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

2nd Innovation Day

Introduction to PITHIA-NRF activities

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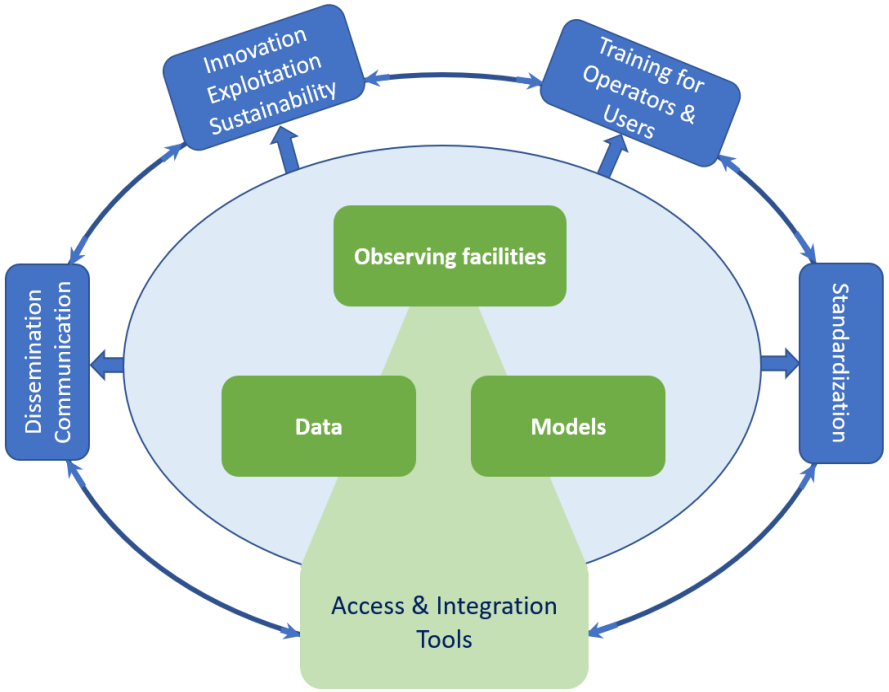
Overview & Ambition

PITHIA-NRF has the ambition to facilitate the development of validated prediction models and its transition from research to applications



Europe operates excellent observing facilities and is extremely well-placed in developing ionospheric, thermospheric and plasmaspheric models.

However, more is needed to:

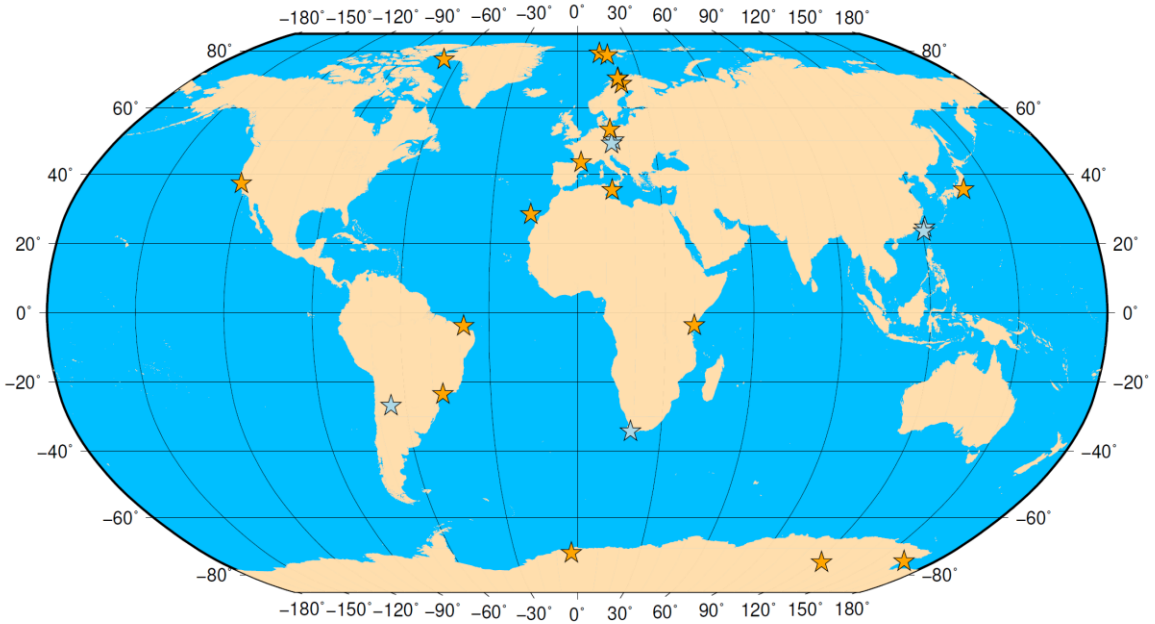
- Support the interoperable use of observing facilities;
- Develop standardized processes that lead to FAIR data and data-products;
- Facilitate the use of scientific models' concepts for experimentation purposes;
- Support space applications developers to implement innovative projects.

