

# WORKING TOGETHER WITH SURF FOR EARTH OBSERVATION

ITC Big Geodata Talks (7 July 2021)



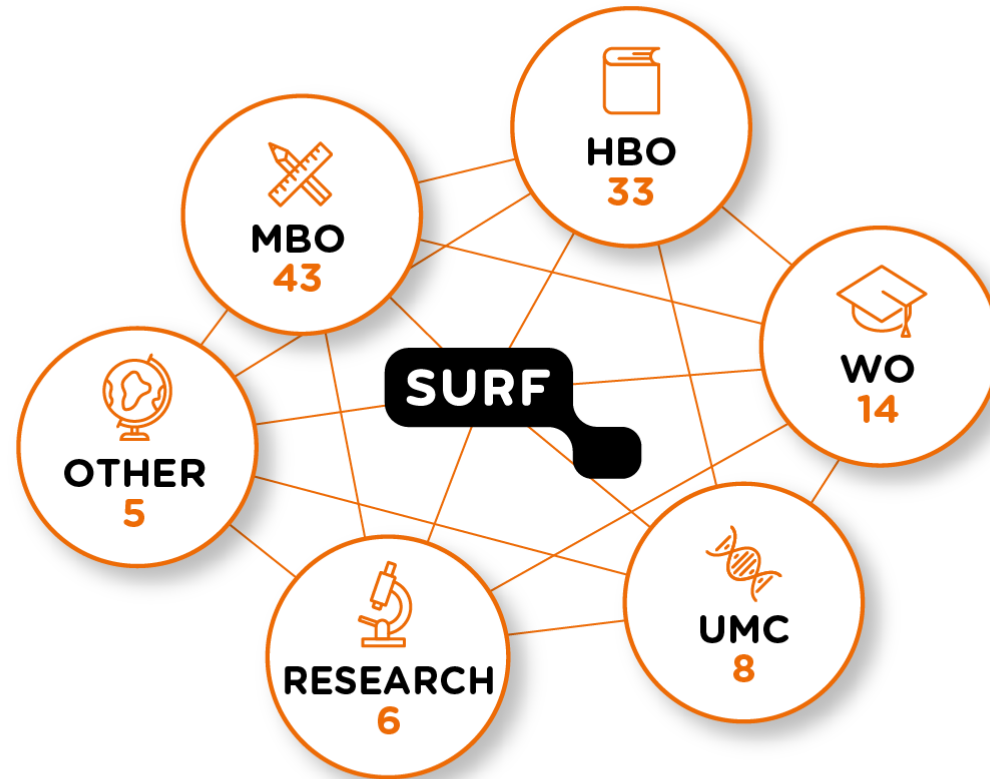
**SURF**

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2. Services' use cases
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# We are SURF



WO: Research-oriented higher education  
HBO: Higher professional education  
MBO: Vocational education and training  
UMC: University teaching hospital

# SURF fields of work



**Cooperative ICT facilities**



**Education**



**Research**



# Cooperative ICT Facilities

How do you offer the users of your institution the best ICT solutions? The SURF network provides a reliable and fast Internet connection, as well as access to all kinds of other ICT services for education and research. And all this is safe and privacy proof. See below how we can help you.



**Network  
infrastructure**



**Data and server  
services**



**Security and  
privacy**



**Trust and identity**



**Joint  
procurement**



**Sustainability and  
CSR**



**SURF**

# Education & ICT

Innovate education with ICT and benefit from the knowledge, experiences and services that SURF is building up together with education institutions. Learn more on our Dutch website.



Organising  
flexible education →



Digital learning  
environment →



Digital learning  
materials →



Digital testing →



Online and  
blended  
education →



Learning  
analytics →

**SURF**



# Research & ICT

For your research, use computing power, superfast data transport, data management and analysis, and the expertise of SURF. For top-level research and innovation. Select one of our fields of expertise below.



Compute  
services



Data storage and  
management



Data processing  
and analysis



Open science



Apply for compute  
access



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# SURF Research Building Blocks



## HIGH-END COMPUTE SERVICES:

High-end computing solutions, in different flavors



## CUSTOM SERVICES & ANALYSIS:

Process, analyse, or visualise complex research data or big data



## DATA STORAGE & MANAGEMENT:

Easily accessible storage on disk or tape, data management advice



## TRUST & IDENTITY

Secure & trusted access to many services with federated identity management



## CONNECTIVITY:

Fast end-to-end connections tailored to your data sharing research needs



## Cloud & Market:

Collective procurement



## SURF Open Innovation Labs:

Quantum computing, IoT and others



## Knowledge sharing & consultancy

SURF provides access to all kinds of ICT infrastructure and services needed for **top-level research and innovation.**

In the next use cases we will discuss some building blocks in more detail and provide links to the relevant web pages.



# Customised services : What solution, framework or cloud is best suited for my research project?

## Custom Cloud Solutions

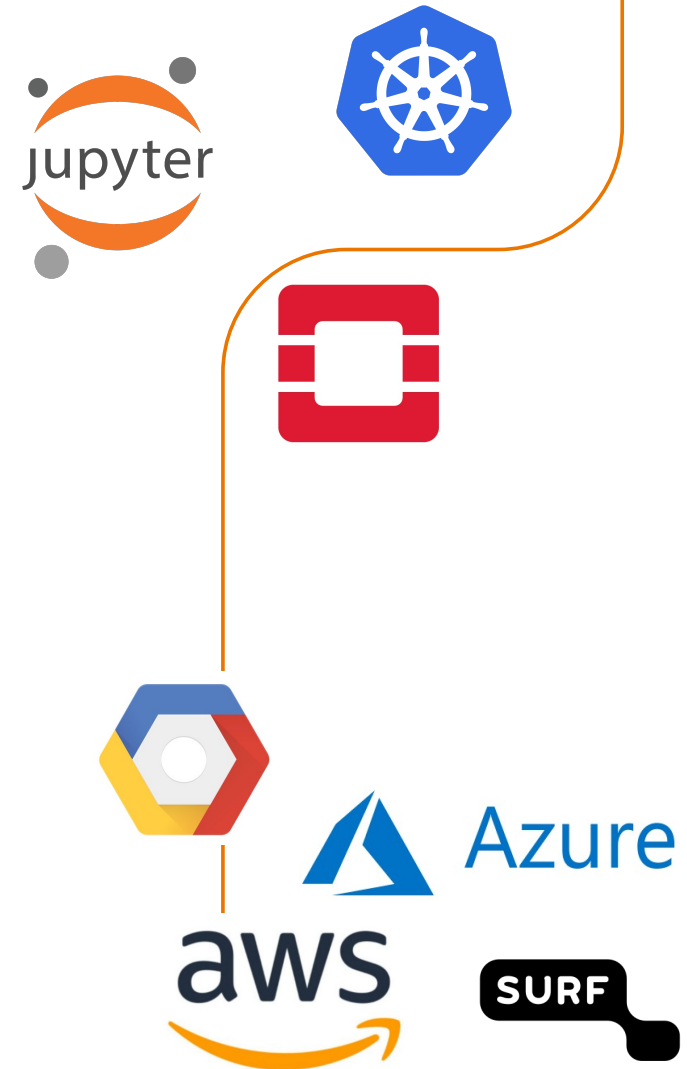
- [Tailor made, cloud based solutions](#)
- Scalable, cloud native, hybrid (combination public/private cloud)
- Consultancy and co-creation

## Visualisation Service

- [High end visualisation](#) of your data

## Artificial intelligence and machine learning expertise

- [for research and education](#)







