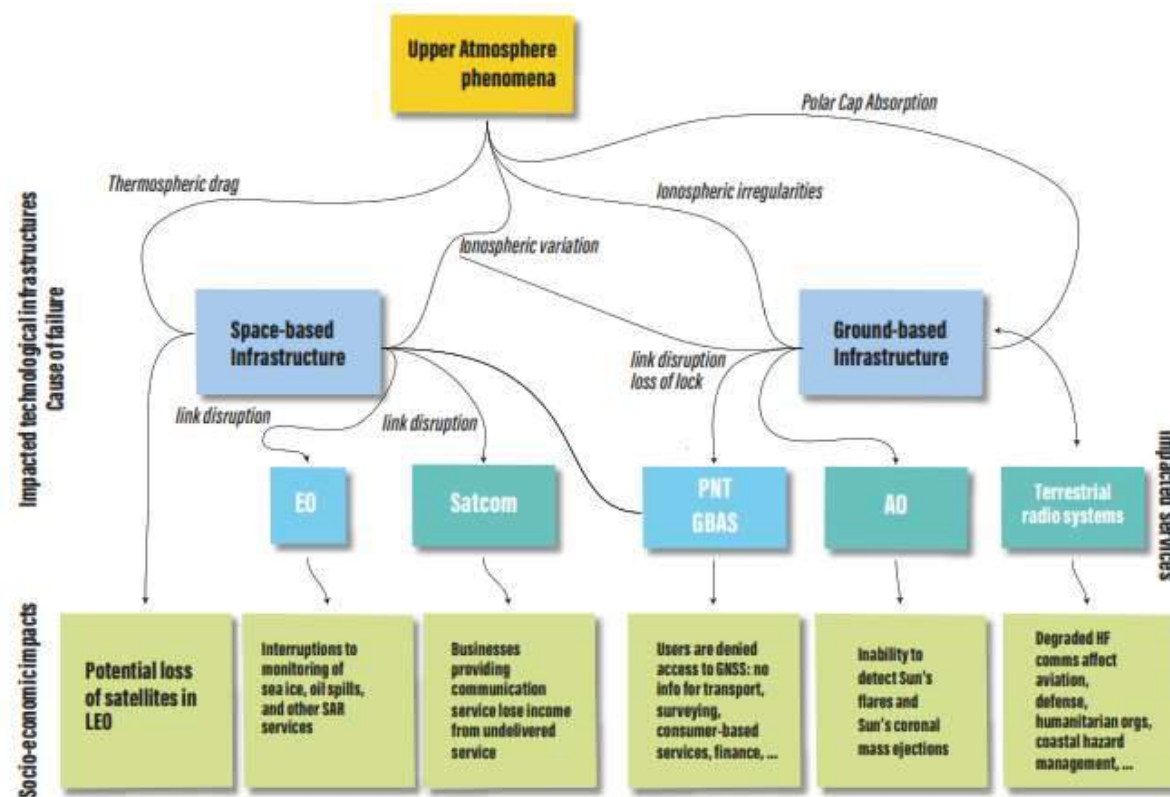
Specific Objective 5

PITHIA-NRF builds the **innovation platform** to

- promote cooperation between stakeholders and sets the standards for future collaboration (i.e. the IPR policies)
- promote joint public-private collaboration for high-risk innovation and close-to-market activities.

