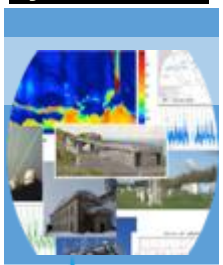
Infrastructure de Recherche Système Terre



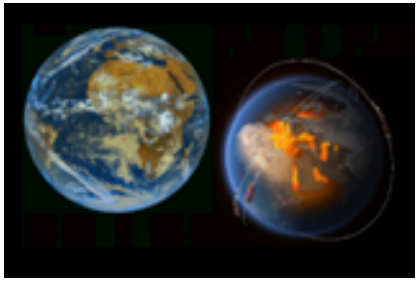
AERIS

ForM@Ter

ODATIS

Theia Pôle Thématique Surfaces Continentales

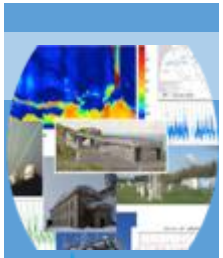
French Research Infrastructure Data and Services for the Earth System



Frédéric Huynh, directeur IR système Terre
Richard Moreno, directeur technique IR Système Terre

irstea Ifremer IRD Institut de Recherche pour le Développement FRANCE cnes cnrs IGN INSTITUT NATIONAL DE L'INFORMATION GÉOGRAPHIQUE ET FORESTIÈRE METEO FRANCE

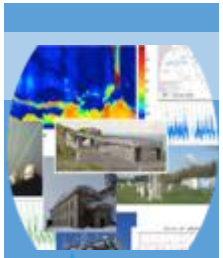
Infrastructure de Recherche Système Terre



Presentation plan

- French EO Data & Services Hubs
- “Earth System” Research Infrastructure
- “Earth System” RI context
- Technical solution
- Technical strategy
- Conclusion
- Annex

Infrastructure de Recherche Système Terre



AERIS

ForM@Ter

ODATIS

Theia Pôle Thématique Surfaces Continentales

French EO Data & Services hubs

irstea Ifremer IRD Institut de Recherche pour le Développement FRANCE cnes cnrs IGN INSTITUT NATIONAL DE L'INFORMATION GÉOGRAPHIQUE ET FORESTIÈRE METEO FRANCE

Infrastructure de Recherche Système Terre

Missions of the Data & Services Hubs

- Federate works of several laboratories
  - Groups of scientists targeted to develop innovating algorithms for value-added products
- Facilitate access to data
- Contribute to the creation of new products and services by adding value to the available spatial, in-situ and campaigns data
  - Develop added value products and services for the science communities and national public actors
- Ensure long term preservation and facilitate the collection of heritage data
- Develop networks of competences /expertise
- Provide support and expertise to users:
  - Participate in the scientific, methodological and technical training of communities
  - Provide facilitation at regional level involving scientists, public and private users
- Support French achievements at European and international level

Infrastructure de Recherche Système Terre

Data & Services Hubs

Data from space missions funded by CNES and scientifically exploited by (CNES, CNRS, IFREMER, Météo-France, IRD, IGN, …) are made available to the scientific community through Data &services hubs specialized in one or more themes :

Earth Observation

- **AERIS** gathers 4 atmospheric data centers (ESPRI, ICARE, SEDOO, SATMOS).
- **FORM@TER** created in 2012 is dedicated to Solid Earth domain.
- **ODATIS** is a portal devoted to oceanography from satellite data via AVISO + for altimetry but also from coastal or offshore data collected in-situ.
- **THEIA** created in 2012 is specialized in land surfaces.

- **CDPP** specialized in the natural plasmas of the solar system was created in 1998.
- **CDS** is the oldest data center and has been collecting astronomical data since 1972.
- **MEDOC** created in 1995 is specialized in solar physics.

irstea Ifremer IRD cnes cnrs IGN METEO FRANCE

Data & Services Hubs

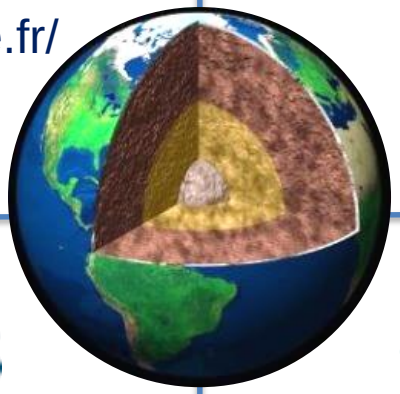
Infrastructure de Recherche Système Terre

Solid Earth

Data and services hub
https://en.poleterresolide.fr/

Land Surface

Data and services hub
http://www.theia-land.fr/en



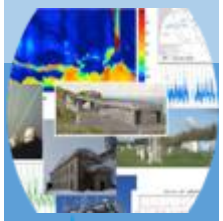
Ocean

Data and services hub
http://www.odatis-ocean.fr/en/

Atmosphere

Data and services hub
http://en.aeris-data.fr/

Infrastructure de Recherche Système Terre



AERIS

ForM@Ter

ODATIS

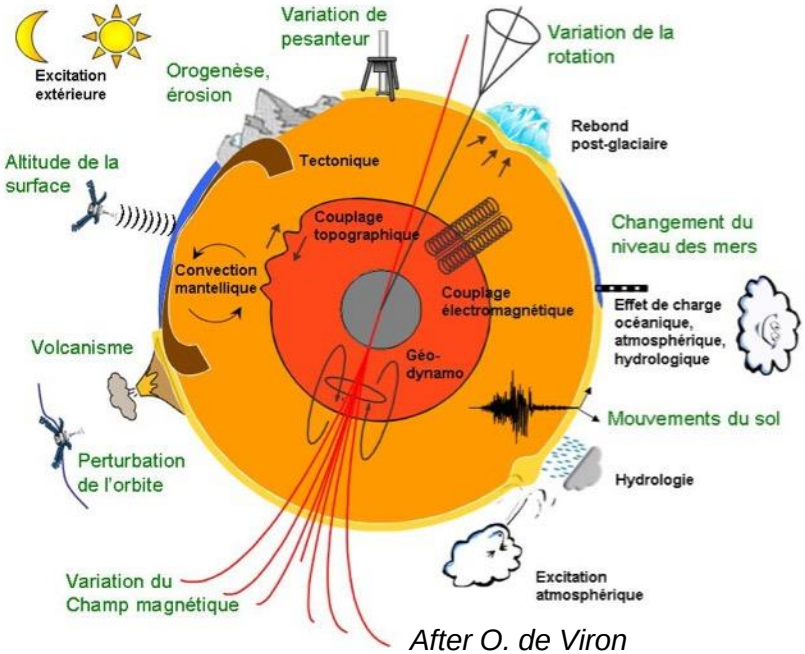
Theia Pôle Thématique Surfaces Continentales

„Earth System“ Research Infrastructure

irstea Ifremer IRD Institut de Recherche pour le Développement FRANCE cnes cnrs IGN INSTITUT NATIONAL DE L'INFORMATION GÉOGRAPHIQUE ET FORESTIÈRE METEO FRANCE

The Earth : a fascinating but complex system…

- **numerous** geophysical & geodynamic **processes**,
- with **variable** spatial and temporal **scales**,
- with many interactions, within and between its **various compartments**: *solid Earth, land surfaces, ocean, atmosphere, (not forgetting interactions with anthroposphere and also Universe...)*



After O. de Viron

Understanding these geophysical ,geodynamic and geo-environement processes
=> need to analyze **numerous and very large datasets** (*satellite, in situ, campaigns, long term observations, but also experimentation results, model outputs, AI, …*).