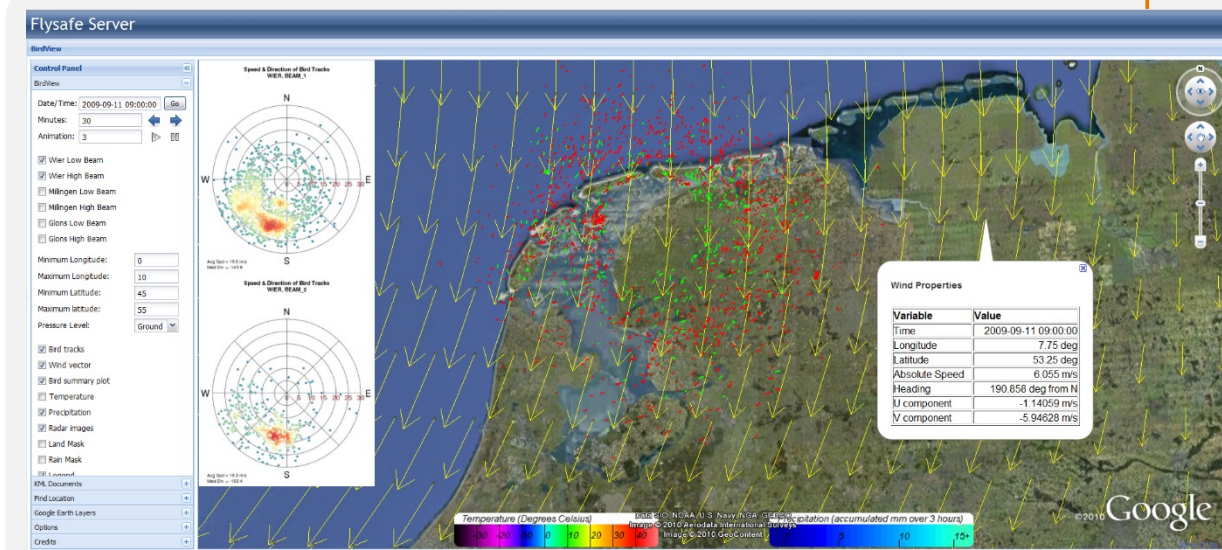
# Co-creation use case e-Ecology

## Bird migration research

### Challenge

Scientists from all over the world want to collect, explain and predict birds' individual behaviour in relation to the local environmental conditions at a given time

### Partners



# UvA-BiTS: Virtual lab for Bird Movement Modelling

**SURF contributes**

- Expertise!
- Infrastructure development and related operations
- Visualisation applications



Remote System Control



Wiki & Manual



Dashboard



Tracker Calendar



Database



KMZ Generator



Flight Generator



BirdView





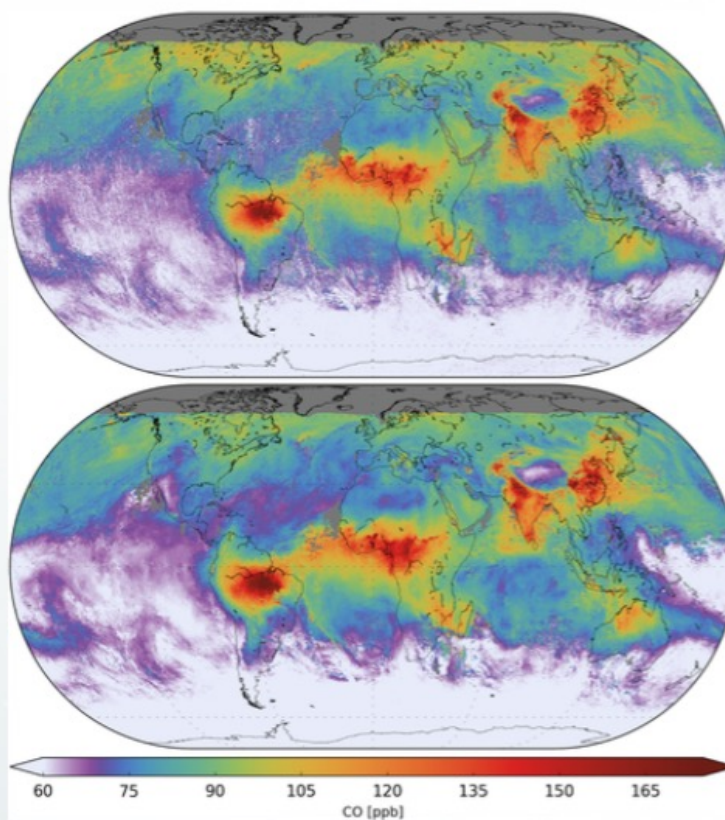
# Tropomi set of objectives

SRON and SURF collaborate on the scientific interpretation of the data by processing of incoming daily Sentinel-5P data and additional reprocessing

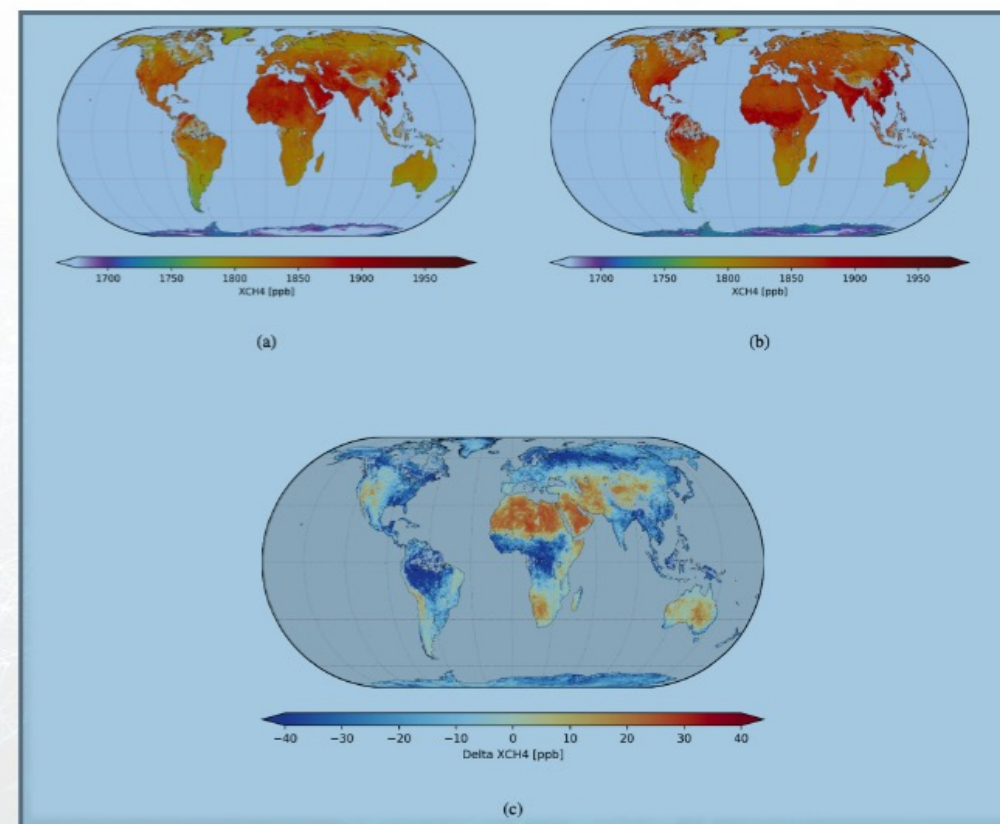
Extension of ESA products and extraction of as much scientific information as possible