… and all these need to be more reliable.

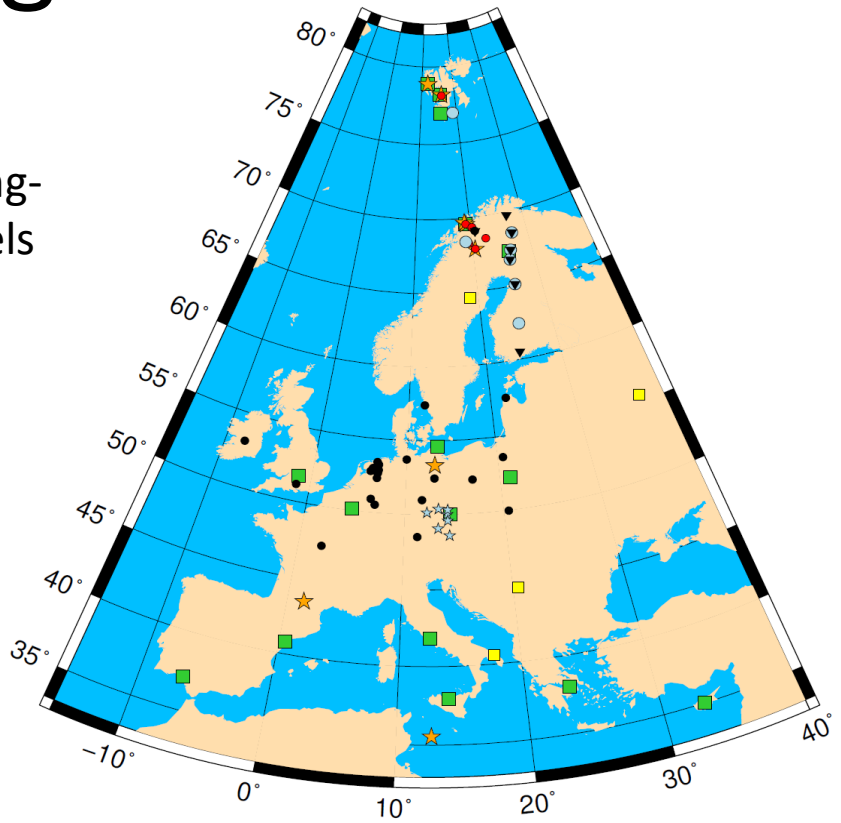
To achieve this challenge, the scientific research community requires support from a **structured research infrastructure** organized to provide **transnational research services,** including **access** and **standardization**.