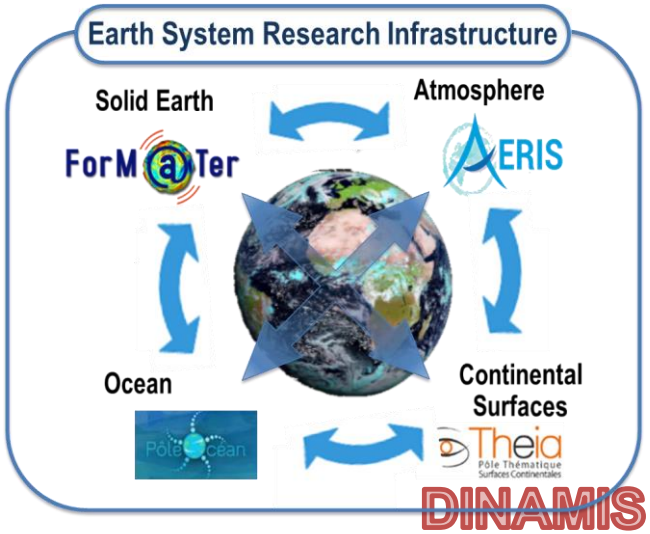
Scientists and decision makers need to have an easy access to all these data and associated products!

Infrastructure de Recherche Système Terre

Missions of the "Earth System" RI

Missions of the "Earth System" RI

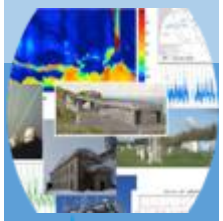
- **Federate** the Data & Services Hubs
- **FAIRisation** of datasets
- Develop **tools to access & analyze satellite and in-situ** (ground, sea, airborne…) **data**
- **Ease and foster integrated & interdisciplinary research** to understand the processes associated with the **Earth System and Global Changes,**
- **develop european & international partnerships.**
- Serve the scientific communities, the actors of public action and **downstream sector**



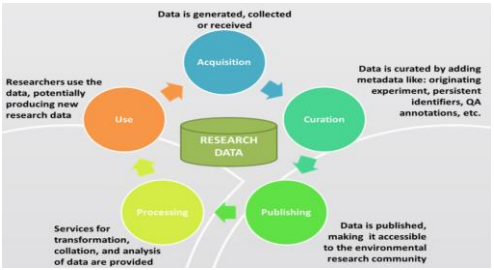
"Earth System" RI is positioned on the **whole data cycle** (in-situ and satellites), from their **production** (in synergy with other RIs and observatories) up to their **delivery** to **users** and to national, European and national **databases** and to national, European and international organizations (Copernicus, GEOSS, EOSC ...).

Infrastructure de Recherche Système Terre

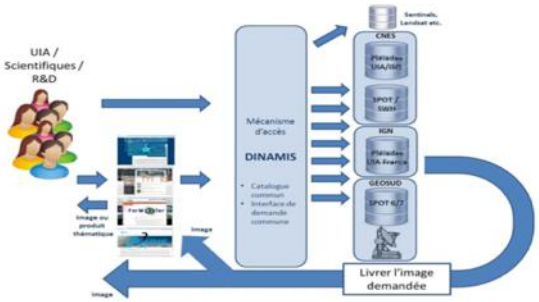
Structure & Organization of the Earth System RI



- ✓ **a RI on the national research infrastructure road map**
- ✓ **4 Data & Service Hubs**
  - ✓ THEIA : land surfaces
  - ✓ AERIS : atmosphere
  - ✓ ForM@Ter : Solid Earth
  - ✓ ODATIS : ocean



- ✓ **Transverse initiatives**
  - ✓ DINAMIS : Mutualised satellite imagery distribution
  - ✓ INTER-POLES committee : technical coordination
  - ✓ Working group Europe



- ✓ **Governance**
  - ✓ Steering board : 34 partners
  - ✓ Executive board : CNRS, CNES, IFREMER, IGN, IRD, IRSTEA, Météo France, MESRI
  - ✓ Directing Board: 4 Hubs Directors & Transverse Actions managers
  - ✓ A Director & a team
  - ✓ Operational structure : UMS CPST "Coordination Pôles de données et de services pour le Système Terre"

Infrastructure de Recherche Système Terre

Priorities

- Reinforce **Transverse initiatives**

  (DINAMIS, Inter-pôles WG, Europe/Int. WG, …)

- Active participation in **European initiatives**

  (H2020-EOSC and FP9, ESFRI, ENVRIfair, Copernicus,…)

- Active participation in international initiatives :

  GEO/GEOSS, ONU-Env, GO FAIR,...

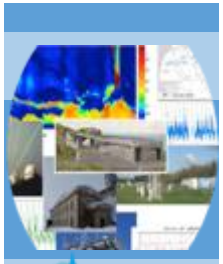
- develop an efficient integrated information system

  (storage, archiving, processing, AI, cloud services, portals)

- Synergies and joint activities with with Space Climate Observatory

- Development services based on **artificial intelligence**

Infrastructure de Recherche Système Terre



AERIS

ForM@Ter

ODATIS

Theia Pôle Thématique Surfaces Continentales

„Earth System“ RI context

irstea Ifremer IRD Institut de Recherche pour le Développement FRANCE cnes cnrs IGN INSTITUT NATIONAL DE L'INFORMATION GÉOGRAPHIQUE ET FORESTIÈRE METEO FRANCE