Calibration and further refinement of numerical models and algorithms

Feedback to ESA proposing changes to the standardised data-processing algorithms



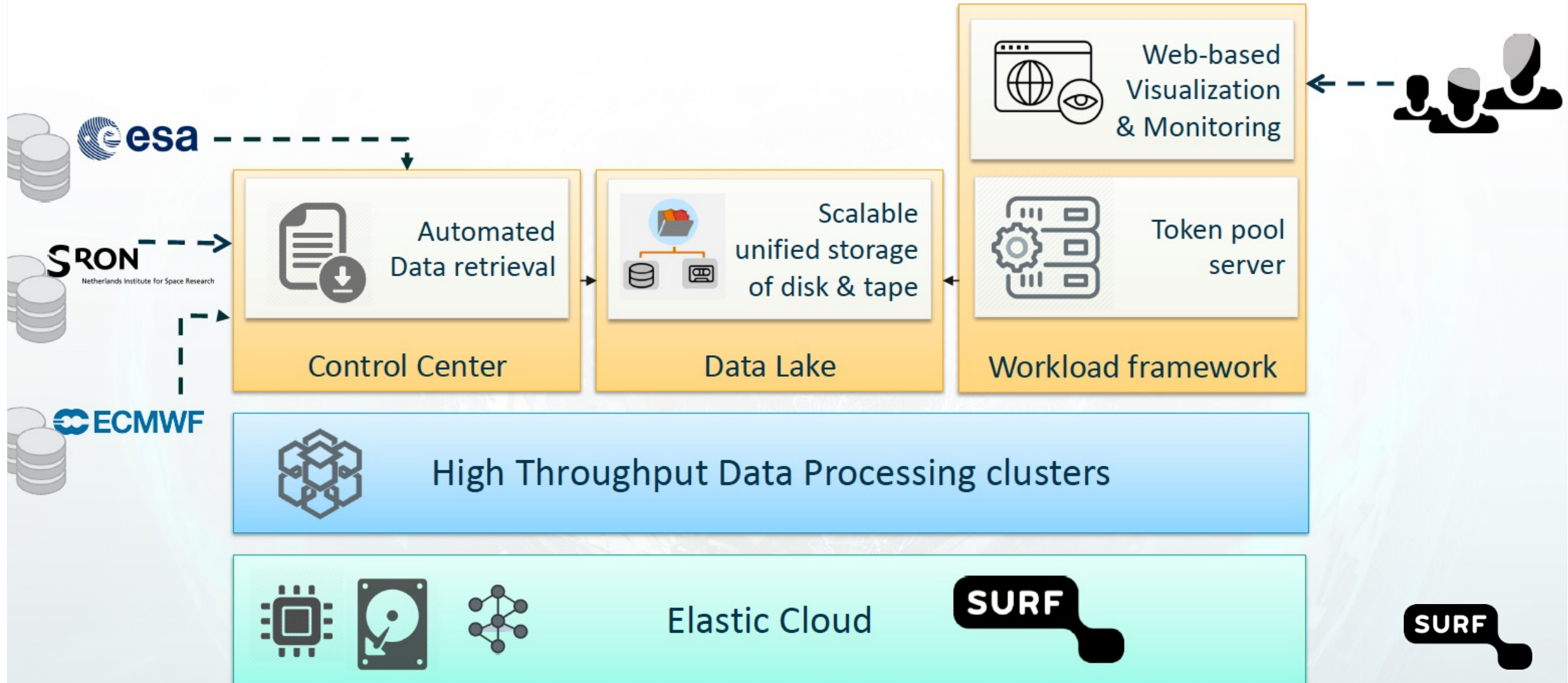
T. Borsdorff et al.: *Measuring Carbon Monoxide With TROPOMI: First Results and a Comparison With ECMWF-IFS Analysis Data, 2018*



A. Lorente et al.: *Methane retrieved from TROPOMI: improvement of the data product and validation of the first two years of measurements, 2020*

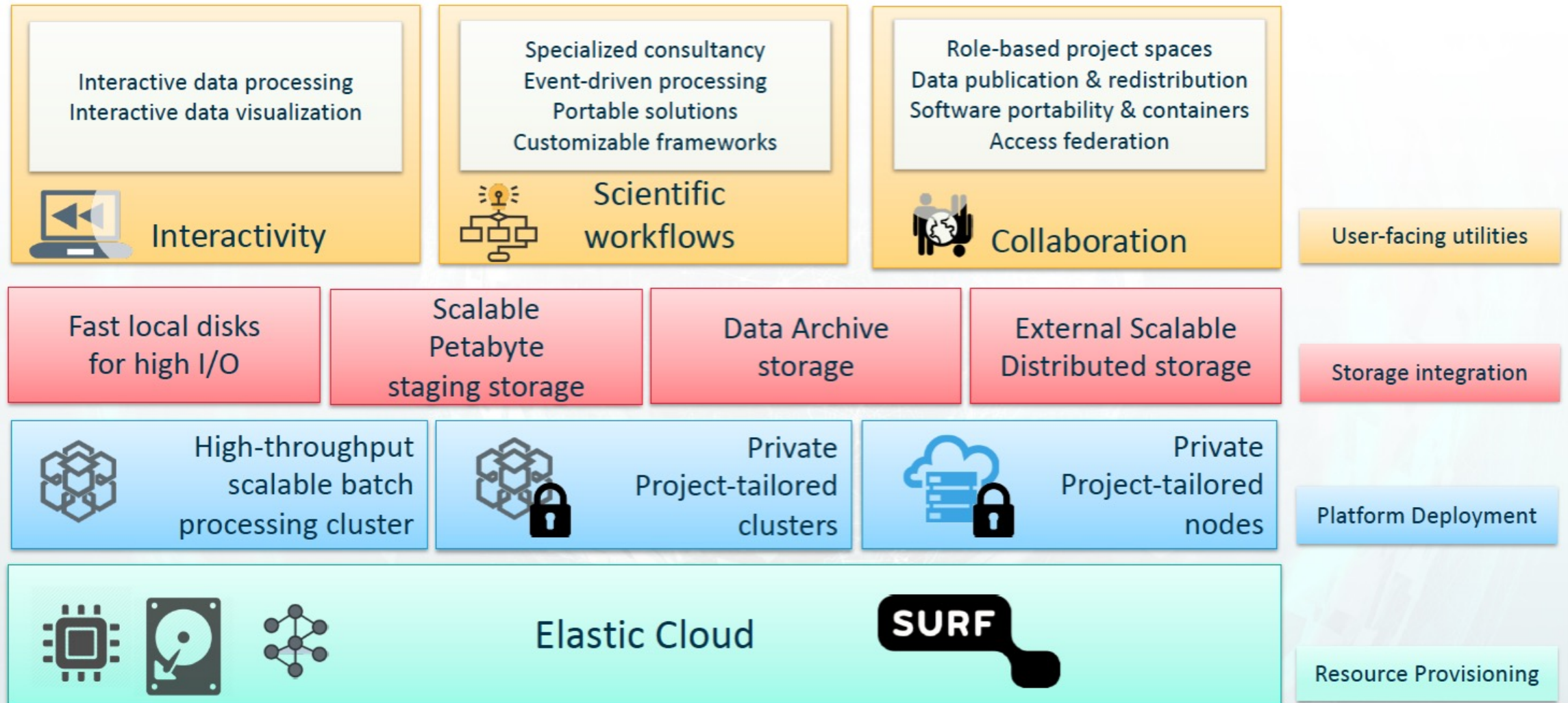
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# Tropomi processing framework





