TELESPAZIO
a LEONARDO and THALES company

EOEPCA - OPEN SOURCE EO DATA EXPLOITATION PLATFORM





EOEPCA
BETTER ACCESS TO EARTH OBSERVATION

esa

Context – Exploitation Platform

Transforming Data to Actionable Information – value-adding

Virtual analysis environment

Data

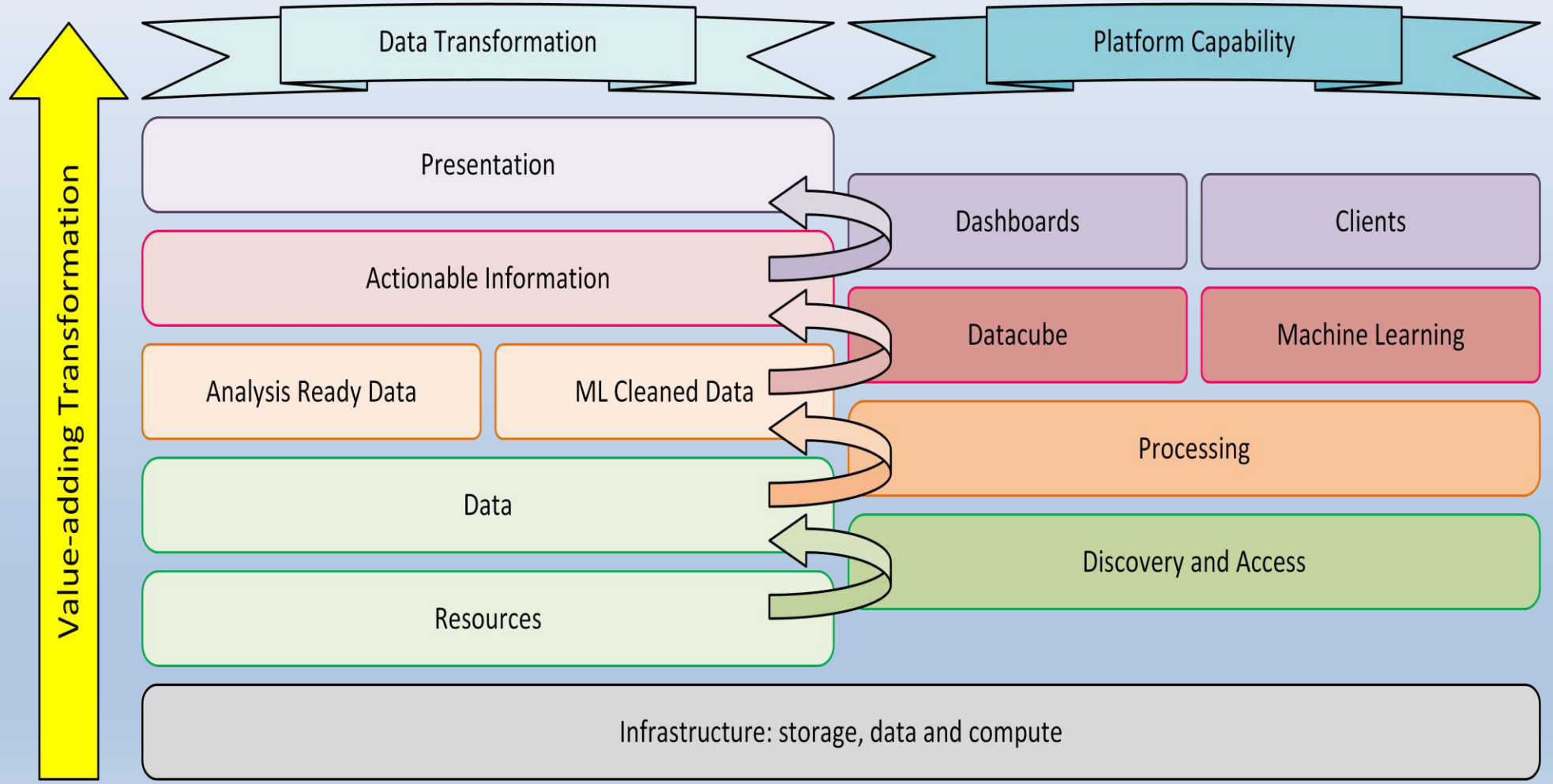
Compute

Tooling

Collaboration

Sharing

Publishing



Aims and Objectives

Problem

Many platforms in a fragmented ecosystem
Difficult for users to exploit their complementary offerings

Our Approach

Common Architecture

- Enabling **Federation** among EO cloud platform offerings
- Promote and develop **Interoperability** standards

Reference Implementation

- **Open Source**
- Avoid further fragmentation
- **Reusable Building Blocks**
- Reduce development costs

Phase 2 - Introducing EOEPCA+

Goals

- Fresh appraisal of the architecture and its implementation
  - **Reusable building-blocks** to promote **interoperability** and **federation**
  - Avoid fragmentation and reduce **development costs**

Open Source Governance

- Strengthen open source approach through **OSGeo – open governance**

Focused Development

- Roadmap informed by **Steering Committee**:
  - **Stakeholders** with Operational platforms intending to adopt EOEPCA building blocks
  - **ESA Projects** such as EarthCODE, APEx
  - **Adoption** and also possibility to **contribute**

Capabilities

- **New capability requirements**
  - Consolidation of processing workflow approaches (OGC API Processes / openEO)
  - Datacubes
  - Machine Learning
  - Open science and best practice
  - Operationalisation of added-value resources (algorithms, applications, data)