Observing facilities

PITHIA-NRF participating organizations offer access to observing facilities, long-term observational data from ground-based and space experiments, and to models



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

Integrating facilities, data and models

PITHIA-NRF Nodes and model/data providers

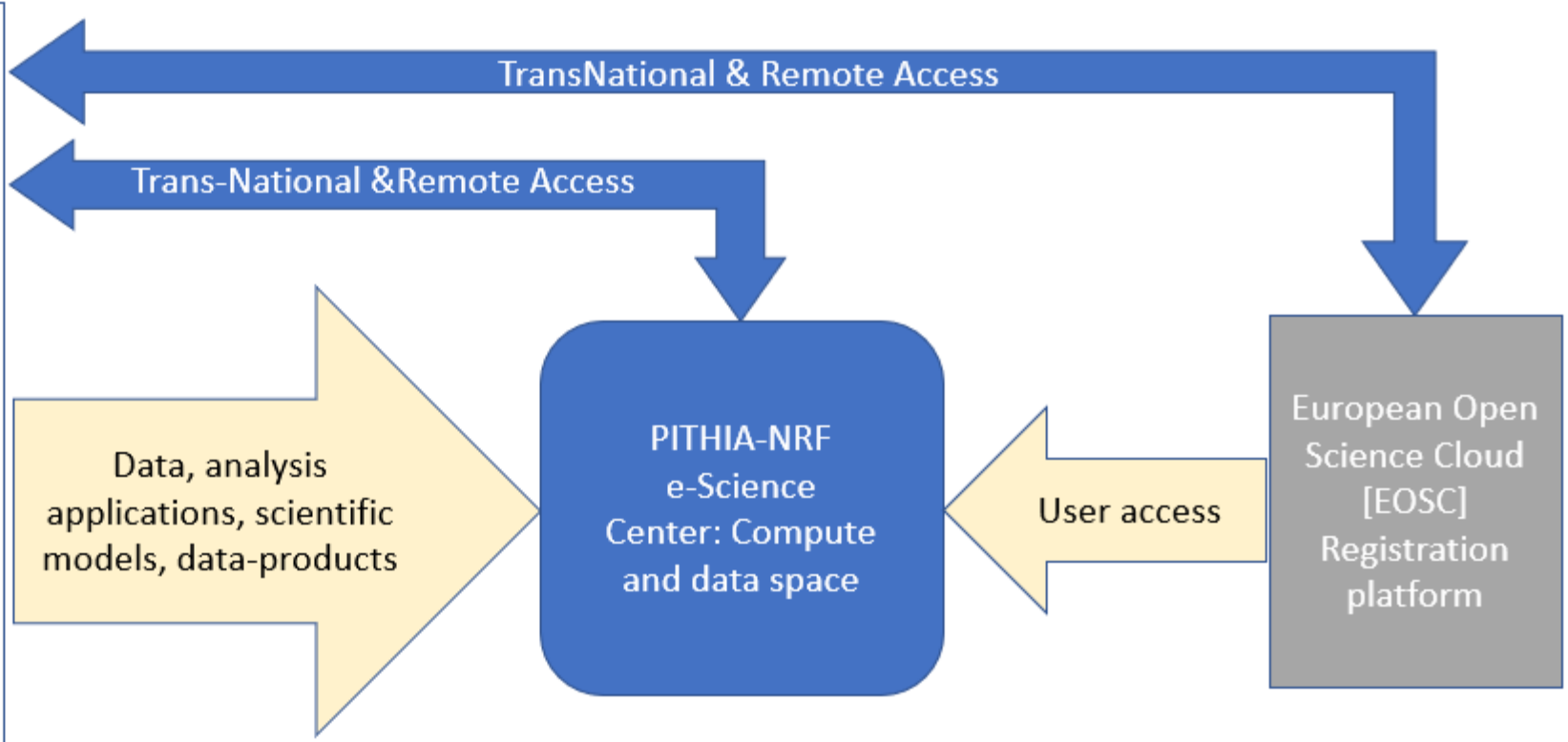
Trans-National & Remote Access

EISCAT	SGO	LOFAR
CBK PAS	IAP	DLR-SO
UPS IRAP	ROB GNSS	UPC IonSAT
OE	NOA	INGV

Remote Access

KU LEUVEN	BIRA	RMI
BGD	CNES	GFZ

- Aligned Trans-National access
- Aligned data management
- Model interoperability
- Software and data-products standardization