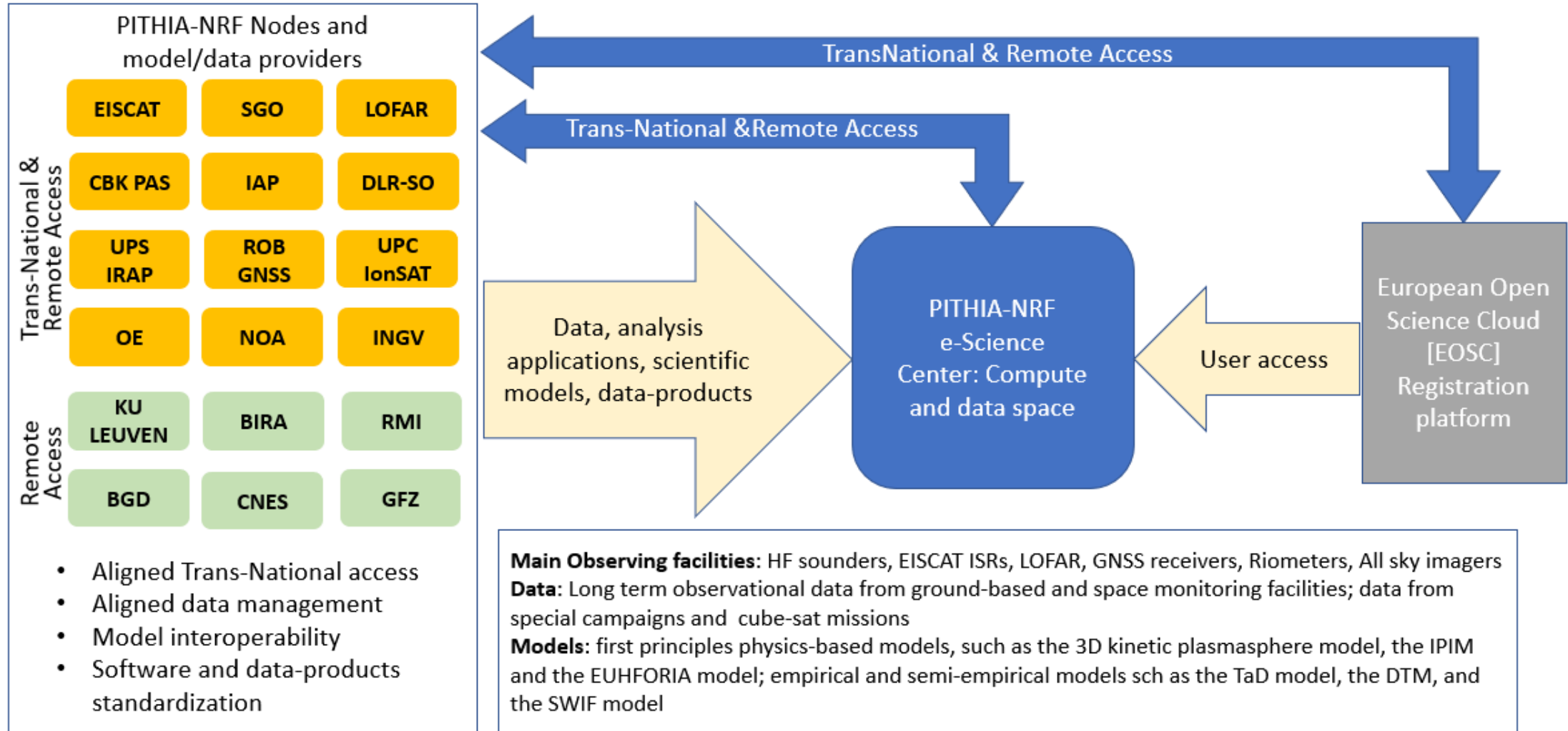


This activity supports the overarching aim of the PITHIA-NRF project for the establishment of a European distributed research infrastructure able to provide a range of services for R&D purposes.



