

EOEPCA - OPEN SOURCE EO DATA EXPLOITATION PLATFORM



EOEPCA
BETTER ACCESS TO EARTH OBSERVATION



Context – Exploitation Platform

Transforming Data to Actionable Information – value-adding

**Virtual analysis
environment**

Data

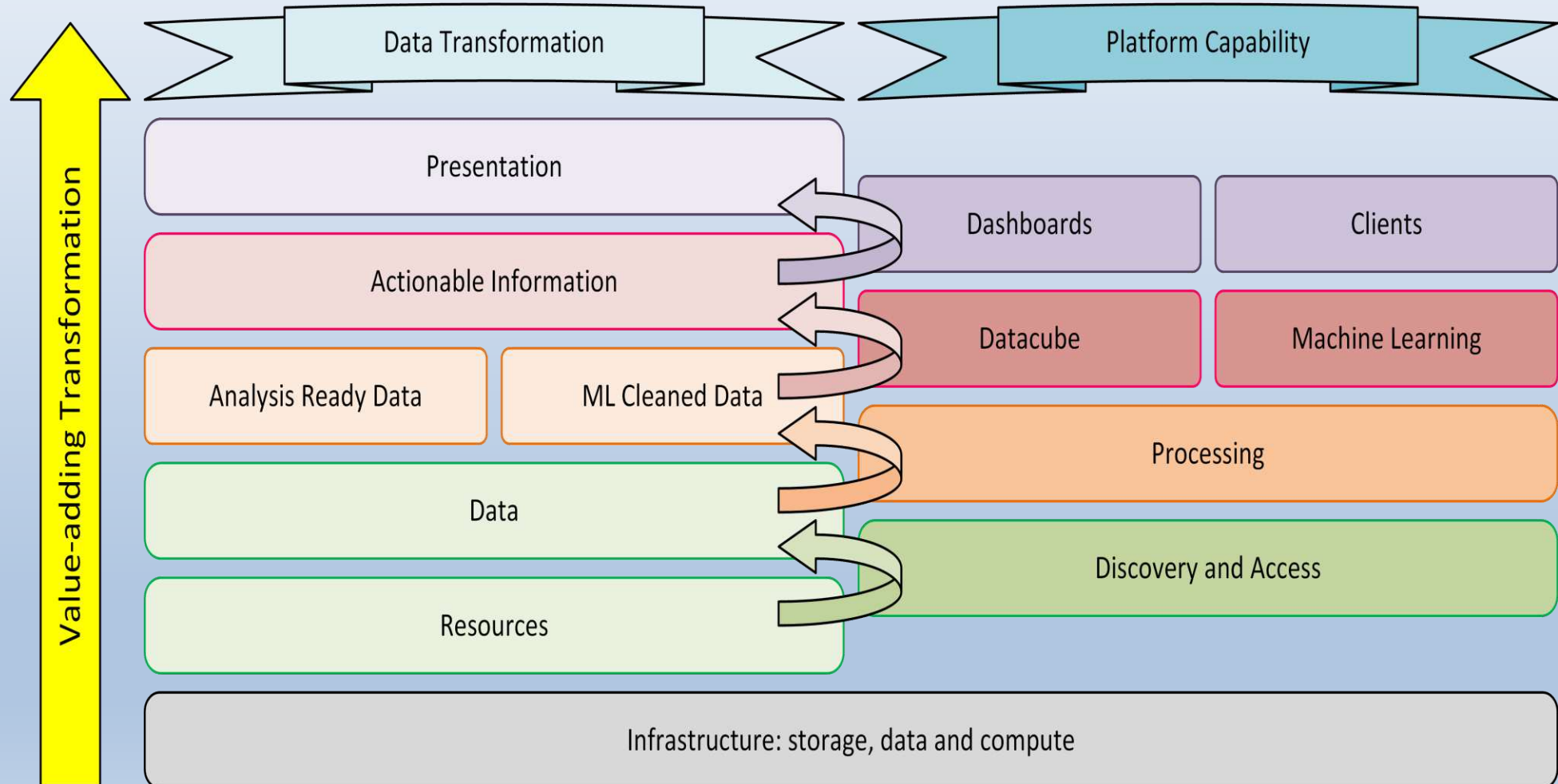
Compute

Tooling

Collaboration

Sharing

Publishing



Aims and Objectives