Main Observing facilities: HF sounders, EISCAT ISRs, LOFAR, GNSS receivers, Riometers, All sky imagers
Data: Long term observational data from ground-based and space monitoring facilities; data from special campaigns and cube-sat missions
Models: first principles physics-based models, such as the 3D kinetic plasmasphere model, the IPIM and the EUHFORIA model; empirical and semi-empirical models sch as the TaD model, the DTM, and the SWIF model

PITHIA-NRF data quality and data management

Data quality

Scientific Quality : Data Quality Flag, Scientific Relevance

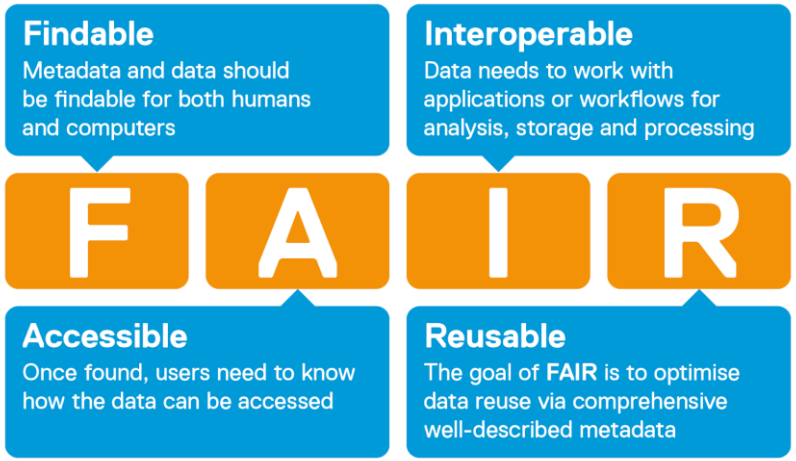
Quality of Metadata : Usage, Scope, Provenance, Persistence, Standardization, Interoperability, Quality, Earliness, Availability

Quality of Data Resources : Quality of data generation, Quality of data repository, Quality of data usage

Compliance to FAIR

Data management

The focus is on FAIRness.



The basic PITHIA-NRF data collections are assessed against a full list of FAIR data maturity model indicators.

Our ambition is to bring PITHIA-NRF facility nodes to achieve FAIRness, through the e-science center.