# Development and service delivery model



# Benefits of dynamic data-processing platforms for Open Science communities



Processing sheer volumes of satellite data to extract useful science

Scaling up easily & delivering solutions quickly on reliable infrastructures

Standardise solutions with APIs and industry standard protocols

Sustainable research with lower maintenance cost

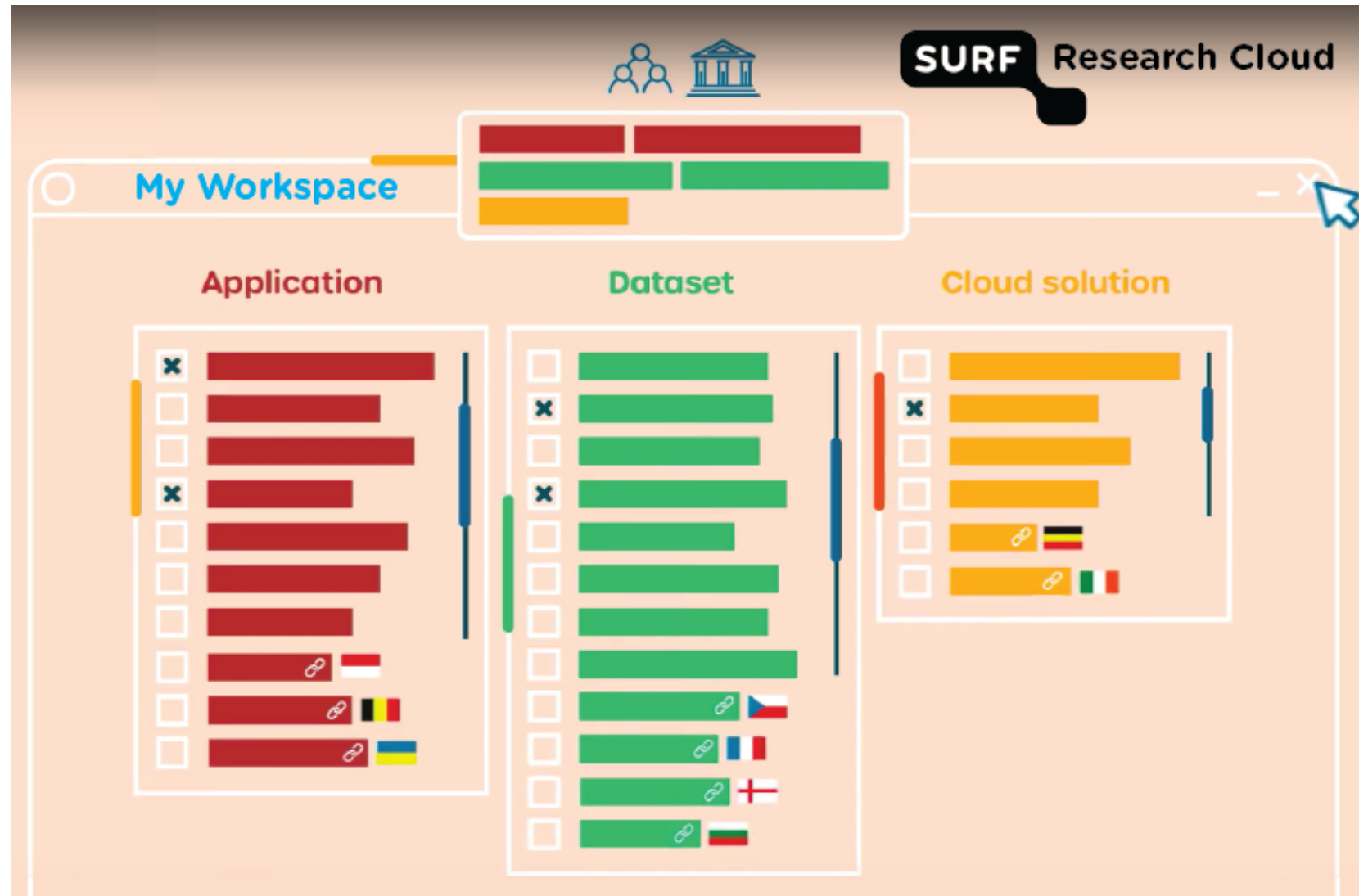
Open access, open data, open software without sacrificing performance & traceability

Increase science output and reproducibility



# KNMI (I)

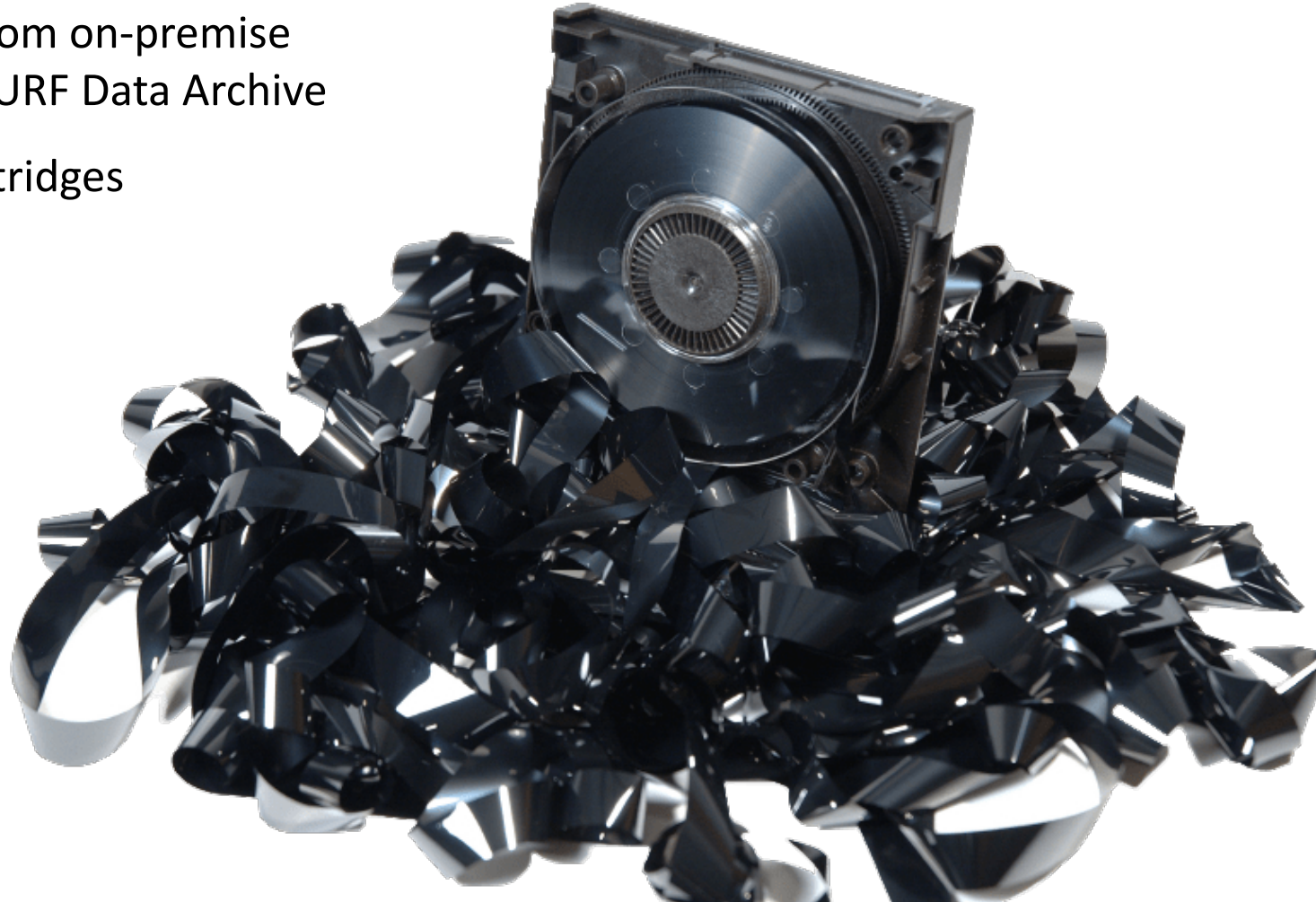
- Project-based research groups, migrating to Research Cloud