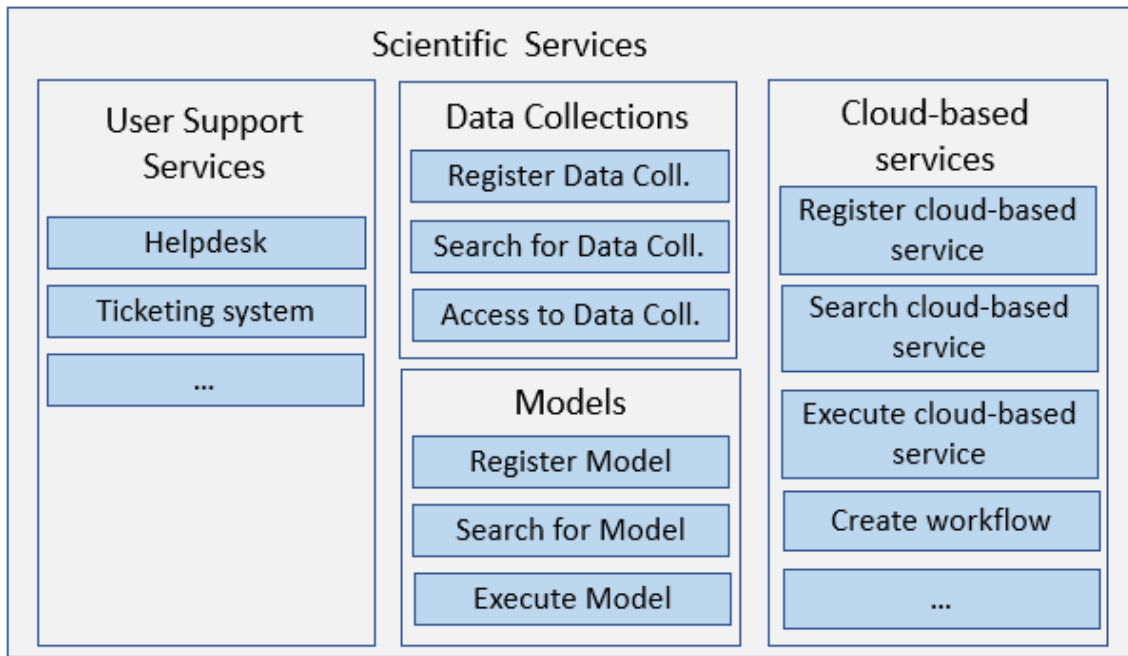


Integrating facilities, data and models

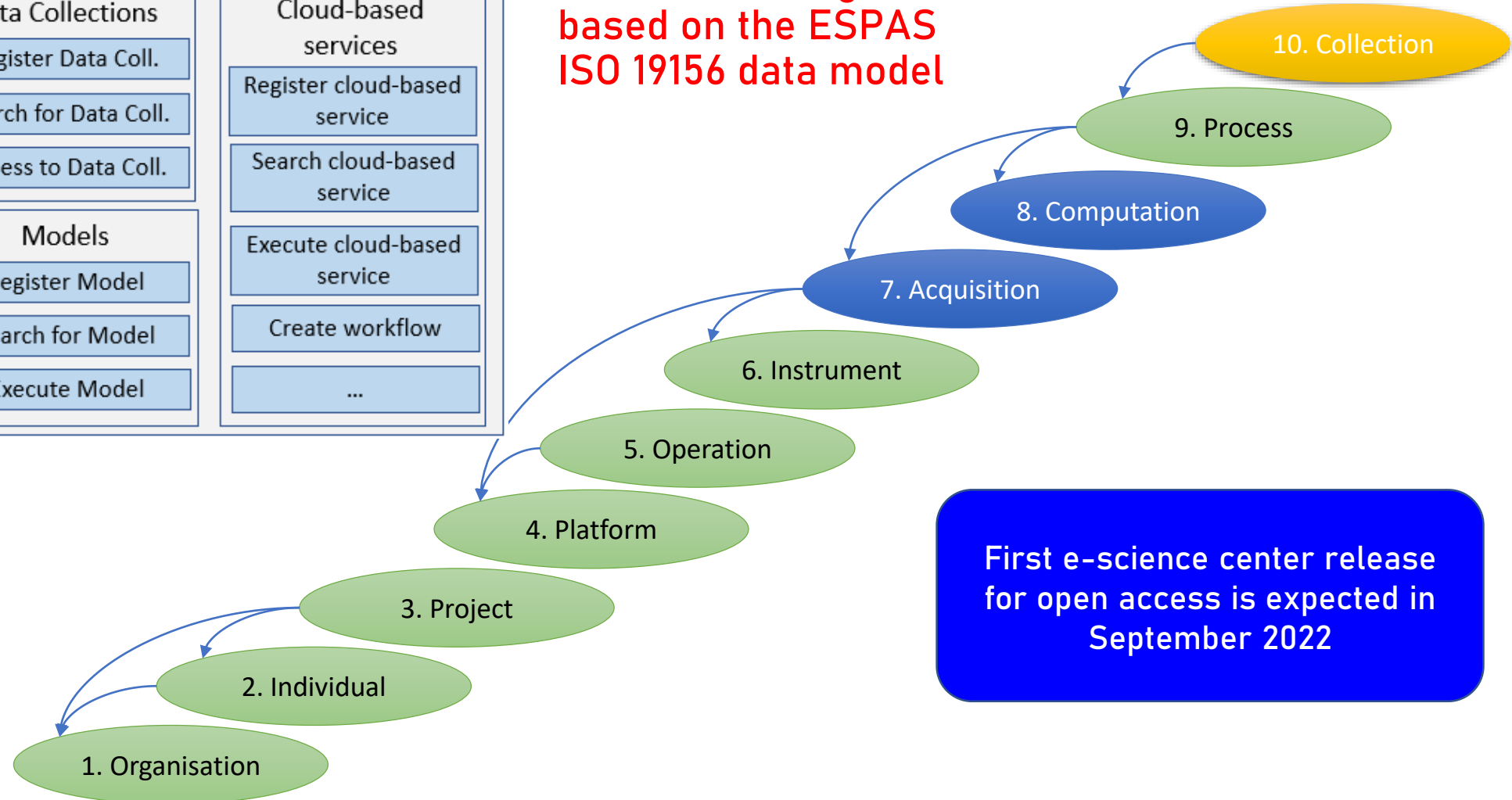




PITHIA-NRF e-Science center



10 STEPS of Registration based on the ESPAS ISO 19156 data model

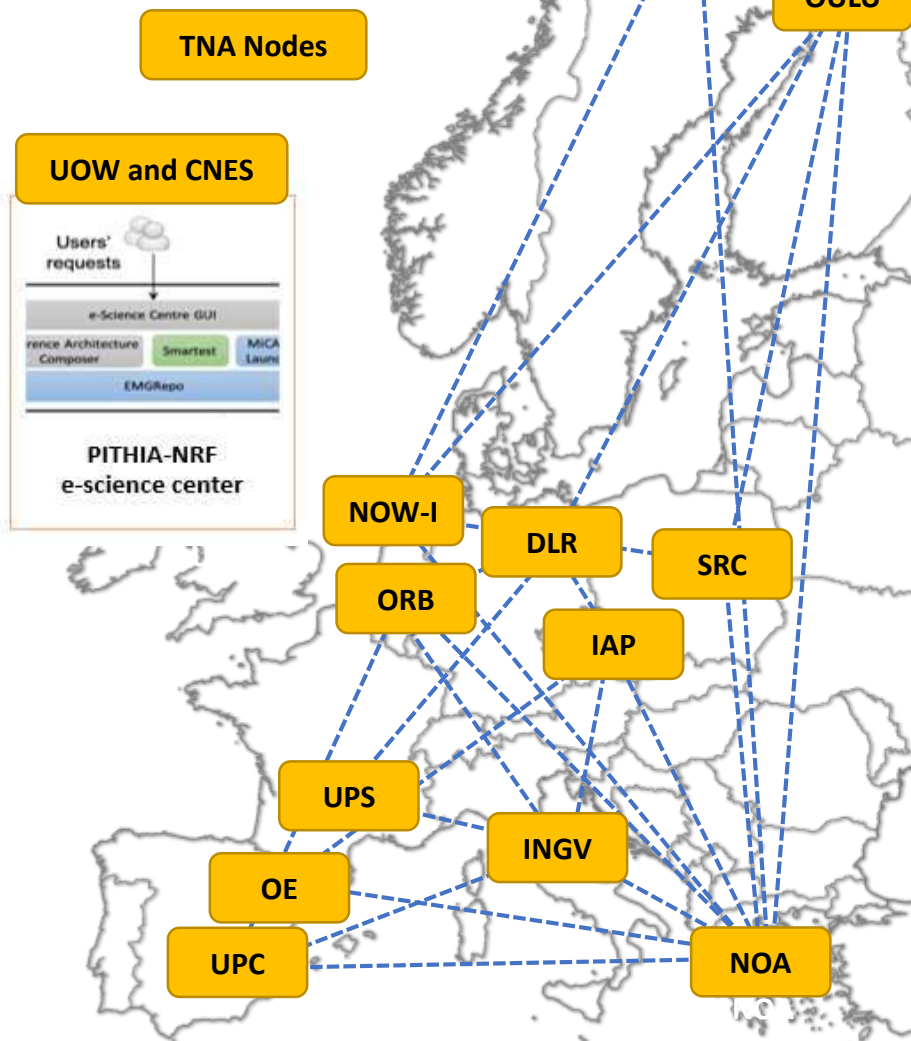


First e-science center release for open access is expected in September 2022



Access

- Publication of opportunity for research advances
- Selection of the best project proposals
- Support users to reach research advances
- Support the nodes to improve and standardize their operations



Integration

- Interoperable operation of facilities
- Common data management policy
- Procedures to archive and retrieve long-term data
- Easy registration and execution of scientific models
- Systematic training
- Standard making process for software and high-level products



PITHIA-NRF ID1 Expected Results



- ✓ To meet our stakeholders
- ✓ To discuss innovation potential: how PITHIA-NRF can support RTD projects
- ✓ To start a dialogue among Node operators and stakeholders regarding priorities and requirements
- ✓ To agree on specific collaboration plans until the next Innovation Day (Spring 2023)



Thank you for your attention!

WEB: <https://www.pithia-nrf.eu>



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