PITHIA-NRF e-Science center

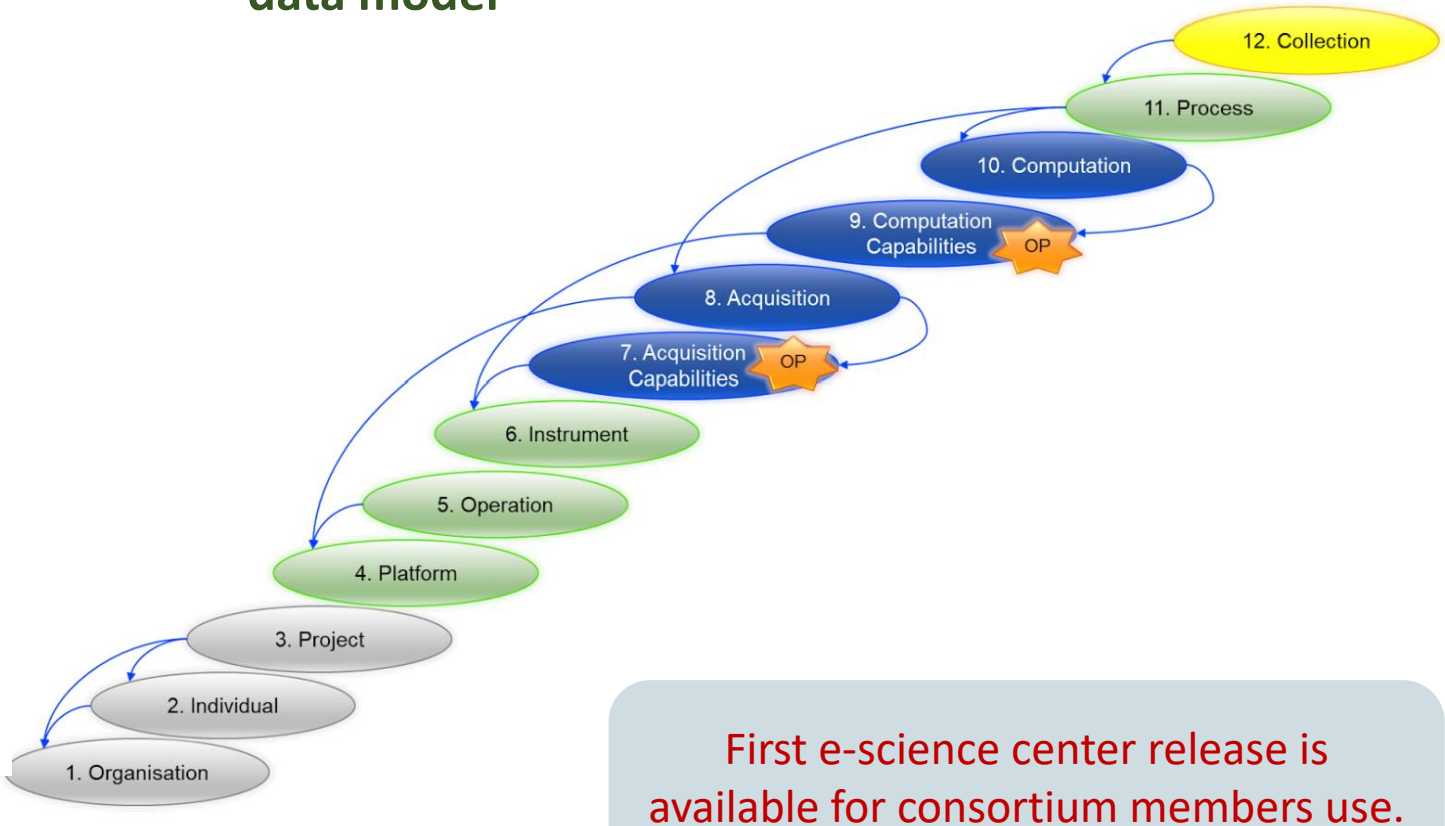
Search & Browse

- Search Data Collections
- Browse Metadata

Admin Functionalities

- Register & Manage Metadata
- Metadata Registration Guide
- Metadata Models
- Space Physics Ontology

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

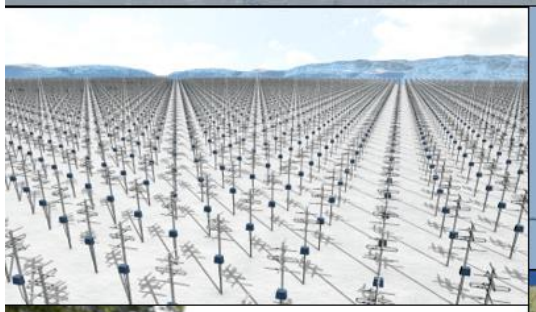


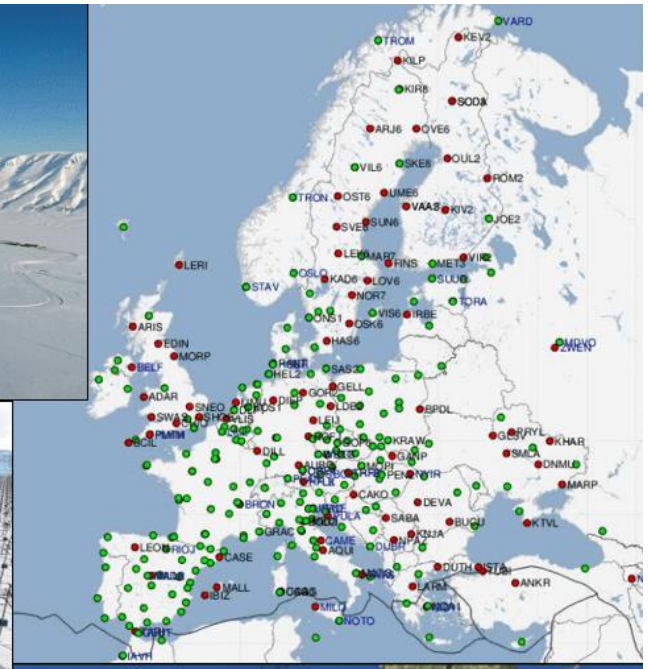
First e-science center release is available for consortium members use.
~350 XML files are registered