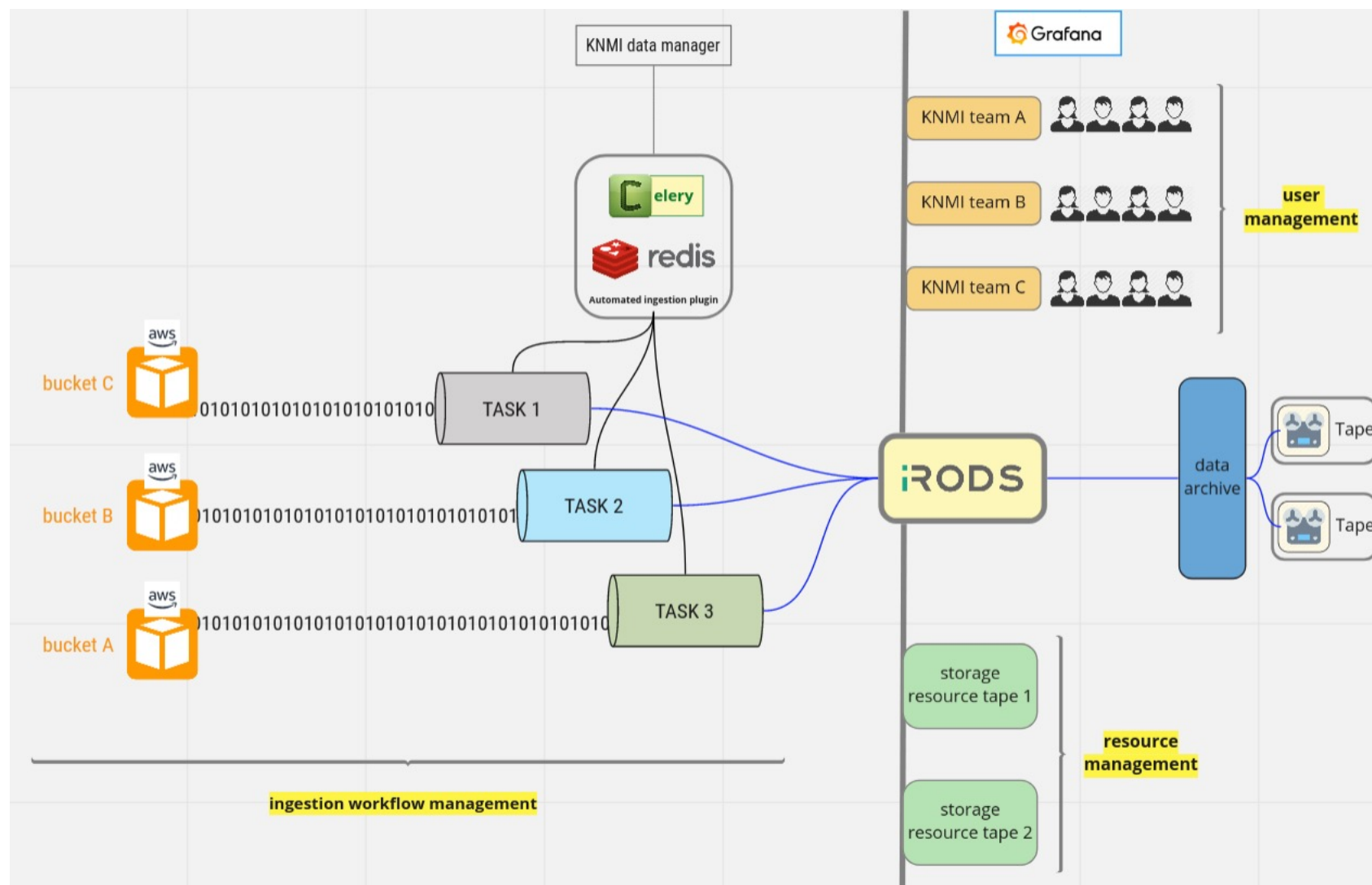
## KNMI (II)

- Migrating from on-premise archive to SURF Data Archive
- Physical cartridges
- 6 PB

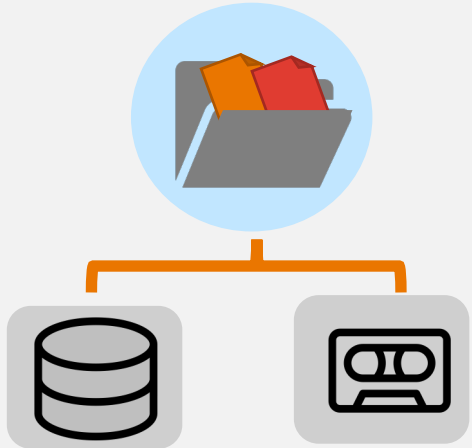


# KNMI (and III)

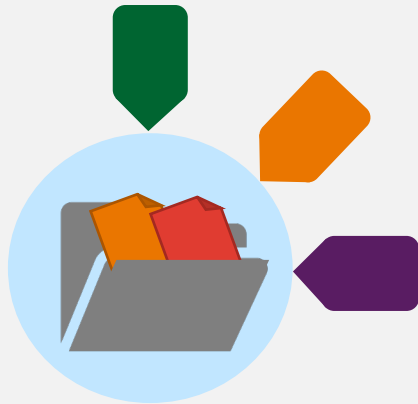
- Ingesting S3 buckets



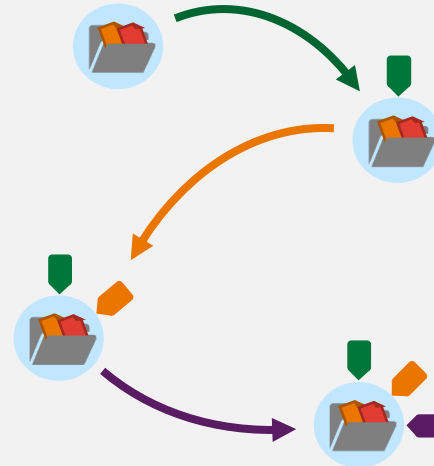
# What is iRODS?