Building Blocks

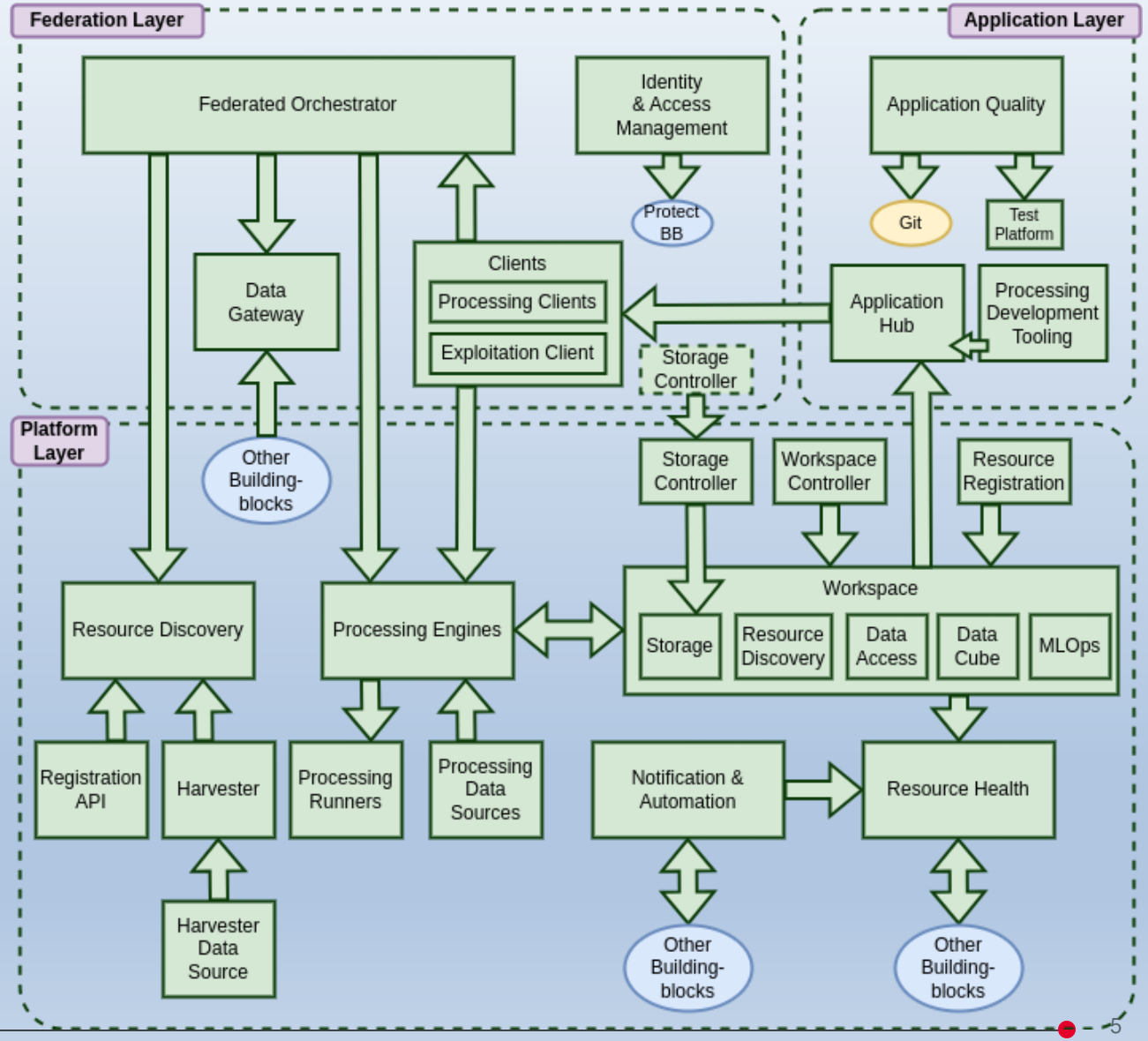
Reference Implementation of the Common Architecture defined by Building Blocks with open standard interfaces

What is a Building Block (BB)?

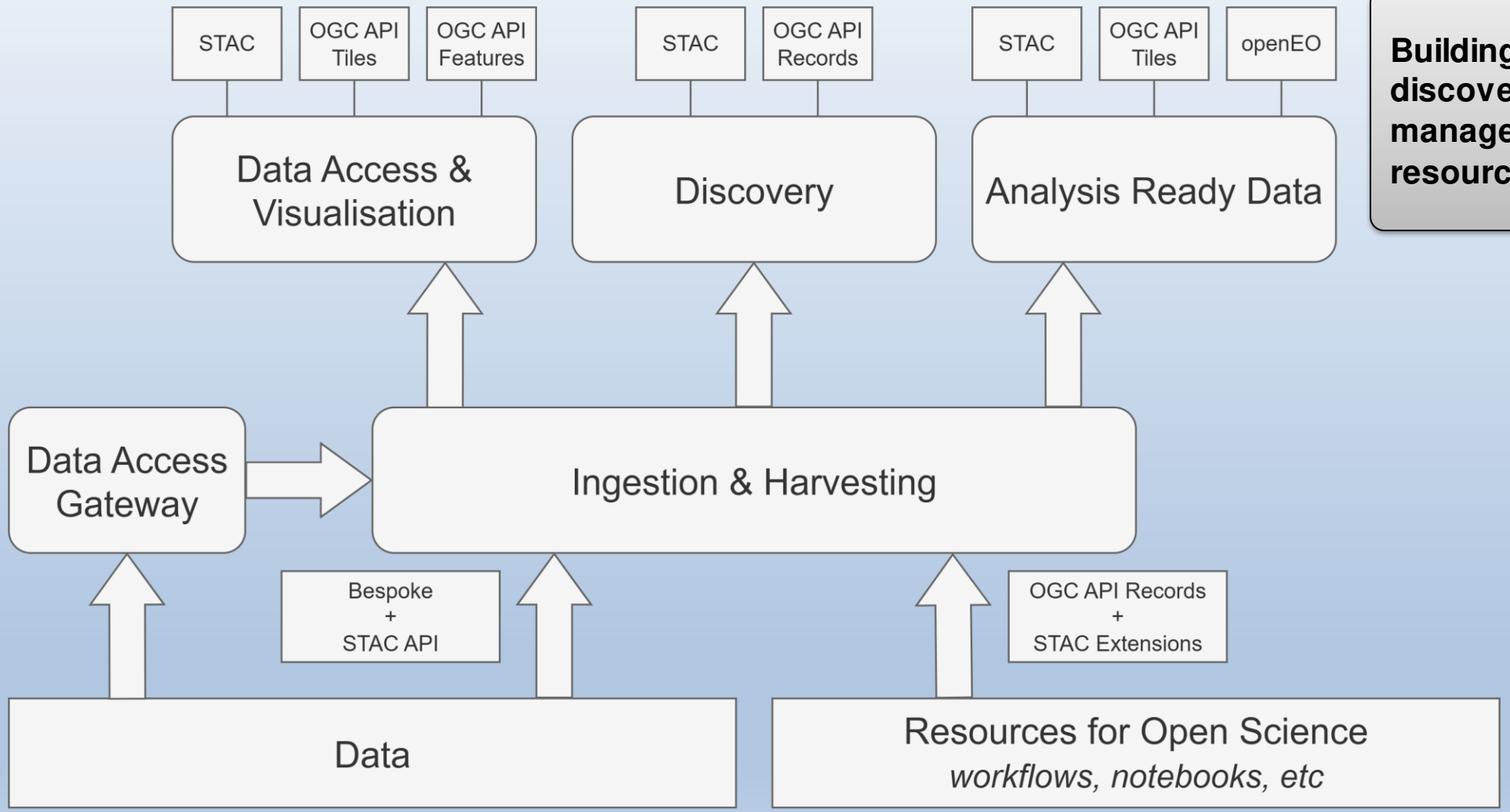
- Software component that implements a specific platform capability
- Typically provides a service interface (REST API) -> standards
- Designed to be used on their own, or in combination as a system
- Open Source