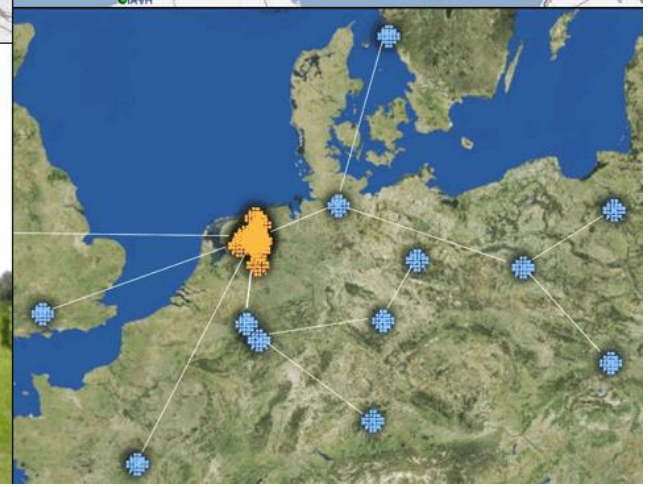
TransNational Access

TNA Calls

- First TNA Call
- Second TNA Call
- Third TNA Call
- Fourth TNA Call







Supporting actions for the TNAs

PITHIA-NRF WOOS

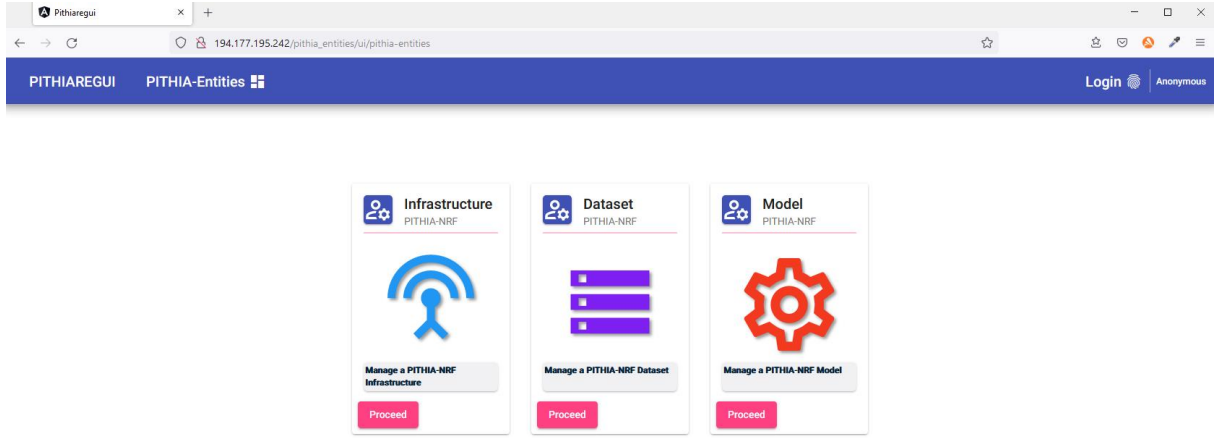
Woorkshops on Optimization of Observing Strategies:

- 1st WOOS (18 May 2021) - online
- 2nd WOOS (20&21 June 2022) - hybrid

Decisions are taken regarding:

- Research priorities within each node
- Joint experiments among several nodes
- Organization of special observing campaigns
- Development of knowledge books

PITHIA-NRF knowledge books



Provides information about the technical characteristics and operational status of the observing instruments.

https://pithia-nrf.eu/pithia-nrf-users/knowledge-book

PITHIA-NRF Training & Innovation

Training for Partners Workshops

TPW#1

The 1st Training for Partners Workshop was organised on 8&9 November 2021 with the participation of 53 members from the PITHIA-NRF beneficiaries and third parties.