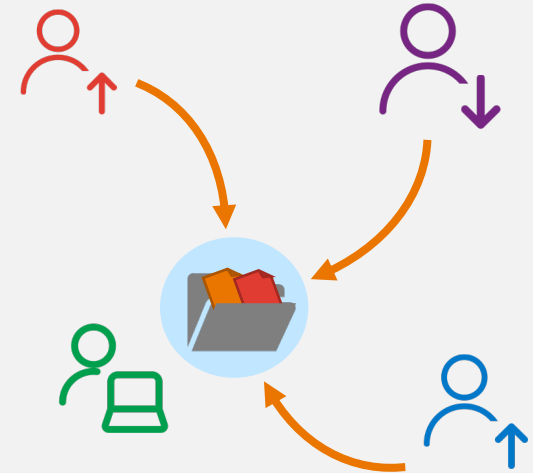
Unified storage of  
disk and tape



Metadata for  
data discovery



Rule engine to  
automate policies



Secure collaboration  
and auditing





# SURF is more... than just big systems



Consultancy



Training



Innovation



Knowledge Exchange

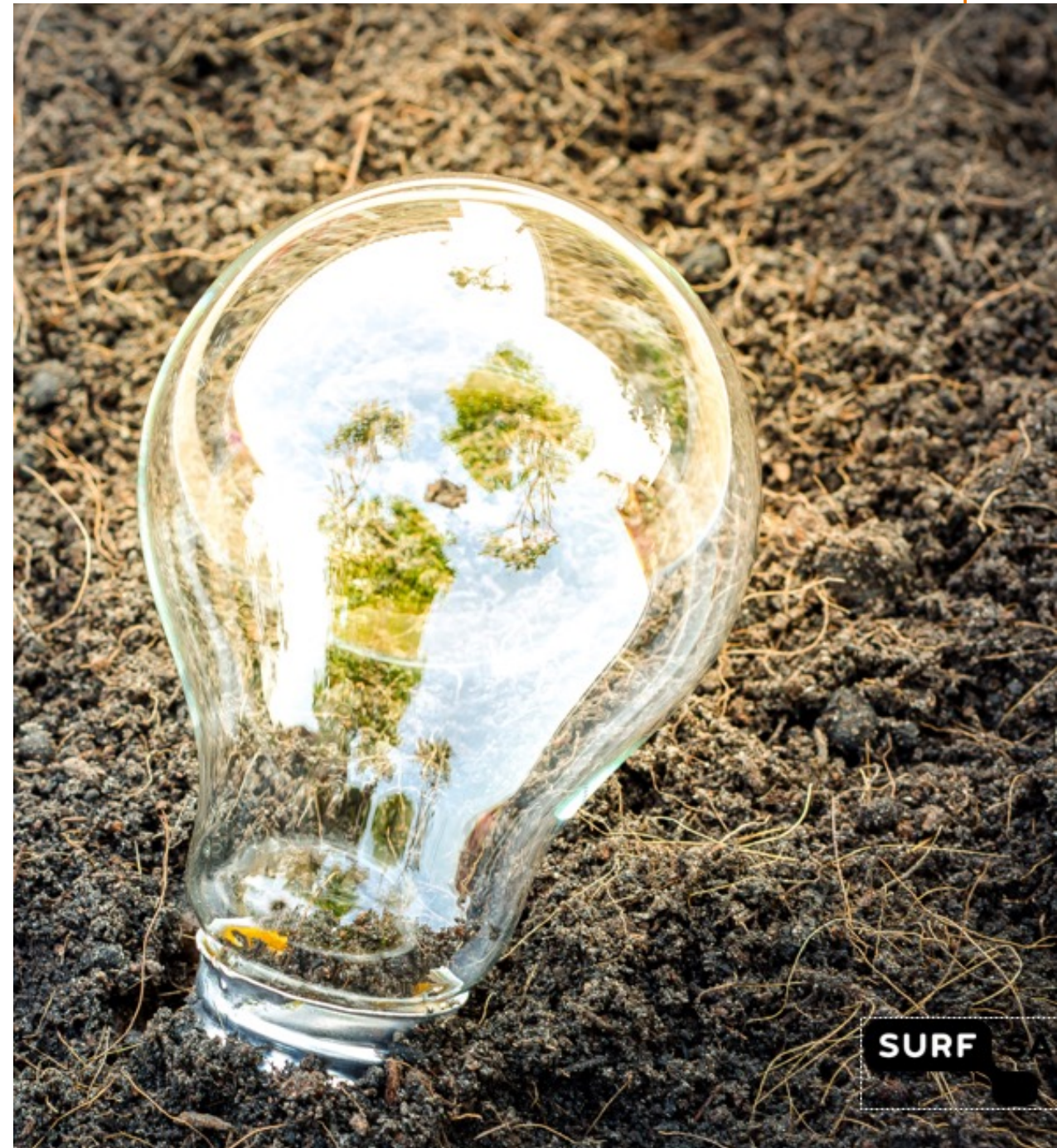





# SURF Open Innovation Lab (SOIL)

- eXploRing VR, AR and MR
- 3D printing for scientific visualisation (finished)
- Machine learning enhanced HPC applications
- Scalable deep learning
- Quantum computing
- Trusted Data Exchange
- Scalable internet-of-things-platform (finished)
- Serverless computing
- Energy Efficient Computing
- Technology assessments processors & components

<https://www.surf.nl/en/the-surf-cooperative/surf-open-innovation-lab>



# SURF Training, Knowledge exchange



CONNECTING

1st  
edition  
13/14/15  
04-2021

**FAST  
FORWARD**

SCIENCE AND TECHNOLOGY



Training

## Introduction to SURF Research Cloud

Do you want to create and manage your own work environment and run powerful applications on it? The SURF Research Cloud is a gateway that opens the door to cloud computing on several platforms. During this training, your workload will run on the SURF HPC Cloud platform, located in Amsterdam.



Sign up

07 Jul 2021

Sign up

9:00-12:00

Online

**Event type**  
Training

**Prerequisite knowledge**  
No prior knowledge required

**Costs**  
Free





# Common challenges in Earth Observation research

## Data management

- Storage
- Access to long time series
- Bulk data retrieval
- Lots of data replication

## Data processing

- Expertise for scaling
- Resources for on-demand re-processing
- Few options for interactive analysis & visualisation

## Collaboration

- Sharing data, products and scientific workflows
- Integrate tools and packages to existing frameworks
- Portability over infrastructures
- Expensive access to large-scale cloud based platforms



# SURF Earth Observation Focus group: Improve national support for EO research

Think of:

- Make scientific EO data more FAIR (findable, accessible, interoperable, and reusable)?
- Facilitate access to (inter)national EO data?
- Collaboration with researchers in (inter)national projects (e.g., Horizon Europe, Digital Europe, EOSC)?
- Community building, knowledge exchange?
- Organise trainings for young EO researchers in (high performance) IT?

Currently: Stakeholder interviews

Ensure that SURF is aligned with the medium/long-term strategy for NL EO research

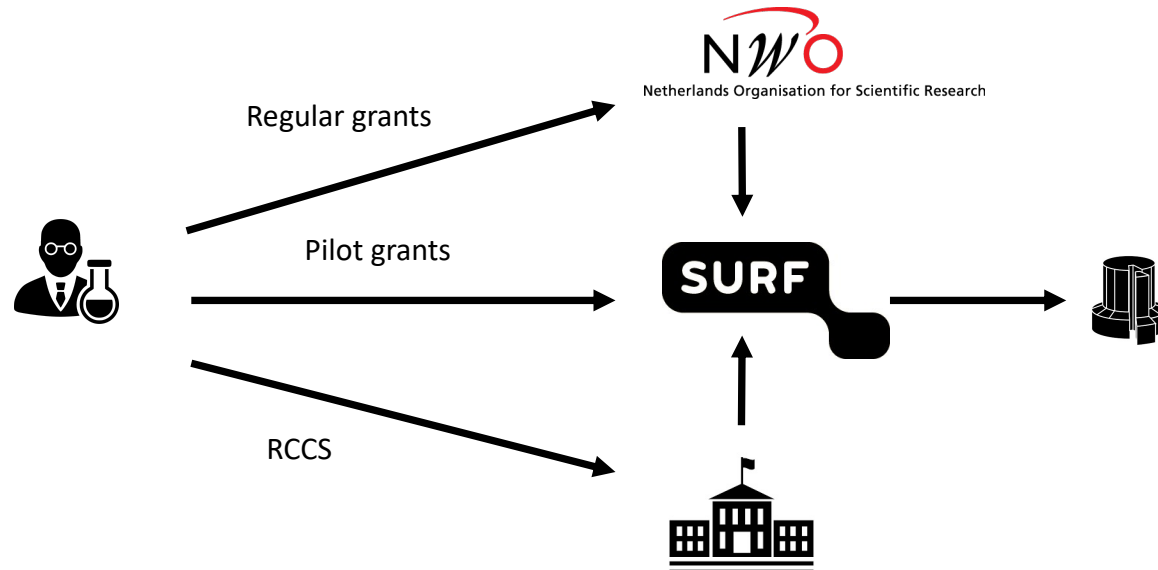




# Access Routes to Research (compute) Services

- [Regular Grants](#): Large scale\* research projects need to apply via NWO.
- [Pilot Grants](#): To run a pilot project (1/year), you can apply for limited amounts of compute, storage and support directly via SURF.
- [Research Capacity Computing Service \(RCCS\)](#) Gives organisations direct access to SURF compute facilities on a contract basis.
- Tailor made contracts

**\*Large Scale Defined:**  
+50,000 SBU on HPC Cloud and/or 2 TB online storage;  
+100,000 SBU Custom Cloud Solutions and/or +2 TB online storage;  
+100,000 SBU on cluster Lisa;  
+500,000 SBU on Cartesius and/or +50 TB project space and/or more than 50 TB offline storage;  
+500,000 SBU Data Processing (Spider and Grid) and/or more than 200 TB online storage and/or more than 300 TB offline storage.  
SBU = System Billing Unit



There are a number of different **routes to get access** to the compute and data infrastructure...

On the entry level there are the **Pilot Grants**. If you need more you need to submit a **Regular Grant** application through NWO. Lastly, the **RCCS contract**, this option allows organisations to directly buy compute time and data infrastructure at SURF.



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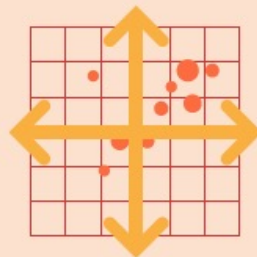
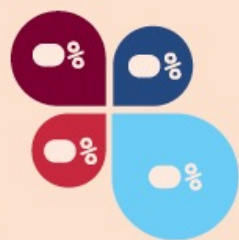
# Examples tailor made contracts UTwente

- **Data Archive**  
Library, ICT Services and Archive (LISA)
- **Research Drive** (community version)  
Faculty of Engineering Technology (ET)
- **RDM storage scale-out**  
Faculty of Electrical Engineering, Mathematics and Computer Science (EEMCS)
- **Trusted data Respository**  
Design and Analysis of Communication Services (EEMCS)



[HTTPS://WWW.SURF.NL/EN/ABOUT-SURF/SERVICES-OFFERED-BY-SURF](https://www.surf.nl/en/about-surf/services-offered-by-surf)

And... how do you handle Research Data?