Deployment

- Kubernetes
- Containerised implementation
- Dedicated helm chart for each BB

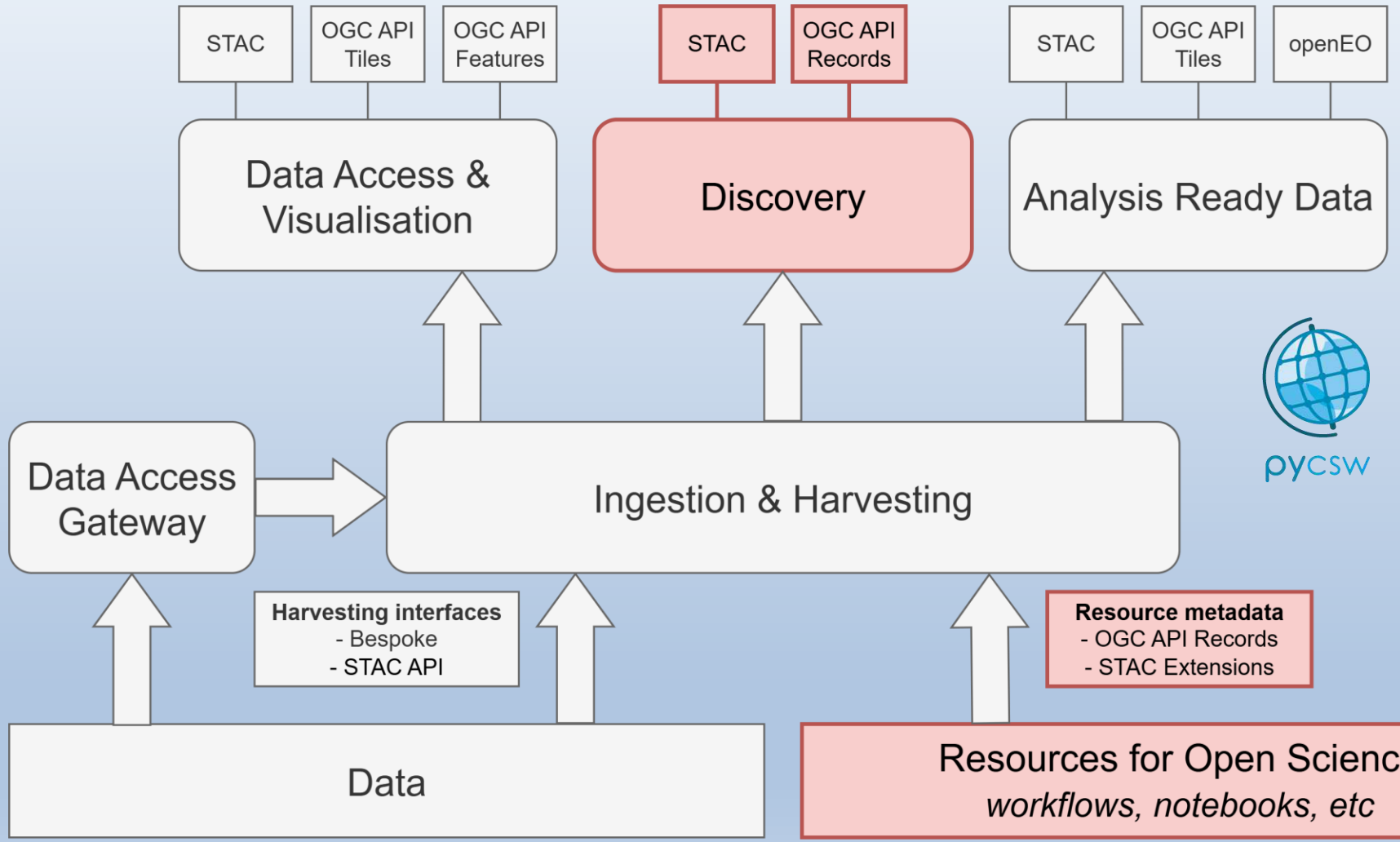


Data and Resources



Building Blocks for discovery, access and management of data and resources

Resource Discovery



Resource Discovery BB

OGC and STAC interfaces

For Reproducible Open Science:

- Workflows, datasets, notebooks, ML models, training data, source repo, documentation, …

EOEPCA Metadata Profile:

- OGC API Records schema
- With STAC Extensions

Data and Resources **Data Discovery & Access**

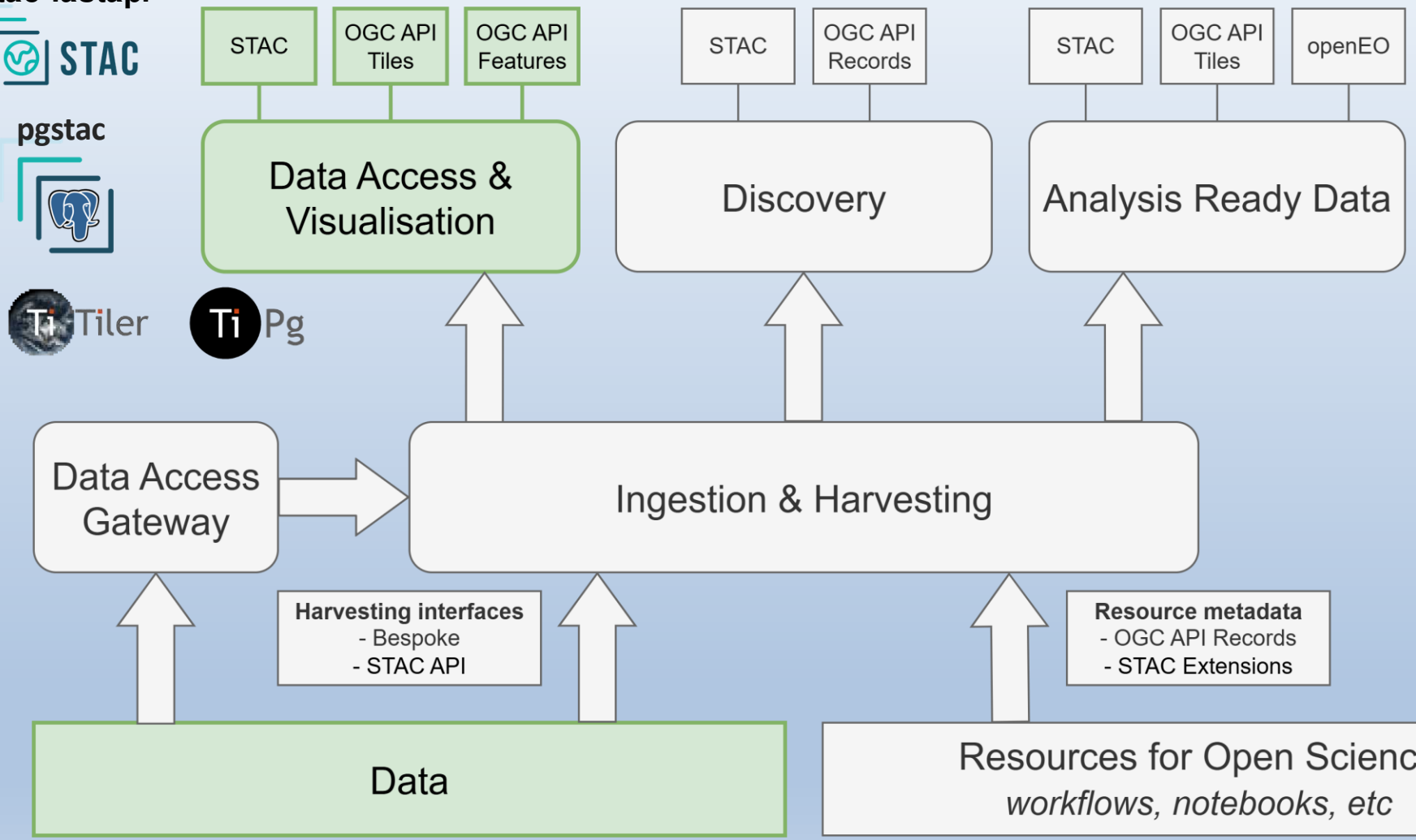
stac-fastapi

STAC

pgstac

Tiler

Pg

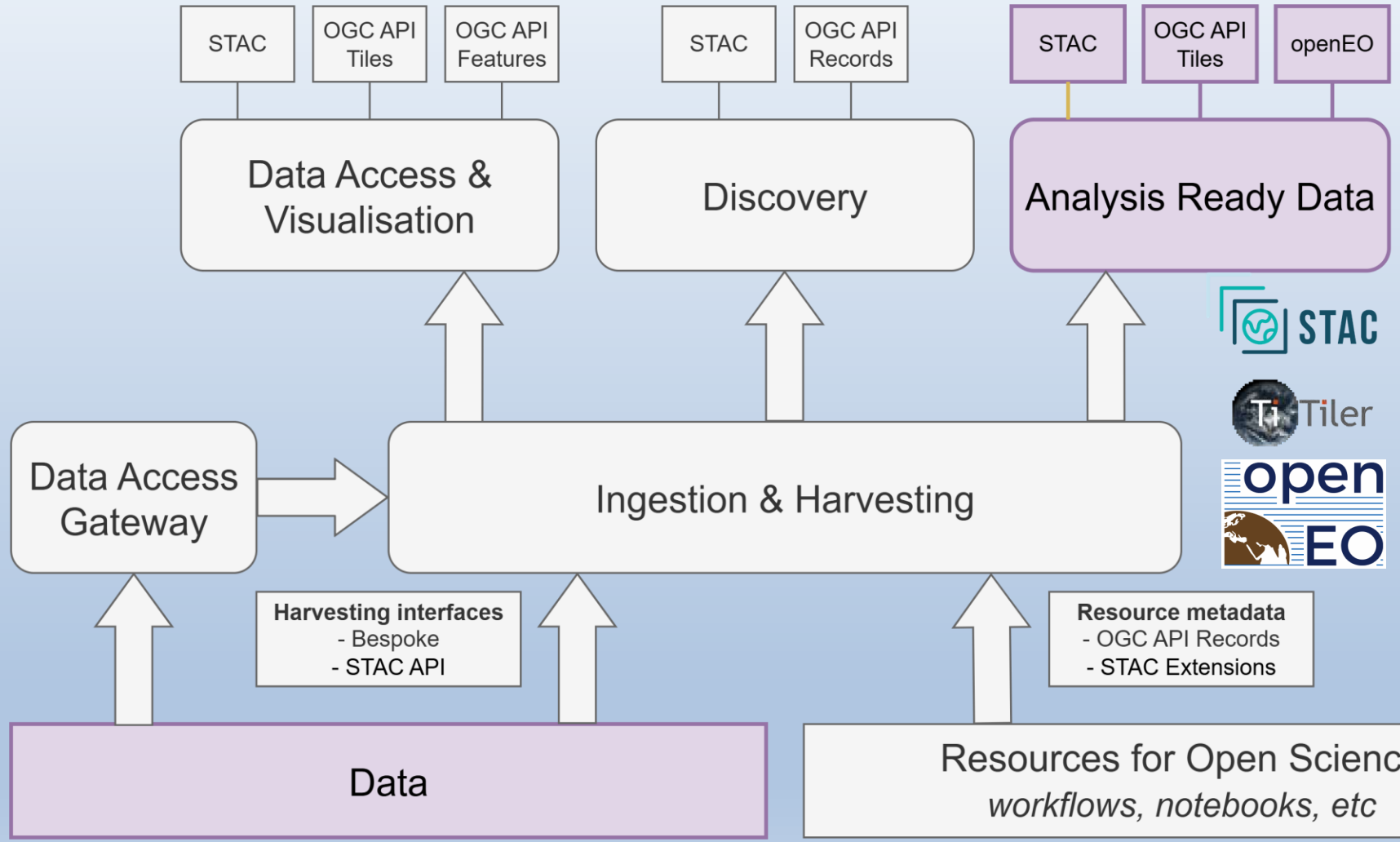


Data Access BB

STAC interface for data discovery

OGC Tiles/Features interfaces for data access and visualisation

Datacube Access



Coming Soon

Datacube Access BB

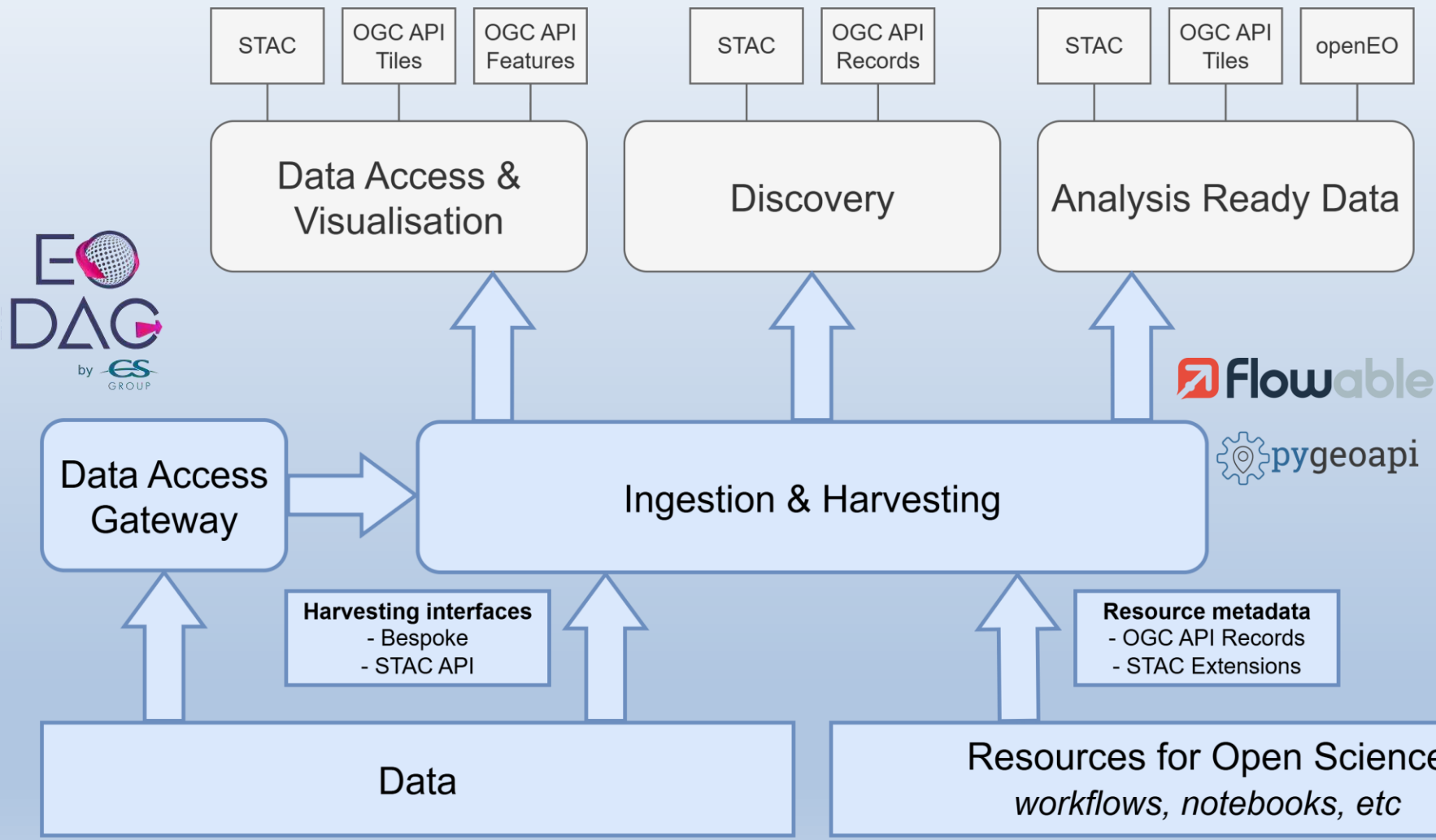
Pixel-based access to multi-dimensional Analysis Ready data

Consolidated API for datacube discovery (STAC), access (Tiles) and synchronous processing (openEO)

Informed by OGC (Testbed-20) GeoDatacube API

STAC Best Practice for Datacubes

Ingestion & Harvesting



BETA

Resource Registration BB
Data harvesting from external sources:

- Generic STAC harvester
- Tailored workers

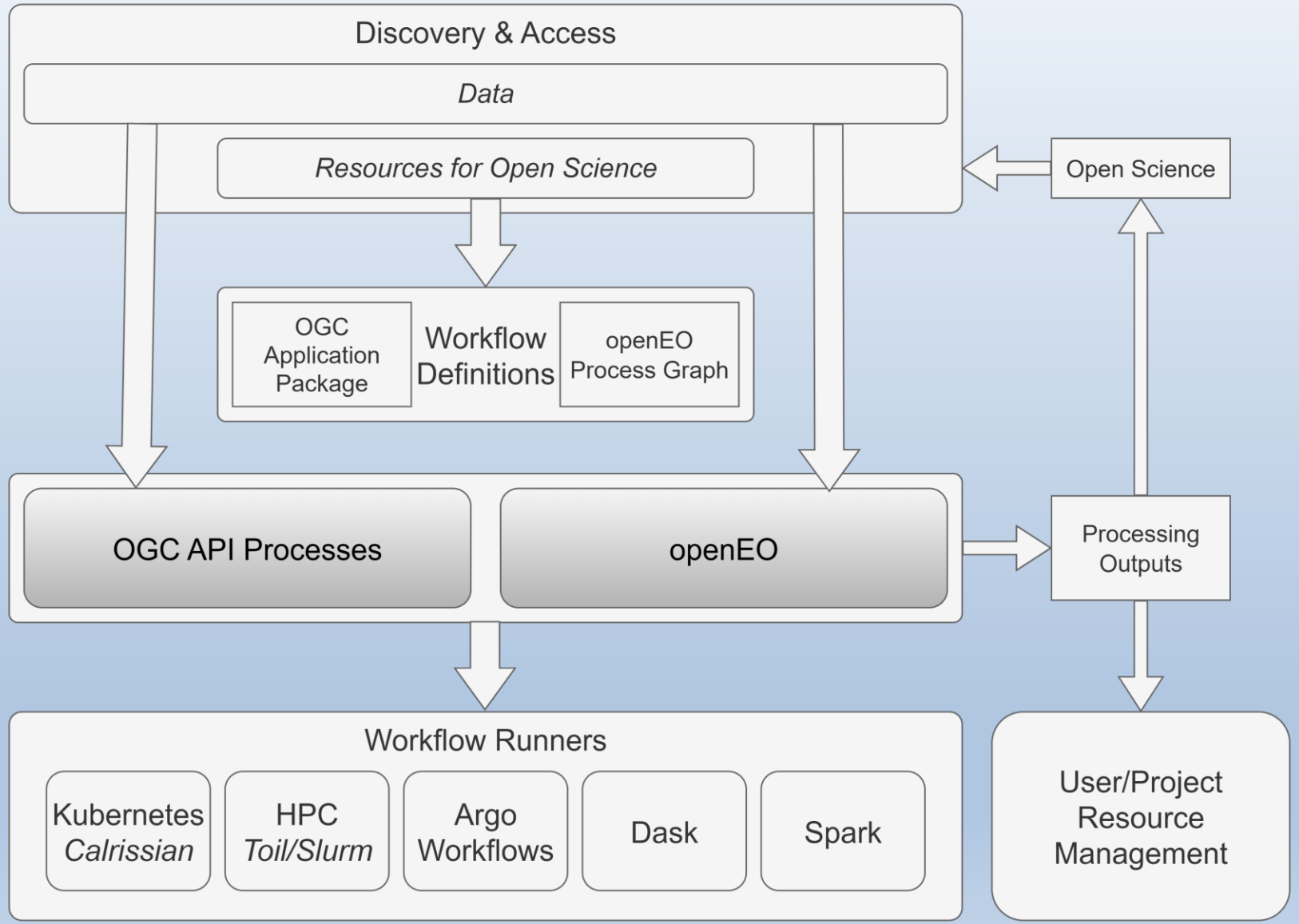
API for resource registration

- EOEPCA Metadata Profile

Data Access Gateway BB
EODag:

- Data source abstraction
  - Data access protocol
  - Authn / Authz
- Python library
- Extensible data providers