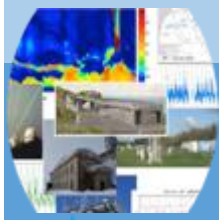
Status of the Data and Service Hubs

- 4/5 Data and Services Hubs (AERIS, FORM@TER ODATIS, THEIA & PNDB)
  - **Very different**
  - Not the same level of FAIRisation
  - Data from French / European satellites, but also from other countries (NASA, JAXA, USGS, NOAA, …)
  - **In-situ data, models, …**
  - Each Hub is distributed among several data & services centers
  - The current state of the Data & Services Hubs is to be taken into account
  - The volume of data is increasing
  - A mandate to open up to the **downstream sector**
- A few figures
  - ~20 Data & services infrastructures
  - 30 CES : scientific expertise consortium
  - 10 000 TB (2018) - 50 0000 TB (2022)
  - 350 scientists, data scientists, engineers, technicians - 170 FTE full time equivalent
- In progress & in discussion:
  - 5th data & Services hub on biodiversity : **PNDB**

irstea Ifremer IRD cnes cnrs IGN METEO FRANCE

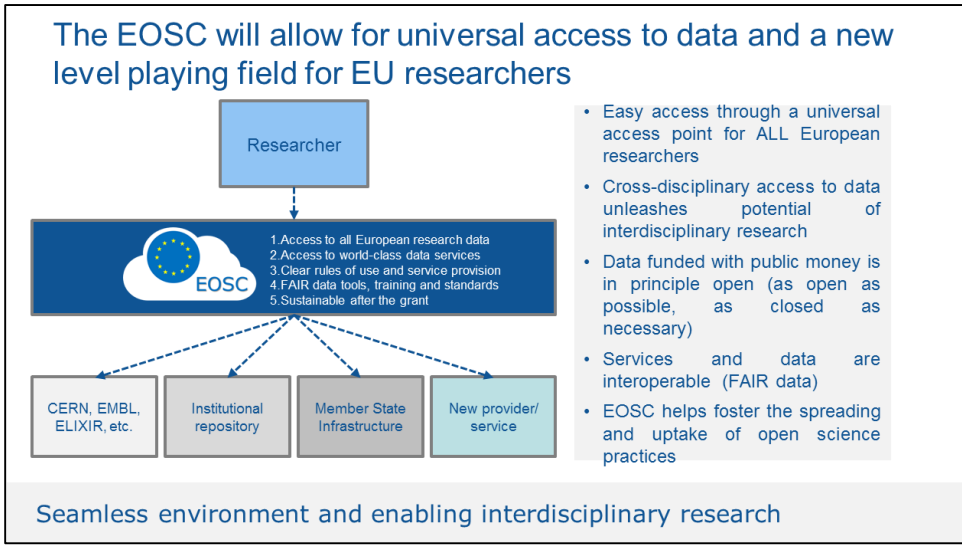
Infrastructure de Recherche

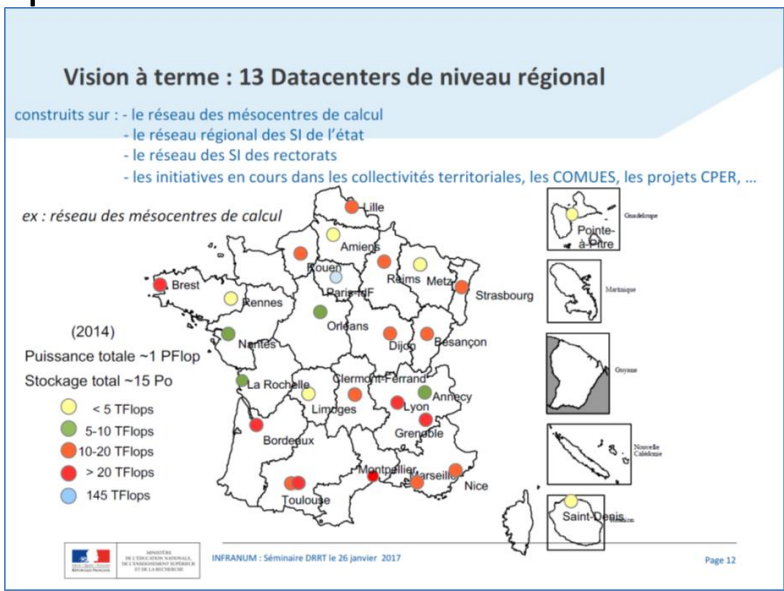
Système Terre



Contexte des infrastructures

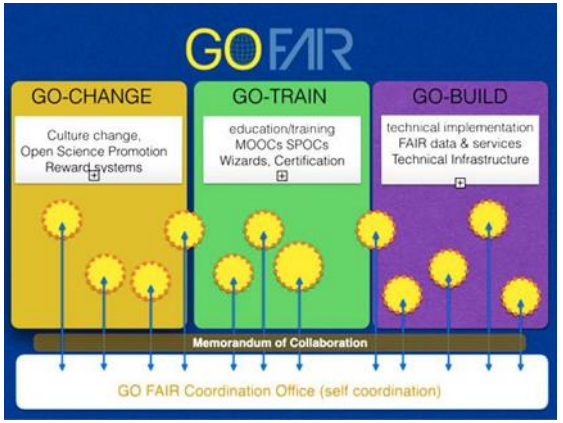
- **EOSC**
  - Incontournable
    - Fortes sources de financement
    - Implication des ESFRI dans EOSC
- **INFRANUM**
  - Incontournable
    - Directive des Ministères
- DIAS ESA & **WeKEO**
  - A considerer
    - Certains AO pourraient imposer l'utilisation des DIAS
    - Intégrer WeKEO nous permettrait de nous 'rapprocher' des données météo et climat' et de disposer éventuellement de moyens cloud commerciaux à proximité pour les usages aval
- Les infrastructures en place dans les pôles
  - A considérer
    - Sur la durée et selon ce qui sera faisable avec INFRANUM (contraintes du monde HPC)
- PEPS
  - Utilisé par
    - THEIA
    - Form@ter dans le cadre projet Etalab
  - Compatible CREODIAS – pas avec les autres DIAS…
- Dinamis, SWOT & SWOT aval, AI4GEO, GeoPortail, …





‘Technical harmonization’

- Paradigm change from CNES point of view
  - Satellite data is not anymore the main source of data
  - The user community is not only the scientists close to space agencies (eg PIs)
  - => Classical standardization forums (CEOS, GEO, ESA DCB, NASA, OGC, ISO, …) are still useful
- Standardization forums of Science / Earth Science
  - Interpole working group
    - Created in 2014 to promote technical exchange between the Data & Service Hubs
    - A two-days workshop every 6 months
    - Example of topics
      - Long term preservation, Authentication & Authorization, catalogues, formats, DOI, Licenses, processing, …
  - RDA – Research Data alliance
    - 95 working groups !
    - RDA Europe deeply involve in EOSC
  - H2020 : ENVRI+ / ENVRI FAIR in an ESFRI context
    - ENVRI & ENVRI FAIR similar to Interpole at European level
    - Work on progress to combine both activities
  - GO FAIR initiative in the context of EOSC
    - Germany + France + The Netherlands



- Interoperability of processing chains ?