You can find more about the 1st Training for Partners Workshop here.

TPW#2

The 2nd Training for Partners Workshop was organised on 28&29 March 2022 with the participation of 53 members from the PITHIA-NRF beneficiaries and third parties.

You can find more about the 2nd Training for Partners Workshop here.

TPW#3

PITHIA-NRF organises the **Third Training for Partners Workshop (TPW#3) on 26-28 September 2022**. The workshop will be held in **ASTRON, Dwingeloo, the Netherlands** and it will be **hybrid**. The local organiser is NWO-I.

The TPW#3 will focus on the e-Science Centre updates, the ontology updates, the integration, and the Data Management Policies and FAIR data maturity assessment.

You can find more about the 3rd Training for Partners Workshop here.

TPW#4

PITHIA-NRF organises the **Fourth Training for Partners Workshop (TPW#4) on 16 March 2023**. The workshop will be held in **RMI, Brussels, Belgium** and it will be **hybrid**. The local organiser is IRM/KMI.

You can find more about the 4th Training for Partners Workshop here.

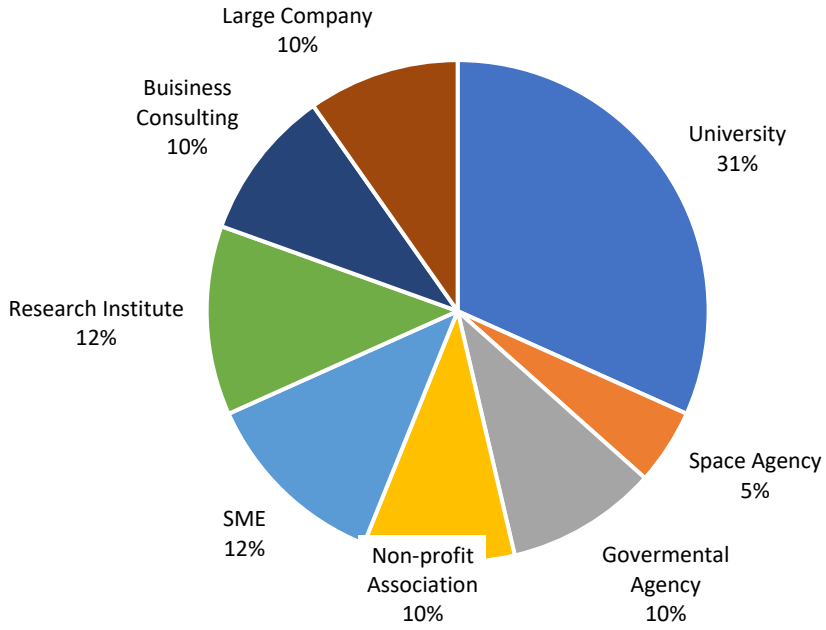
TPW#5

It is planned to take place in month 30 of the project.

Innovation Days

PITHIA-NRF services mitigating the socio-economic impacts of the upper atmosphere effects.

- Use the TNA tool for developments
- Use the e-science center to register data
- Use the e-science center as data source



PITHIA-NRF Plans for the 2nd period

Joint Research Activities

- Improve the functionalities of the e-science center for data mining and interaction between models
- Register as many as possible data collections from the project beneficiaries and external providers