Processing

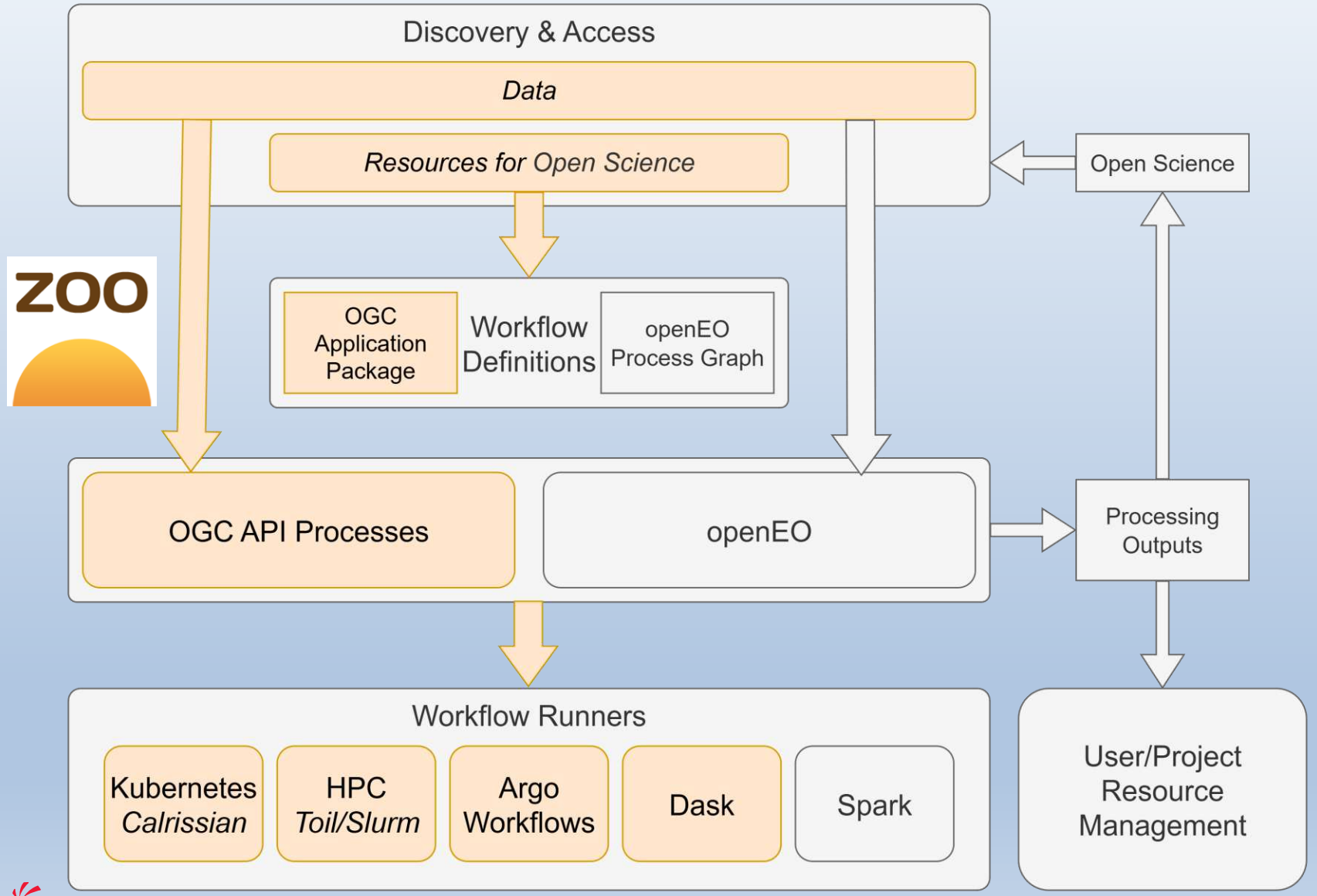


Bring the processing to the data

Building Blocks for user-defined processing and analysis

Two complementary approaches

Processing OGC API with Application Packages

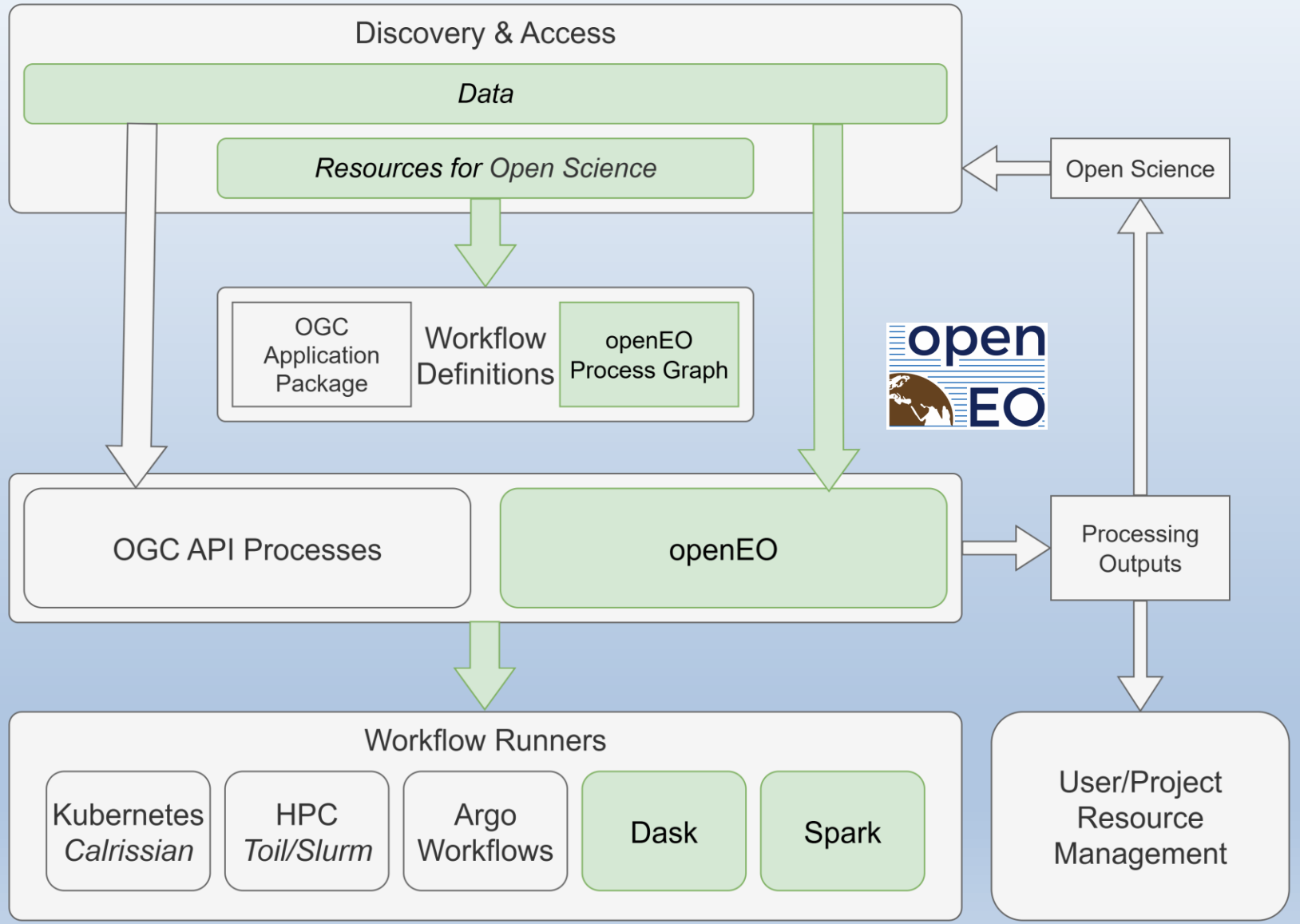


OGC Application Package
- Portable processing workflows
- Common Workflow Language
- Steps: Containerised algorithms
- OGC Best Practice

Processing BB
OGC API Processes
- General Purpose Processing
- Containerised workflows
- OGC Application Package
- Suited to batch processing

Workflow Runners
Backend workflow execution
Extensible integrations for CWL orchestration

Processing openEO



Processing BB - openEO

- Client-oriented Semantics
- Python, R, JavaScript clients
- JSON workflow representation
- Close data integration
- Emerging support for Application Packages

Workflow Runners

- Backends for Dask and Apache Spark
- Also TiTiler-based implementation for synchronous Datacube Access