Infrastructure de Recherche Système Terre

Réponses à AO Européens – sur sollicitation MESRI

- PHIDIAS
  - Réponse à AO CEF (mi-novembre)
    - WP1 : Management
    - WP2 : Compute and storage workflow management
    - WP3 : Technical coordination, development of the common system
    - WP4 : Intelligent screening of large amount of satellite data for detection and identification of anomalous atmospheric composition events
    - WP5 : Big data EO: processing on-demand for environment monitoring
    - WP6 : Ocean Use case
    - WP7 : Dissemination, Impact and Sustainability Path

- *Pas plus d'informations ici car confidentiel*

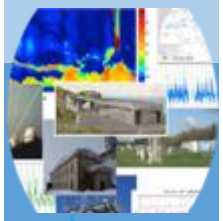
Réponses à AO Européens – sur sollicitation MESRI

EOSC-Pillar
Coordination and Harmonisation of National &Thematic Initiatives to support EOSC

Work package No	Work Package Title
1	**Management**
2	**The human factor of the EOSC: Dissemination, Outreach and Community building**
3	**National Initiatives Survey**
4	**From National Initiatives to trans-national services**
5	**The Data layer: establishing FAIR data services at the national and transnational level**
6	**EOSC in action: Use cases and community-driven pilots**
7	**The infrastructure layer: delivering horizontal data storage and computing services, from national to transnational**

Part. N°	Participant organisation name	Country
1	Consortium GARR (GARR)	Italy
2	Consiglio Nazionale delle Ricerche (CNR)	Italy
3	CINECA Consorzio Interuniversitario (CINECA)	Italy
4	Istituto Nazionale di Fisica Nucleare (INFN)	Italy
5	Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC)	Italy
6	Universität Wien (UNIVIE)	Austria
7	Centre Informatique National de l'Enseignement Supérieur (CINES)	France
8	Centre National de la Recherche Scientifique (CNRS)	France
9	Institut National de la Recherche Agronomique (INRA)	France
10	Institut National de la Recherche en Informatique et Automatique (INRIA)	France
11	Institut Francais de Recherche pour l'Exploitation de la Mer (IFREMER)	France
12	Institut National de la Santé et de la Recherche Médicale (INSERM)	France
13	Karlsruher Institut für Technologie (KIT)	Germany
14	Deutsches Klimarechenzentrum GmbH (DKRZ)	Germany
15	Fraunhofer Gesellschaft zur Förderung der Angewandten Forschung e.V..(Fraunhofer)	Germany
16	Helmholtz Zentrum Potsdam, Deutsches Geoforschungszentrum (GFZ)	Germany
17	Gent University (UGENT)	Belgium
18	Trust-IT SRL (TRUST-IT)	Italy

Infrastructure de Recherche Système Terre



AERIS

ForM@Ter

ODATIS

Theia Pôle Thématique Surfaces Continentales

Technical Solution

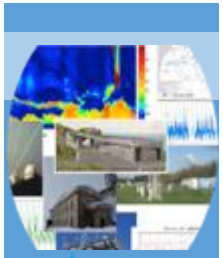
irstea Ifremer IRD Institut de Recherche pour le Développement FRANCE cnes cnrs IGN INSTITUT NATIONAL DE L'INFORMATION GÉOGRAPHIQUE ET FORESTIÈRE METEO FRANCE

Infrastructure de Recherche Système Terre

Overarching principle of operation

- Main motivation of the “Earth System” Research Infrastructure
  - not to re-invent the wheel
  - but to take benefits on existing initiatives by improving the standardization and the interoperability of the systems already in place.
  - Base developments on open source software with wide communities
- Improve transdisciplinarity and across domain interoperability.
- Facilitate access to both space data AND in-situ data..
- Take into account the evolution of the computing infrastructure landscape
  - in France (Infranum) and in Europe (EOSC, DIAS, ...)
  - and to be able to integrate into this ecosystem.
- Re-use of what has been done in each Data and Services Hubs (ODATIS, THEIA, …).
  - In order to encourage this re-use and to push for the sharing of practices, a working group (named Interpole) was set up four years ago.
    - » technical experts from each Hub to explore technical topics of common interest
    - » DOI, Long Term Preservation, Catalogue, Format, SSO, processing, …
  - this work takes in account and implements the recommendations established by the Working Groups of the Research Data Alliance (RDA).

Infrastructure de Recherche Système Terre

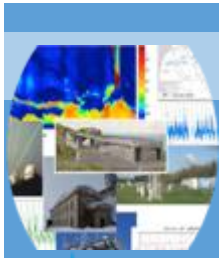


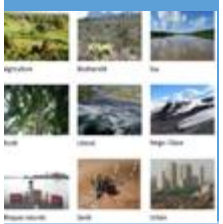
Overarching principle of operation

- For space data
  - possible to rely on a long history of standardization
  - through the following organizations (CEOS, GEO and OGC).

- For data observed in-situ
  - more complicated
    - » due to the variety of the observation systems
    - » and the manual work at laboratories to analyze samples
    - » and due to the number of thematic fields that are considered: physics, chemistry, geology, biology and biodiversity, genomics...
  - However, several initiatives, funded by the EC and the Members States, have also been conducted for several years to make in-situ data more findable and accessible.
    - » SeaDataNet and EMODNet, EuroArgo, EMSO, Jerico have set up data management systems, standards and tools to let users retrieve, display and access data sets
    - » ACTRIS, EPOS, ..
    - » More recently, all these research infrastructures have been federated within a cluster called ENVRI.

Infrastructure de Recherche Système Terre





Inspiring models

- NASA EOSDIS hub
  - Common Metadata Repository / Unified Metadata Model (Opensource)
  - Combined with their progressive migration toward cloud computing
- Hub Pangeo (~datacube) (Opensource)
  - Already used for atmosphere, ocean and climate data
- GeoDAB: GEOSS data hub
- EuroGEOSS, AmeriGEOSS, NextGEOSS
  - CKAN & cloud computing capabilities (Opensource)
- ESA DCB Initiative: 'Network of Exploitation platforms'
  - And their cloud initiatives: DIAS, TEP/MEP/MAP
- ENVRIfair H2020 project
  - Naturally linked to EOSC
  - French Data&Services Hubs are part of the consortium
    - IAGOS, ACTRIS, EURO-ARGO, EPOS, EMSO, ANAEE, SeaDataCloud, …

Processing Topology

- Increase of data volumes
  - => better to **bring the processing close to the data**
    - Not for everyone; downloading data is still an option
      - Cf Copernicus dissemination statistics
    - Very interesting for newcomers (eg startup, …)
    - Mandatory for very big volumes e.g. NISAR
- Need to **combine data** from different compartments
  - => have data very close from each other

Increasing distance

    - In the same cluster
      - e.g. NASA EOSDIS evolution (AWS) & Copernicus CGS evolution
    - In a limited number of cluster linked with high speed network
      - e.g. : WeKEO, Current CGS architecture, AERIS/ESPRI, INFRANUM (AC),
      - EOSDIS (DAAC)
    - Distributed in several data centers not linked with HS network
  - Use ad-hoc technologies to give unity to the system
    - e.g. Ceph object storage / IRODS / …