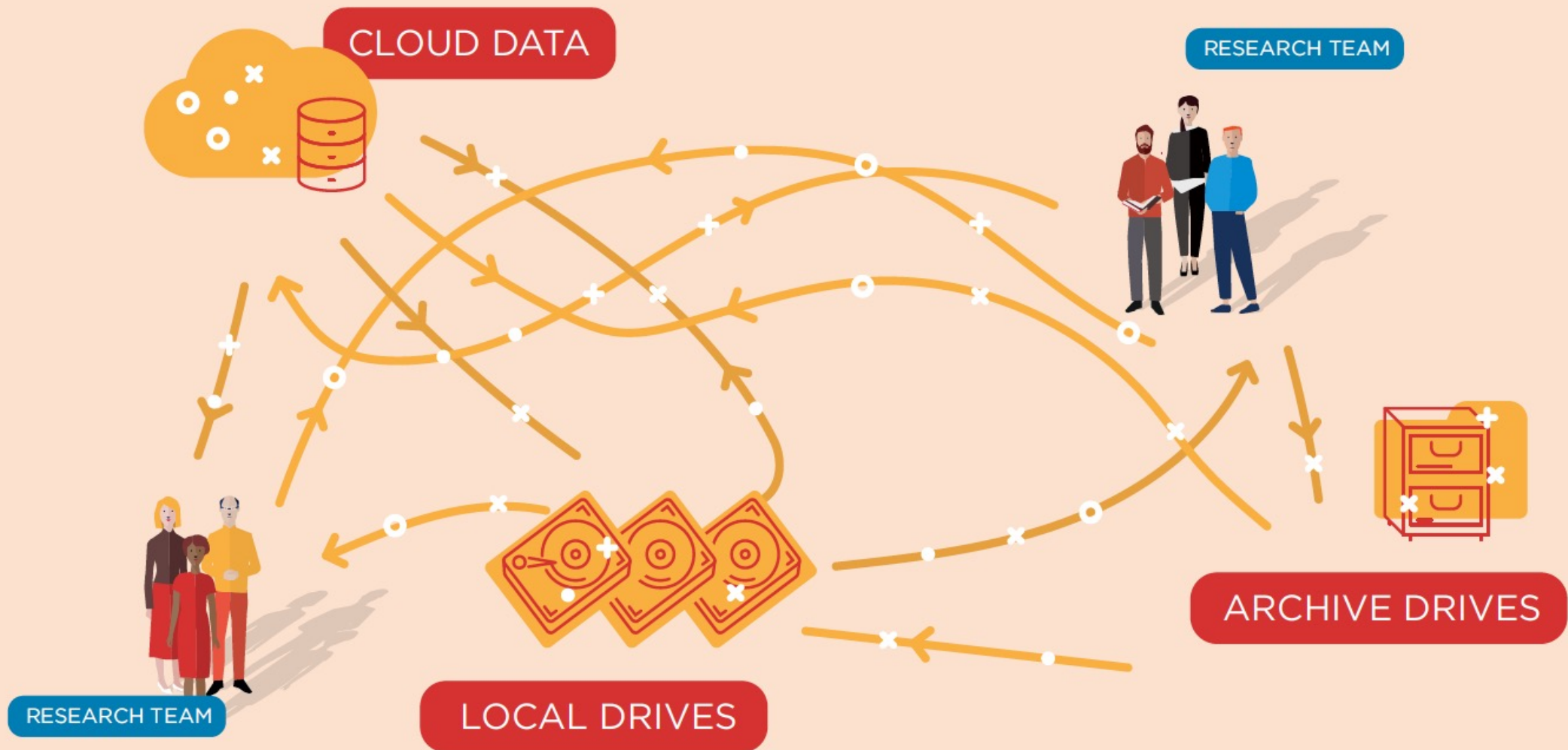
RESEARCHTEAMS

DATASETS



RESEARCH TEAMS WITH DATASETS

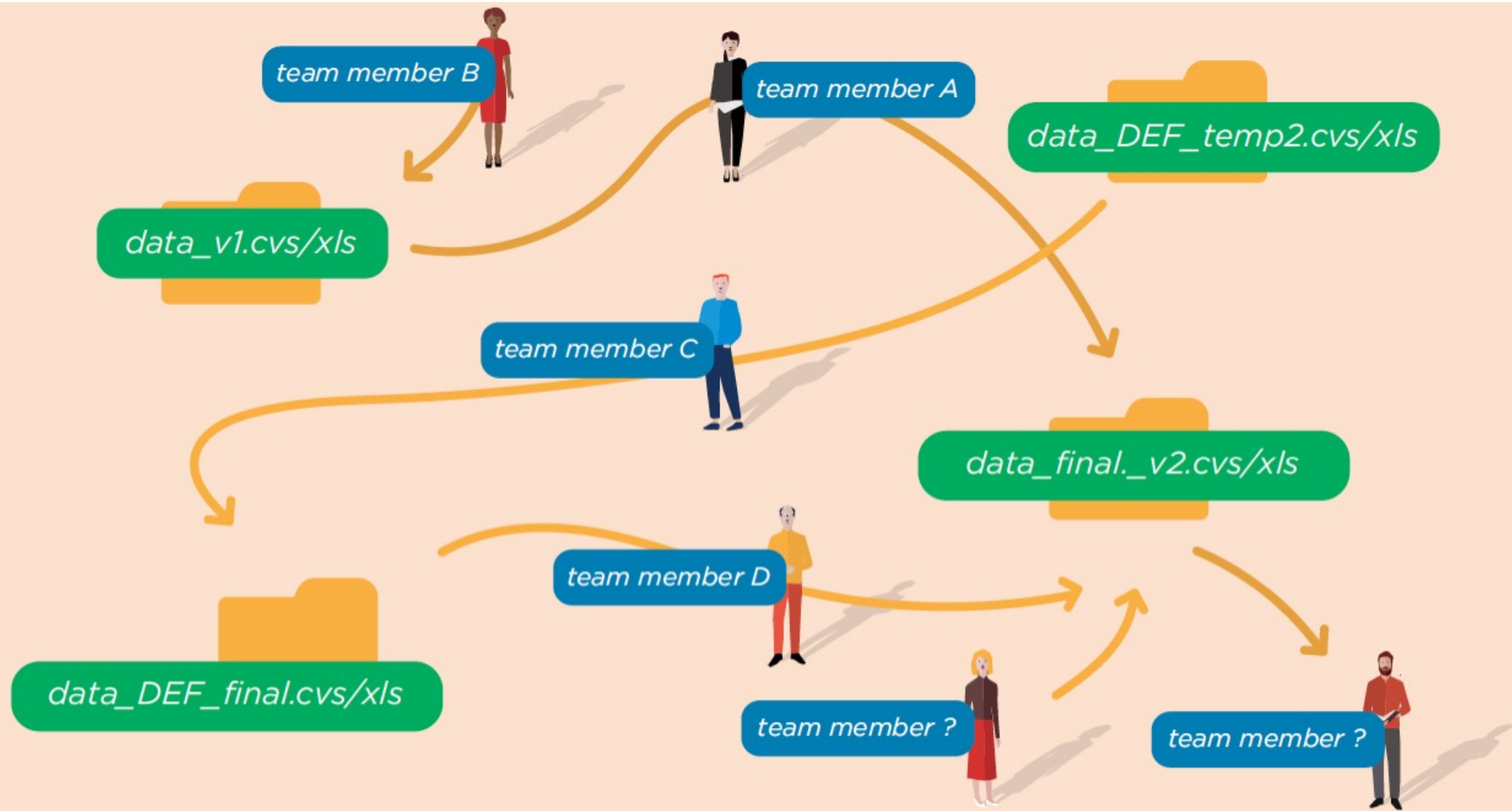
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PROBLEM  
DIFFICULTY SHARING DATA