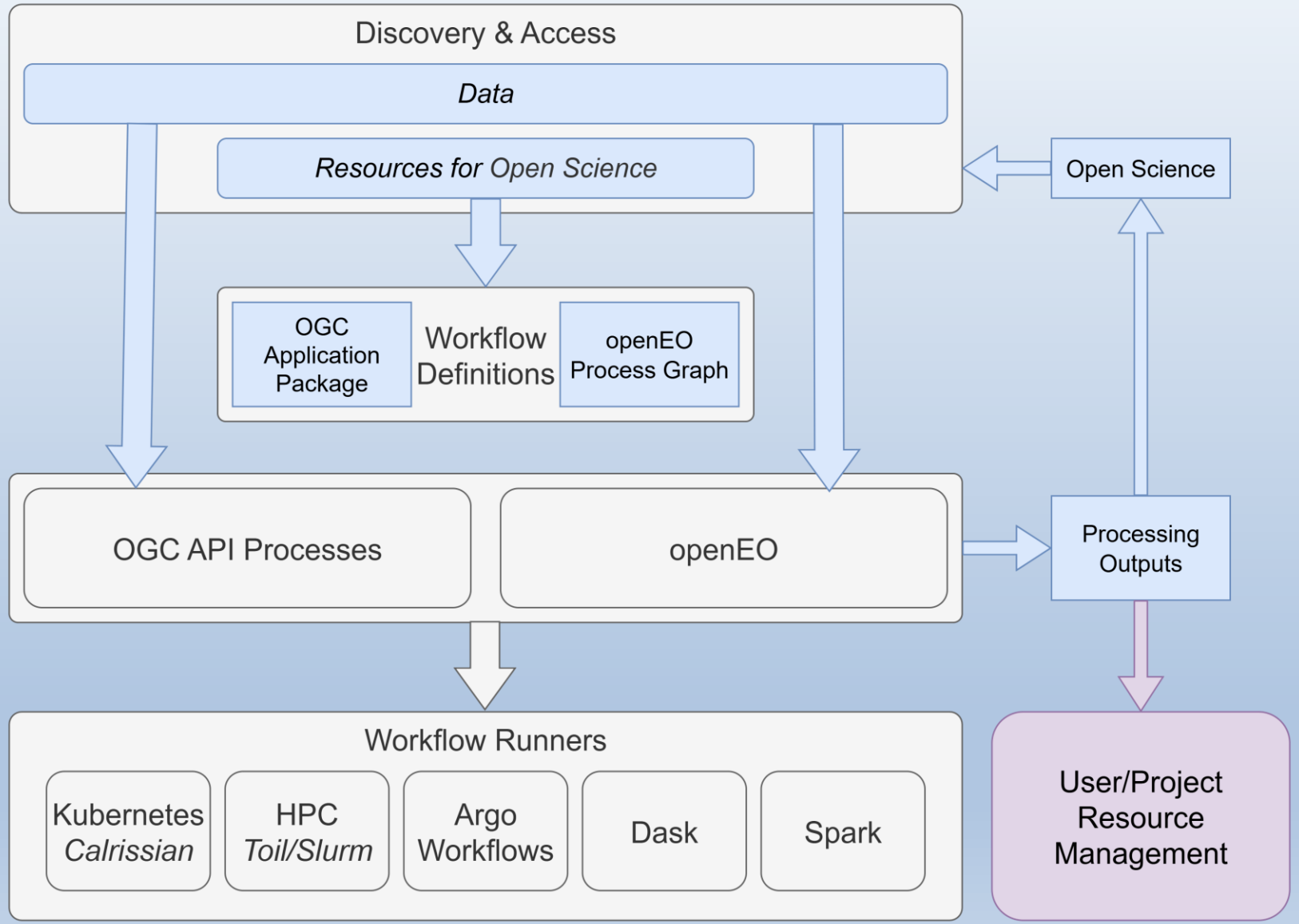
Federated Orchestrator BB Coming Soon

Cross-platform workflow execution
Hybrid workflows, combining:

- openEO / OGC API Processes
- Application Packages
- openEO Process Graphs

Processing

Open Science



Reproducible Open Science

- Portable/reusable workflows
- Shared processing results
- My Outputs => Your Inputs
- EOEPCA Metadata Profile

Workspace BB

- User / Project / Team
- Resource management
- Collaboration / sharing
- Storage and shared services
- Integrates with other BBs

File Browser

vcluster

And there's more…

Federated User Identity

- **IAM BB**
- Single Sign-on
- External Identity Provider integration

Machine Learning

- **MLOps BB**
- Model Training & Management
- Training data management

Interactive Analysis

BETA

- **Application Hub BB**
- Notebooks for Scientific Storytelling
- Dashboards to showcase research outcomes

Application Best Practice

- **Application Quality BB**
- Best practices for Reproducible Open Science
- Static analysis
- Performance tuning

BETA

Event-driven Behaviour

- **Notification & Automation BB**
- Automated behaviour
- E.g. systematic processing
- Building Block decoupling

Coming Soon

Operational Outcomes

- **Resource Health BB**
- Added-value Outcomes
- **Datasets, workflows, applications**
- Automated monitoring and alerts

BETA

Partner Organisations

DLR
EOX
EOFARM
development SEED

Resource Discovery
Resource Registration
Data Access
Datacube Access
Workspace

TERRASUE
vito
GeoLabs
eurac research
Matthias Mohr Softwareentwicklung

Processing
Application Hub
Federated Orchestrator
Notification & Automation

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NOVASPACE
Communications & Outreach

werum SOFTWARE & SYSTEMS
IAM

CS a Sopra Steria company
MLOps
Data Gateway

spaceapplications SERVICES
SENSmetry
Application Quality
Resource Health

13 Building blocks (and counting) by a variety of developers

EOEPCA+ @ OSGeo

Home » Projects » EOEPCA+

EOEPCA+

EOEPCA+'s vision is to streamline the access to and processing of earth observation (EO) data located on multiple platforms and within disparate networks. The goal is to enhance interoperability by defining the technical interfaces between these cloud resources in line with OGC standards and best practices.

OSGeo Community

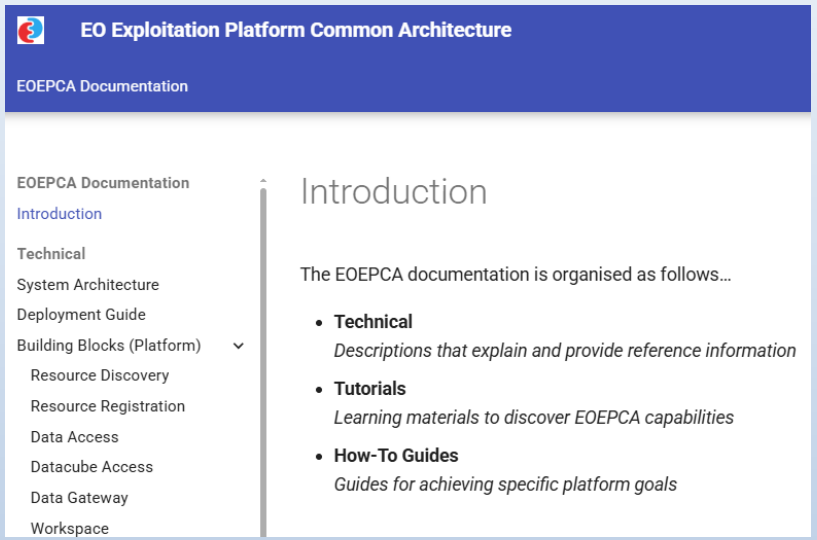
Back to projects

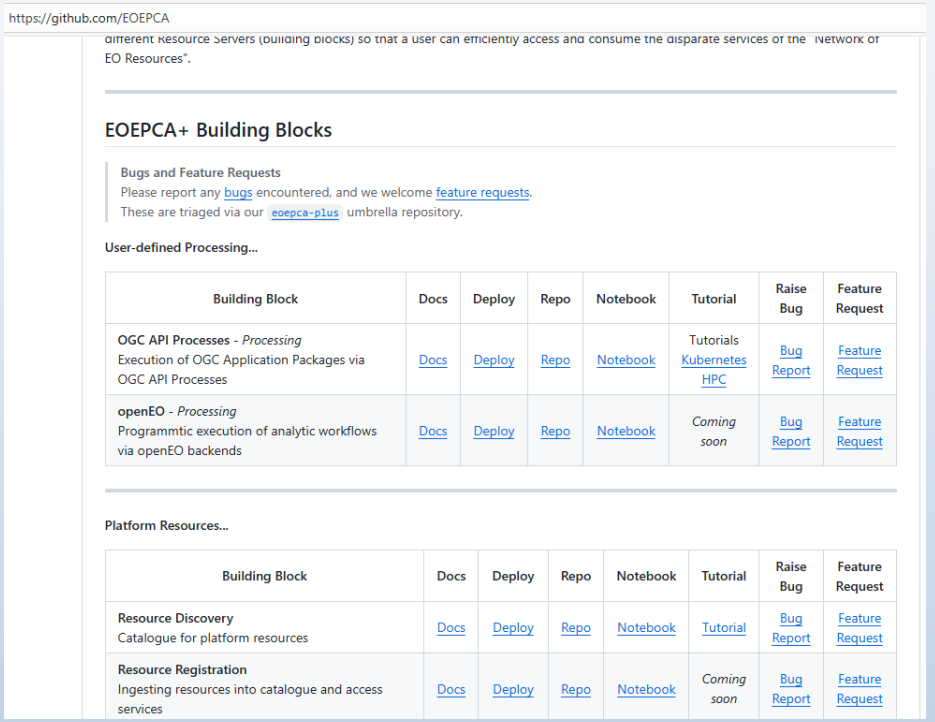
EOEPCA
BETTER ACCESS TO EARTH OBSERVATION