High level functions

Exploitation teams

operate

Users

Products Tools Services

Users feedback

Training Incubation Algorithms Chains

Eo-lab & InSpace

Support

Data & Services Infrastructure

Data & Services Centers — CDS

Repository / Publication — DPO

Advanced services for dissemination — HDSK

Quality of service — QoS

IDS

User feedback

Users support

Help Desk — HDSK

Support to data producers — SPRD

Collaboration

Support to developpers — SDEV

Animation centers (regional and national) — CART

SUPP

Expertise

Scientists

Products definition ATBD & proto

Operational Processing chains

Dev teams

Support to developpers

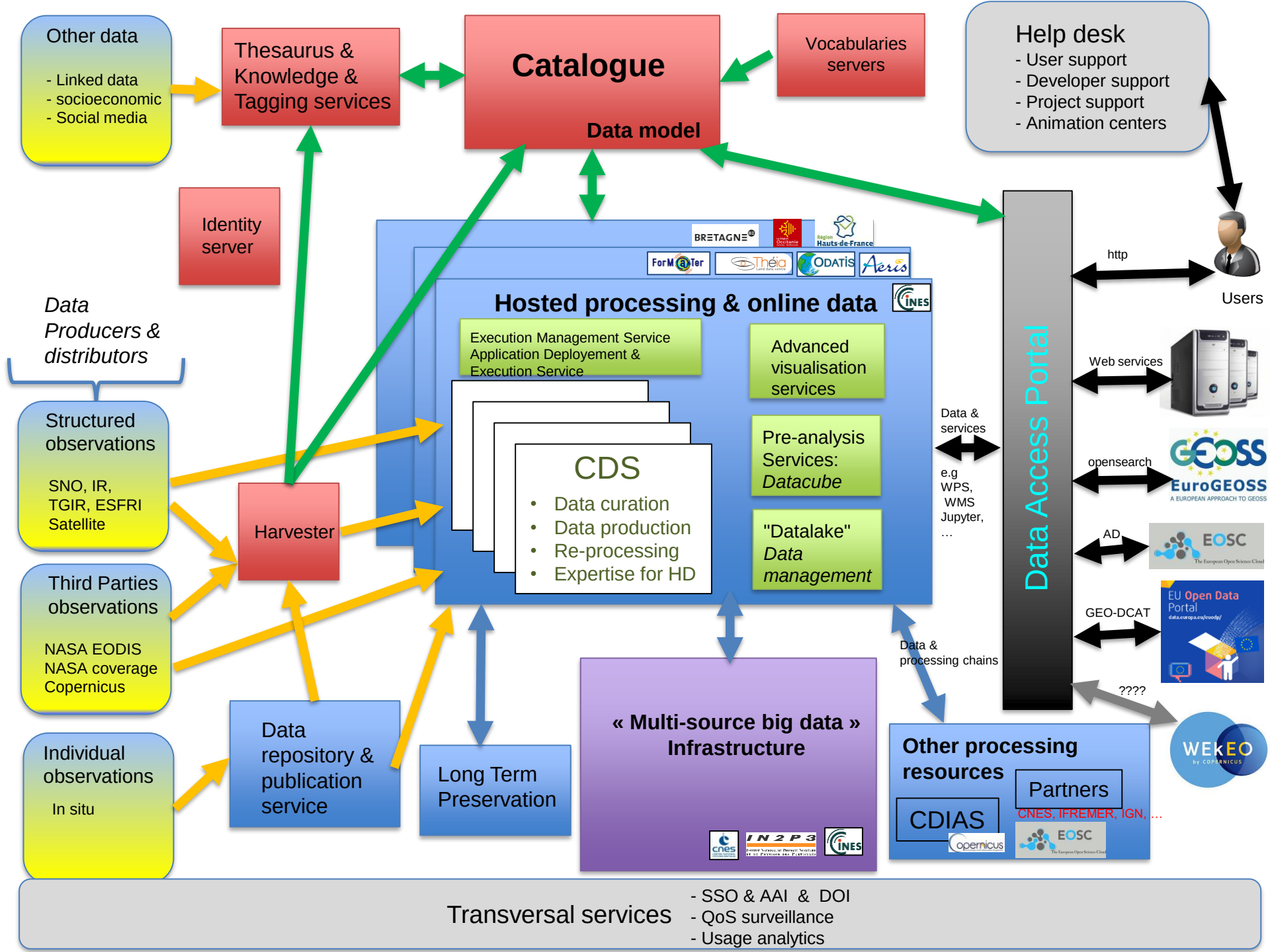
Synergies

AI initiatives eg Datapole

Infrastructure de Recherche Système Terre

Key ideas

- Strong and operational help desk
  - To support users
    - e.g. allow feedback on datasets
    - e.g. present locally : CART
  - To help set up new projects : Development support
  - Support to data and processing migration
  - Capacity building : AI, Cloud computing, coding language, orchestration, DevOPS, …
- Collocate data as far as possible
  - To ease the combination between data from different compartments
  - As a consequence of the "*bringing the processing close to the data*" paradigm
  - Datalake technologies – smooth/efficient data management tool
    - CNES datalake | ENS(Elastic Node Server)/dhus (ESA) | AERIS/ESPRI (Ceph, …), NASA EOSDIS, …
- Operational and trustworthy catalogue of data & services
- Foster interoperability between processing platforms
  - DIAS, EOSC, INFRANUM, PRACE, …
- Not techno push
  - Need from users and IR ST strategy
- Quality of service
  - IR ST system monitoring / analytics
- FAIRisation of data


Other data
- Linked data
- socioeconomic
- Social media
Thesaurus & Knowledge & Tagging services
Catalogue
Data model
Vocabularies servers
Help desk
- User support
- Developer support
- Project support
- Animation centers
Identity server
Hosted processing & online data
Execution Management Service
Application Deployement & Execution Service
Advanced visualisation services
Pre-analysis Services: Datacube
"Datalake" Data management
CDS
• Data curation
• Data production
• Re-processing
• Expertise for HD
Data Access Portal
http
Users
Web services
opensearch
AD
GEO-DCAT
????
Data & services
e.g WPS, WMS Jupyter, …
Data & processing chains
Data Producers & distributors
Structured observations
SNO, IR, TGIR, ESFRI Satellite
Third Parties observations
NASA EODIS
NASA coverage
Copernicus
Individual observations
In situ
Harvester
Data repository & publication service
Long Term Preservation
« Multi-source big data » Infrastructure
Other processing resources
Partners
CNES, IFREMER, IGN, …
CDIAS
Transversal services
- SSO & AAI & DOI
- QoS surveillance
- Usage analytics