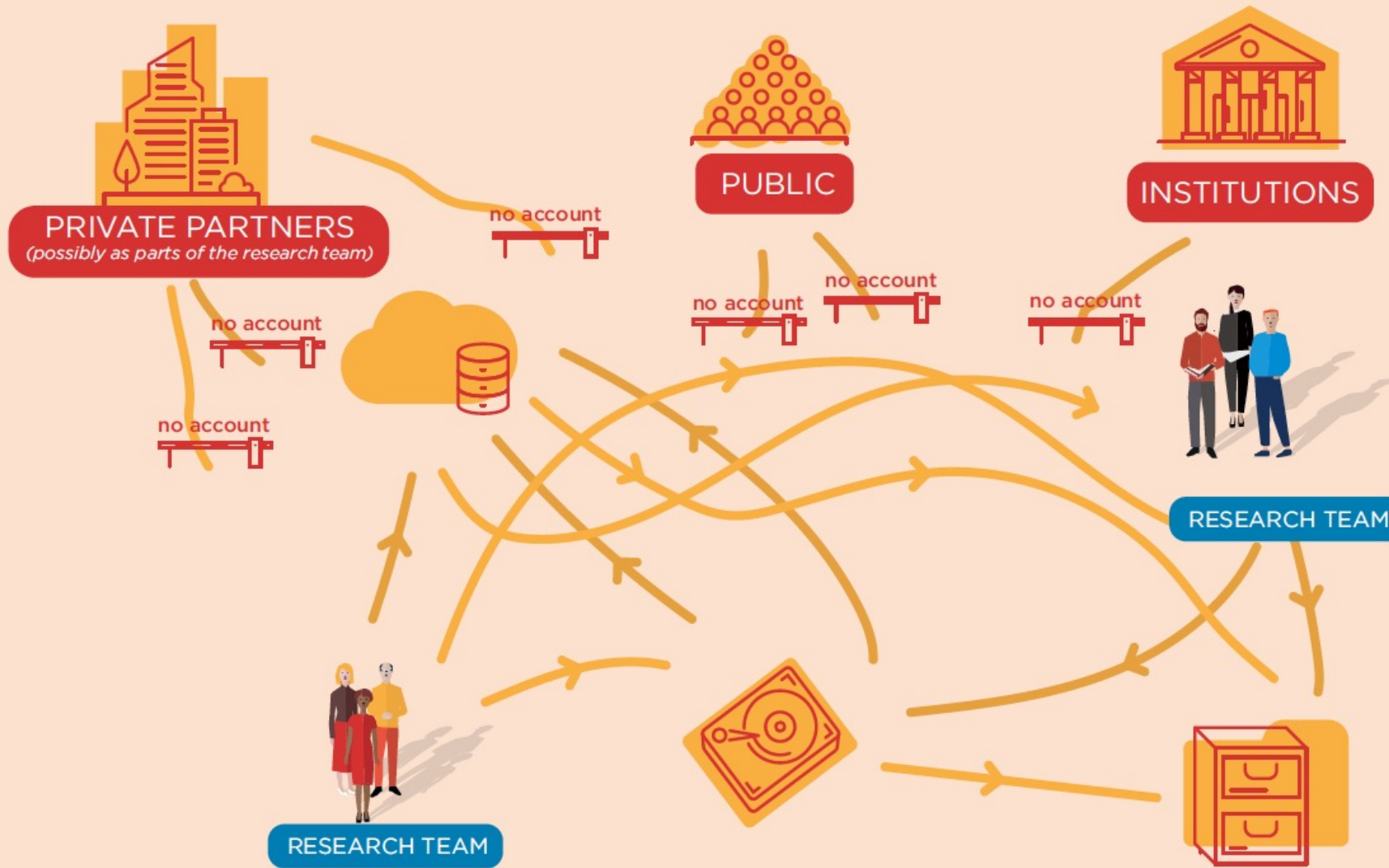






PROBLEM

# UNORGANIZED FILE AND USER ACCESS MANAGEMENT

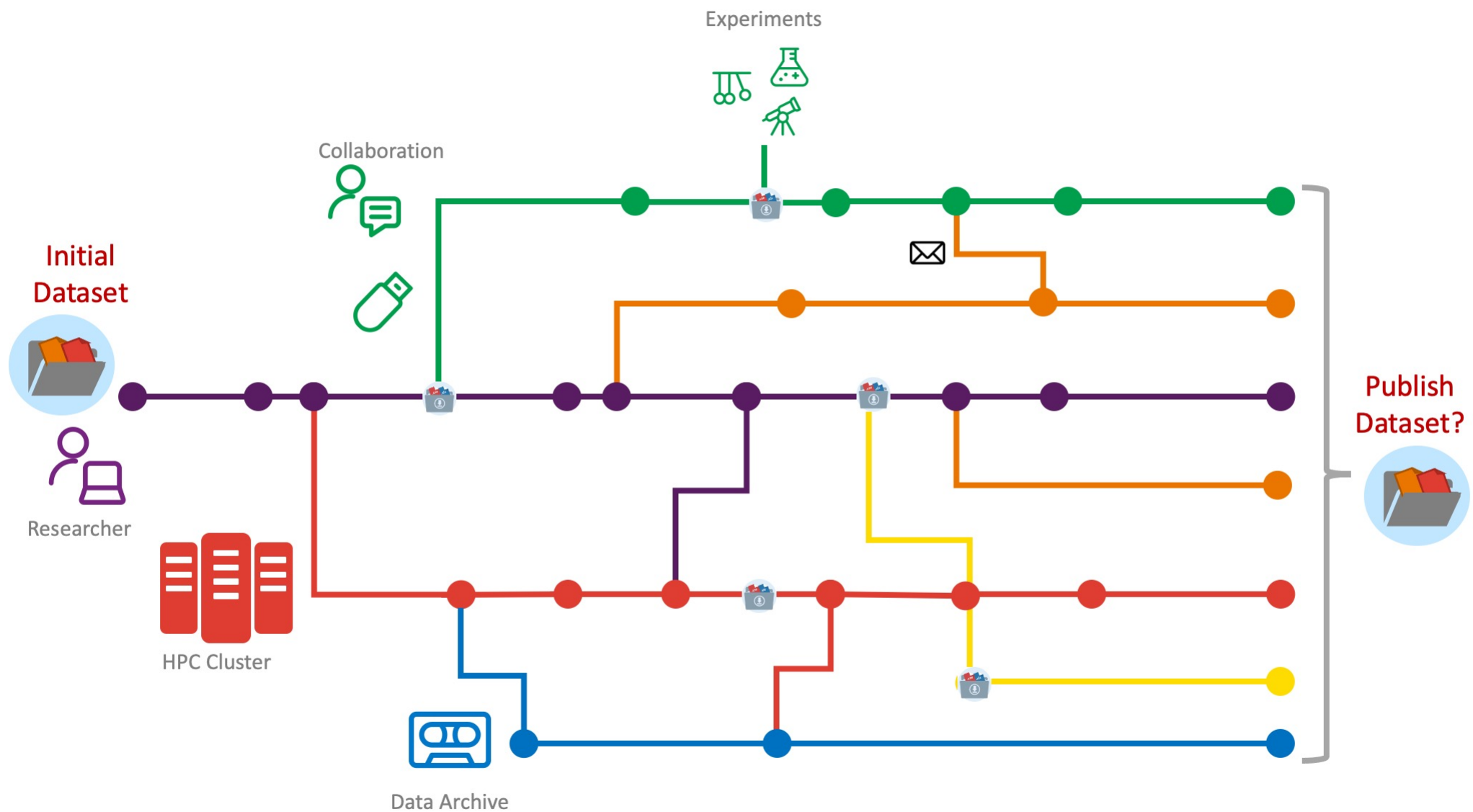


PROBLEM

ACCESS IS DIFFICULT FOR EXTERNAL PARTNERS

SURF

# Data, what's the problem?







**Thank you!**

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**Driving innovation together**

**SURF**