Trans National Access Activities

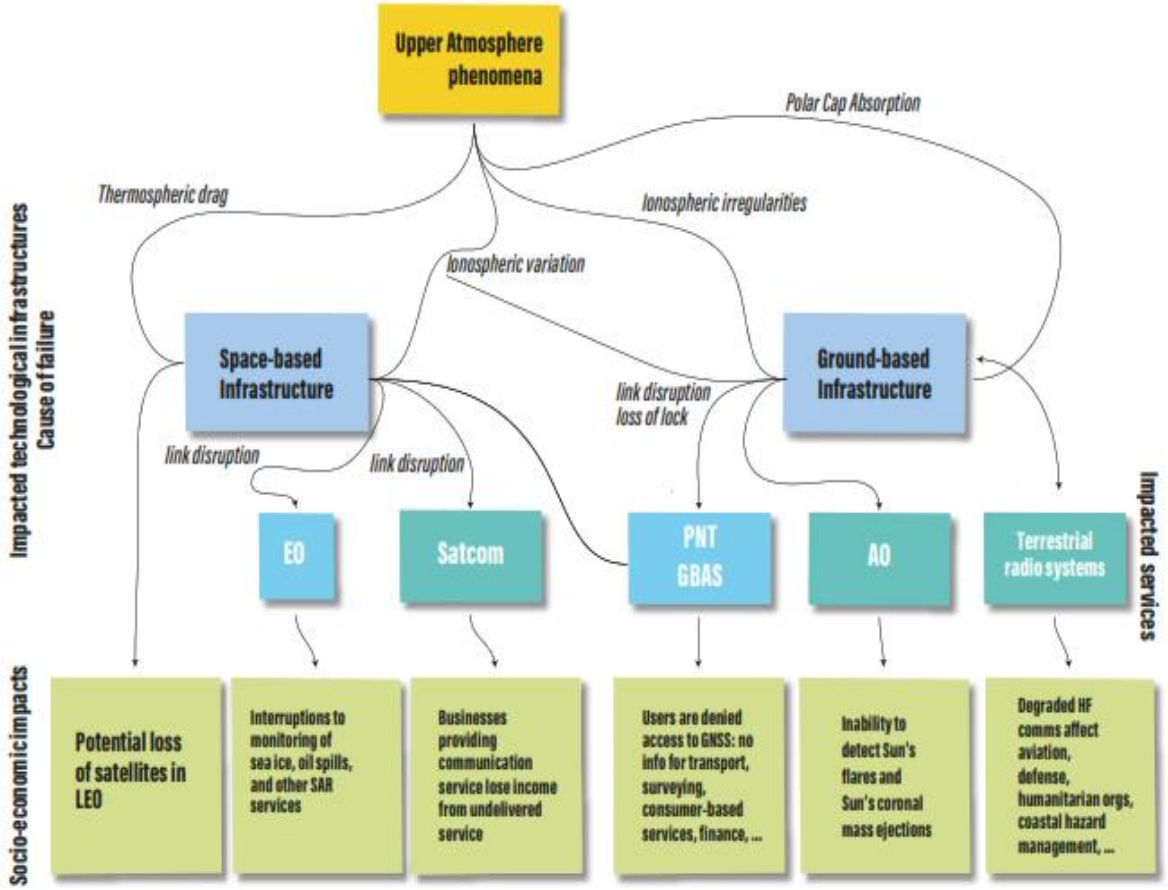
- Issue more open TNA calls – improve the advertisement
- Organize more users' meetings
- Encourage and support users to publish their results

Networking Activities

- Intensify Integration following EOSC and community standards
- Optimize further the observing strategies between complementary experiments in the network nodes
- Develop the sustainability plan in coordination with the exploitation and innovation groups
- Encourage further involvement of network stakeholders to innovative developments
- Actively involve young researchers through access and training
- Stregnethen links with other projects and international programmes

About the 2nd Innovation Day

Innovation activities in PITHIA-NRF target at maximizing the socio-economic impacts of the investment made by the Horizon 2020 in Research Infrastructures.



PITHIA-NRF innovation platform provides innovative solutions for the development of software and high-level data products including:

- Standardization of **data registration**, discovery and access in compliance to FAIR criteria.
- Standardization of **scientific models' registration**, and workflow solutions for research, development and innovation.
- Standardization of **policies for the optimized operation** of experimental facilities.
- Subsidized **trans-national access to research facilities** for academics and SMEs.

Thank you for your attention!

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

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