Data: IR ST data catalog

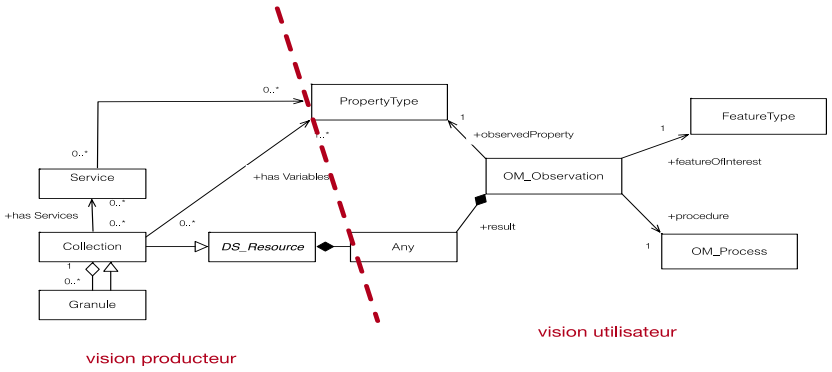
- A unique, operational catalog
  - Containing all data metadata and pole services
    - Like the NASA EOSDIS CMR (https://earthdata.nasa.gov/about/science-system-description/eosdis-components/common-metadata-repository)
  - Requires a unified data model (~ UMM NASA & HMA ESA)
    - Taking into account spatial data, in-situ, models, ...
    - Based on ISO and Inspire recommendations for example
    - Work in progress as part of the 'Interpole' catalog WG
  - Vocabularies / ontologies
    - adoption and maintenance of commonly agreed vocabularies and ontologies,
    - set up of standardized vocabulary servers
- With interfaces
  - interoperable
    - **INSPIRE**, CEOS opensearch, Linked data / RDF, Geo DCAT, WIGOS / WMO standards, ...
  - Adaptable (nothing is fixed)
  - **Two step search**: collections then granules
    - CEOS connected data assets, GEOS, NASA EOSDIS, ESA FedEO, ...

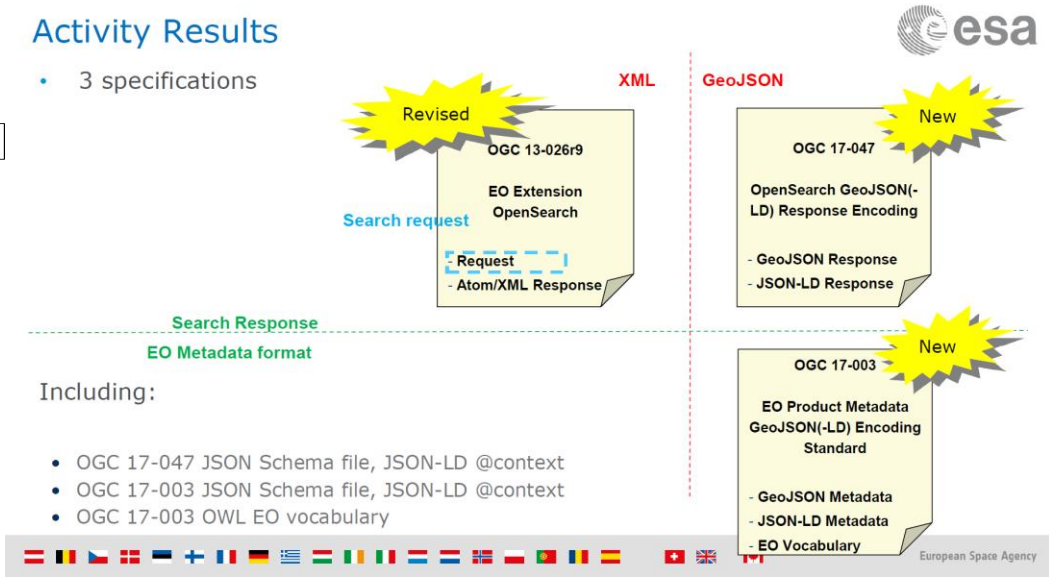
https://docs.google.com/spreadsheets/d/1PcbMMh4fq0-IozkI2rmRLOnxR139qluXEZVVDX-IUbM/edit#gid=647170322

Data model

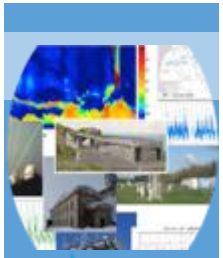
http://devlog.cnrs.fr/_media/ids2014_presentation ogc_francoisandre.pdf?id=ids2014_j2?cache=cache&usg=AOvVaw3vvXX5vS-6mjfYvahHjWEQ

- Study led by Interpole
  - Definition of a pivotal model that will allow us to interface with different standards
    - INSPIRE, CEOS opensearch, EOSC, …
  - Two levels : collection and granule
    - Two-step search (big number of granules)
    - Applicability to in-situ data is to be verified.
  - Idea : base the data model on adaptation of the NASA data model & vocabularies
    - UMM-G / UMM-C & UMM-S
    - GCMD keywords
    - SWEET ontology





Infrastructure de Recherche Système Terre



AERIS

ForM@Ter

ODATIS

Theia Pôle Thématique Surfaces Continentales

Technical Strategy

irstea Ifremer IRD Institut de Recherche pour le Développement cnes cnrs IGN METEO FRANCE

Infrastructure de Recherche Système Terre

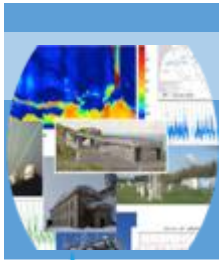
Computing Infrastructures

- Target = INFRANUM
  - Progressive but determined approach
  - Migration when data is used in a transverse IR ST framework (SCO example)
  - Migration when IT means become obsolete
  - Some datasets may not be migrated
    - Old and little used
    - Necessary proximity of the producer in case of a reasonable data volume: case of certain **in-situ data** => concept of technical cache

- Ability to be distributed across multiple sites
  - At the beginning the IR ST will still be spread over several CDS themselves distributed over several sites
  - On opportunities to be able to switch to external means like DIAS or EOSC
    - Eg for European projects

- Need for adaptation & fine analysis
  - INFRANUM ⇔ HPC : not compatible with the IR ST way of working
    - => need for adaptation of INFRANUM centers to be able to cope with HPDA or HTC
  - All IR ST compute services may not be able to join INFRANUM
    - Even if there is an evolution of INFRANUM
  - **Analysis & discussion with INFRANUM are necessary**