Learn more | Quick Start

Documentation:

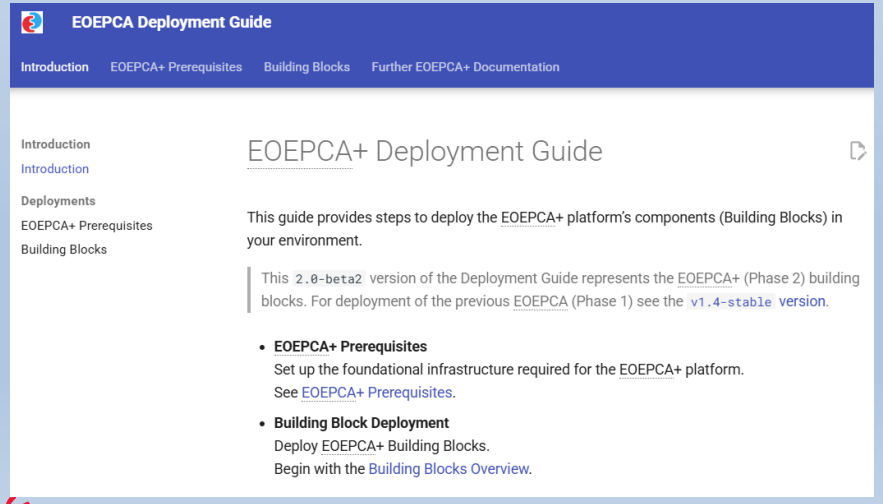
https://eoepca.readthedocs.io/





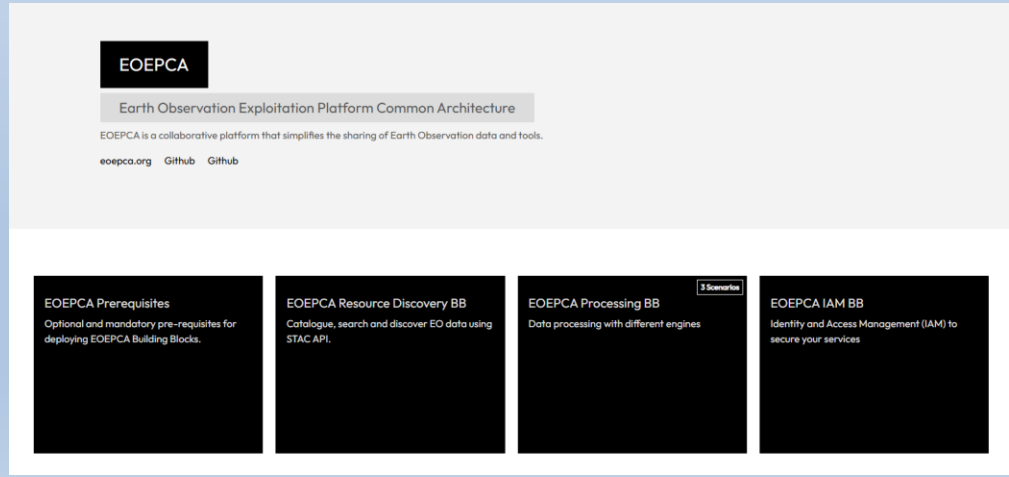
Central repository:

https://github.com/EOEPCA



Interactive tutorials:

https://killercoda.com/eoepca/



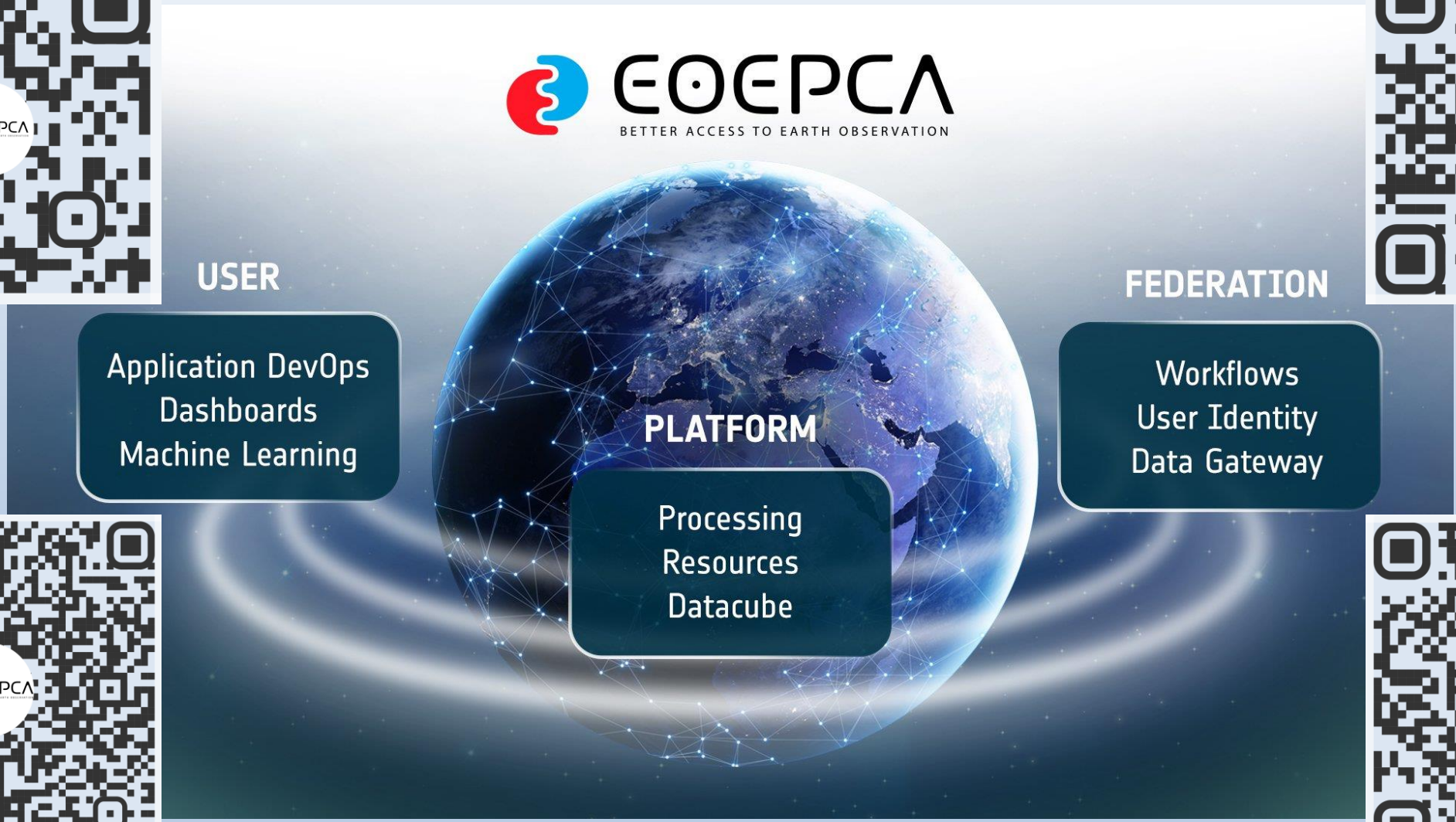
Demo Area – This afternoon
12.55pm

An Interactive Demo
of Cloud-Native EO Processing

Find Us

eoepca.org

Documentation



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THANK **YOU**
FOR YOUR ATTENTION

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