Infrastructure de Recherche Système Terre



Computing Infrastructures

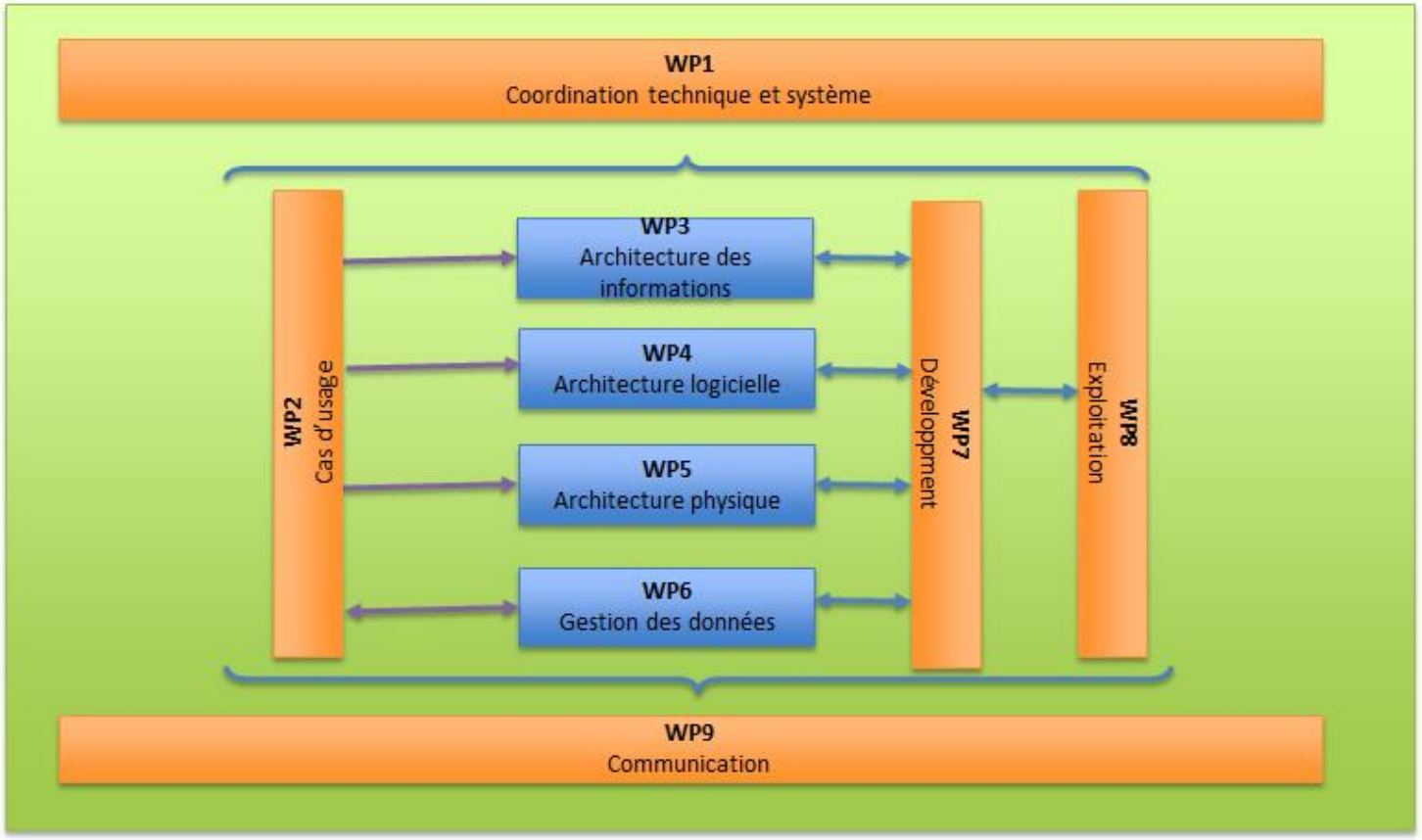
- **INFRANUM not operational within 3 years**
- Target is also **EOSC**
  - How is it compatible ?
- **Intermediate step** on relatively limited means
  - Temporary infrastructure to choose
    - **CINES** (most probable solution) : *EUDAT => EOSC*
    - CALMIP or any regional INFRANUM center
    - CNES, IFREMER, IGN, any IR ST CDS infrastructure
    - DIAS
    - EOSC ⇔ EUDAT, EGI, …
  - A way to learn and validate the consideration of user needs
  - Software for the intermediate stage
    - Limit specific developments (at least for this step)
      - Catalog and data hub (CKAN, NASA CMR, CNES datalake, ...)
      - 'Modern' means of processing data: Datacube + Jupyter / Pangeo / ...
  - Rapid Implementation of Development / Migration Support service

Infrastructure de Recherche Système Terre

Computing Infrastructures

- Il est illusoire de penser que l'IR ST pourra être concentré sur **un seul et unique MesoCentre** d'INFRANUM.
- Mais une fois INFRANUM en place la distribution de l'IR sera limitée aux MésoCentres régionaux et nationaux
  - Bretagne
  - Haut De France
  - Calmip (Occitanie)
  - …
- Avec prise en compte des MesoCentres nationaux
  - IDRIS, CINES, IN2P3
  - Notamment pour la combinaison des données très volumineuses
  - Et / ou besoin de très gros moyens de calculs
- D'où une architecture distribuée
  - Pour les données
  - Et les traitements
  - Avec les solutions techniques afférentes

Découpage en WP

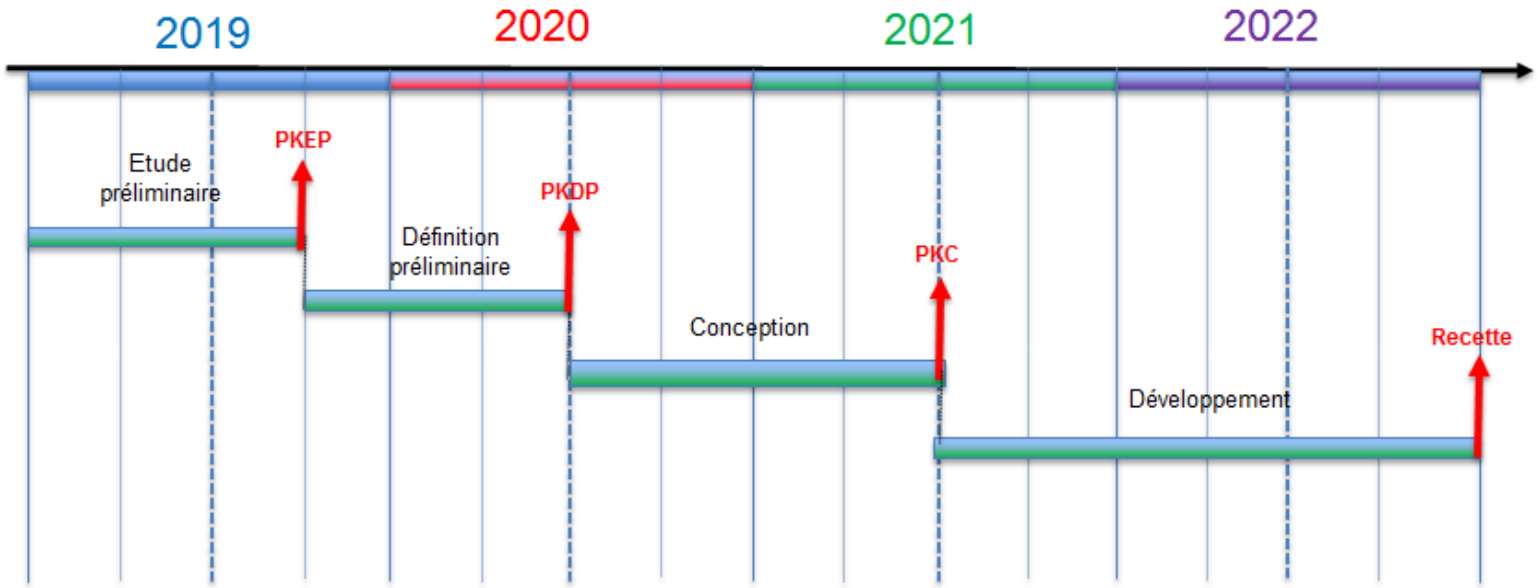


Infrastructure de Recherche Système Terre

Planning

- “T0” arbitrairement positionné au 01/01/2019 car :
  - la 1ère réunion GT_TECH a eu lieu en janvier 2019
  - De même que le kick-off d’ENVRI-FAIR - projet structurant pour l’IR_ST
- planning guidé par le besoin, mais aussi par les ressources et les contraintes :
  - la durée des projets sur lesquels l’IR_ST va s’appuyer
    - ENVRI FAIR : 4 ans à partir de 15/01/2019
    - PHIDIAS (si retenu) : 3 ans à compter de mai 2019 ~ To+41M
    - EOSC-Pillar : 3 ans à compter de ~ avril 2019 ~ To+40M
    - AERIS/SSO : 1 an à compter de ~ juin 2019 ~To+18M
    - THEIA/metacatalogue : 1 an ? à compter de février 2019 : To+13M
    - Etude CNES/Catalogues : 6 mois à compter de mai 2019 : To+11M
  - La mise en place d’INFRANUM qui ne devrait pas être opérationnel avant début 2023 (To+48M)
- Un autre élément dimensionnant est l’AO PIA3
  - Il faudra être déjà prêt avant son ouverture
  - Ce budget est nécessaire à la mise en place de l’IR_ST

Planning



Planning développement IR_ST

Planning

WP	Tâche	Nom de la tâche	Resp	Etat	Date début	Durée	Date fin	Retard	Priorité	Date cour	GANTT	Ressources
Date début	Mois courant											
01/01/2019	2	Projet IR "Système Terre"	F. Huynh		0	48	48			2		
WP1 : Coordination technique & Système	1,1	Gestion de projet et reporting	R. Moreno	En cours	0	48	48		2 - Assez urgent	2		GT_TECH
	1,2	Prise en compte de l'existant et des contraintes		En cours	0	12	12		2 - Assez urgent	2		GT_TECH
	1,3	Définition de l'architecture Métier	R. Moreno	En cours	0	6	6		1 - Urgent	2		GT_TECH
WP2 : Cas d'usage	2,1	Programmes Internationaux		Non commencée	3	6	9		2 - Assez urgent	2		GT_TECH
	2,2	Cas d'usage SCO		Non commencée	3	6	9		2 - Assez urgent	2		GT_TECH
	2,3	Données de test pour les catalogues		Non commencée	3	6	9		2 - Assez urgent	2		GT_TECH
	2,4	Autres cas d'usage		Non commencée	3	6	9		2 - Assez urgent	2		GT_TECH
WP3 : Architecture des informations	3,1	Modèle pivot de données	JC Desconnets	En cours	0	12	12		1 - Urgent	2		GT_TECH
	3,2	Vocabulaires	JC Desconnets	Non commencée	3	9	12		1 - Urgent	2		GT_TECH
	3,3	Ontologies	JC Desconnets	Non commencée	4	20	24		2 - Assez urgent	2		GT_TECH
WP4 : Architecture logicielle	4,1	Solution technique pour le catalogue interne	AD	Non commencée	4	26	30		2 - Assez urgent	2		GT_TECH + Etude CNES"Catalogues"+PHIDIAS+ENVRI-FAIR
	4.1.1	*Prototypage catalogue interne*	R. Moreno	Non commencée	4	14	18		1 - Urgent	2		GT_TECH + Etude CNES"Catalogues"
	4,2	Solution technique pour le portail de diffusion avancée	AD	Non commencée	4	26	30		2 - Assez urgent	2		GT_TECH + Etude CNES"Catalogues"+PHIDIAS+ENVRI-FAIR
	4,2,1	*Prototypage portail diffusion avancée*	R. Moreno		4	14	18		1 - Urgent	2		GT_TECH + Etude CNES"Catalogues"
	4,7	Intelligence artificielle et annotation de données	AD	Non commencée	15	15	30		2 - Assez urgent	2		AD
	4,9	A&A Identity provider	D. Boulanger	Non commencée	6	9	15		1 - Urgent	2		GT_TECH + Devt AERIS/SSO + PHIDIAS + AC Etude CNES catalogues
	4,12	DOI	AD	Non commencée	4	20	24		2 - Assez urgent	2		AD
WP5 : Architecture physique	5,1	Proposer une roadmap infrastructure	K. Ramage	En cours	0	36	36		2 - Assez urgent	2		GT_TECH + PHIDIAS + AC EOSC-pillar
	5,2	Définir les infrastructures des services IR_ST	K. Ramage	Non commencée	4	32	36		1 - Urgent	2		GT_TECH + Etude CNES/Catalogues + PHIDIAS
WP6 : Gestion des données	6,1	Méthodologie pour Inventaire	D. Boulanger	Non commencée	0	4	4		1 - Urgent	2		GT_TECH + ENVRI FAIR
	6,2	Inventaire des données des pôles	D. Boulanger	Non commencée	0	9	9		1 - Urgent	2		GT_TECH + ENVRI FAIR
	6,3	Rédaction du Data Management Plan	AD	Non commencée	0	6	6		2 - Assez urgent	2		GT_TECH
	6,4	FAIRisation des données	AD	Non commencée	9	39	48		2 - Assez urgent	2		GT_TECH + ENVRI-FAIR (AC) + PHIDIAS + EOSC-Pillar + autre à trouver

Infrastructure de Recherche Système Terre

Logique pour choix techniques

- **Décision collégiale** avec groupe resserré GT_TECH
  - 5x2 personnes, 2 par pôle
  - Animé par le DT IR ST (3 personnes)
  - Support ponctuels possibles (CNRS, CNES, IFREMER, IRSTEA, …)
- On garde GT_INTERPOLE : approche bottom-up
- Dans la limite du possible
  - **Eviter les développements dédiés**
  - Pas techno push, mais partir des **besoins utilisateurs**
  - Chercher des solutions opérationnelles et fiables sur étagères
    - Dans les pôles
    - Chez les partenaires / tutelles (outils génériques, résultats de R&D)
    - ENVRI fair
    - H2020 (NextGEOSS, OBEOS, EOPEN, OPENEO, BigDataEurope, GeoCraddle, …)
  - Mise en place de **PoC** pour **valider l'adéquation au besoin**