Problem

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

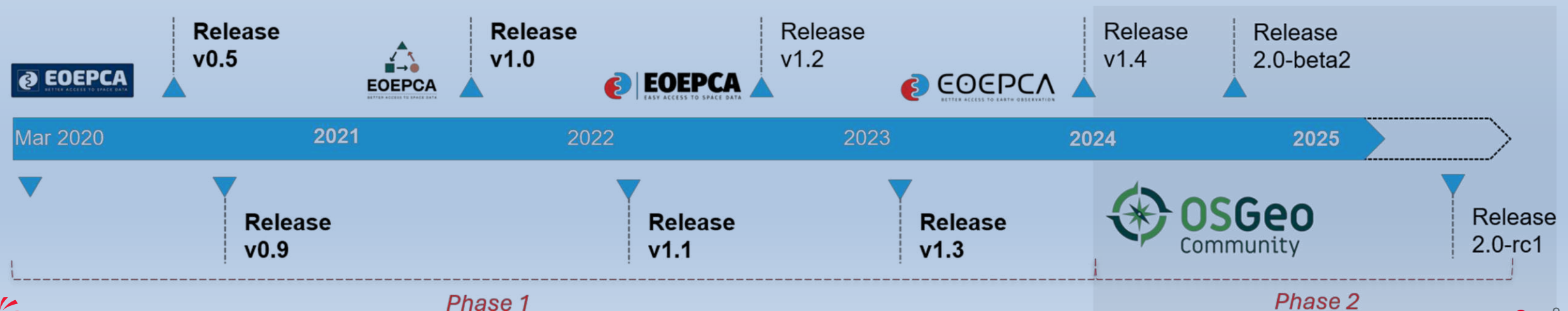
Our Approach

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

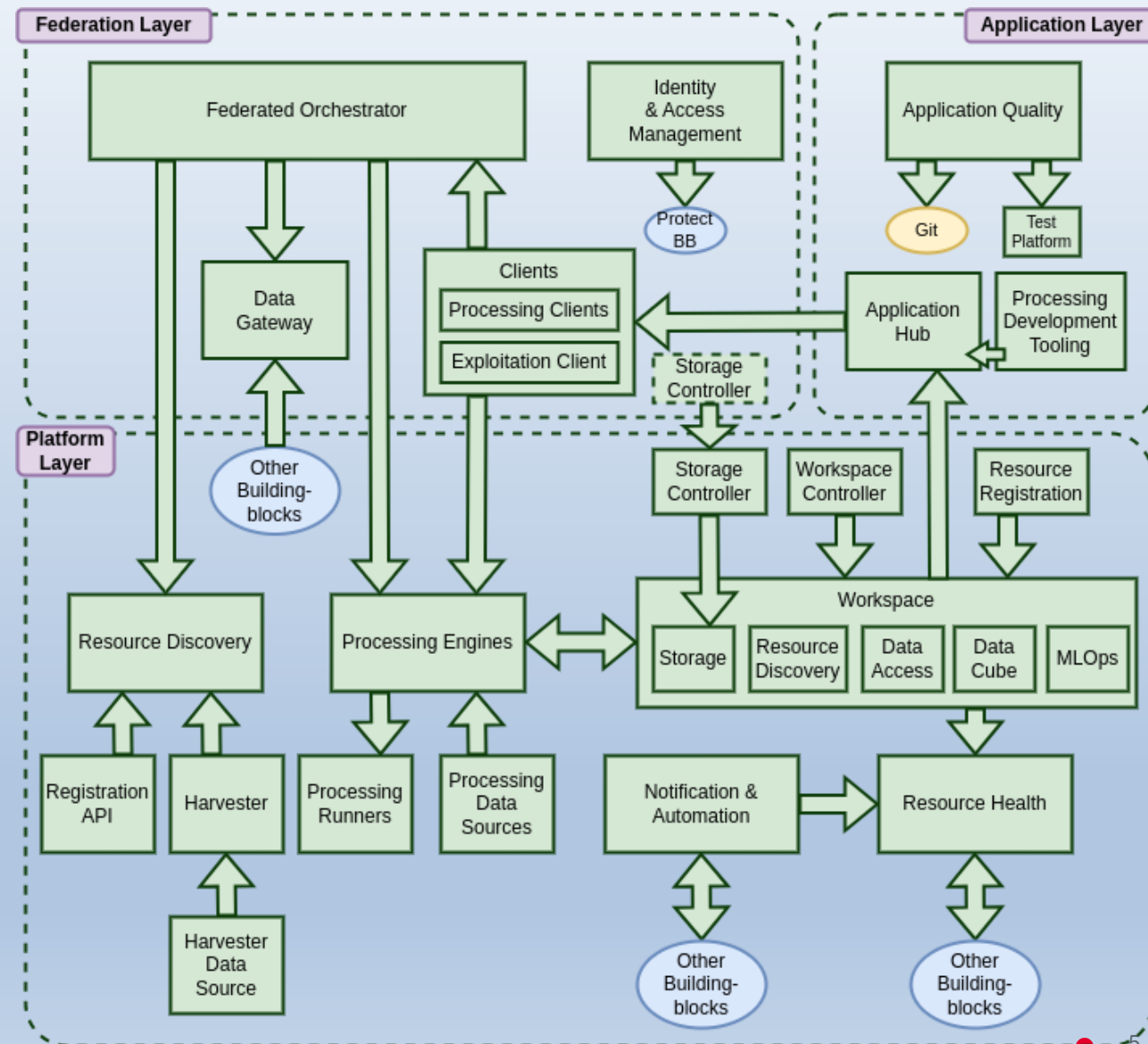
Reference Implementation of the Common Architecture defined by Building Blocks with open standard interfaces

What is a Building Block (BB)?

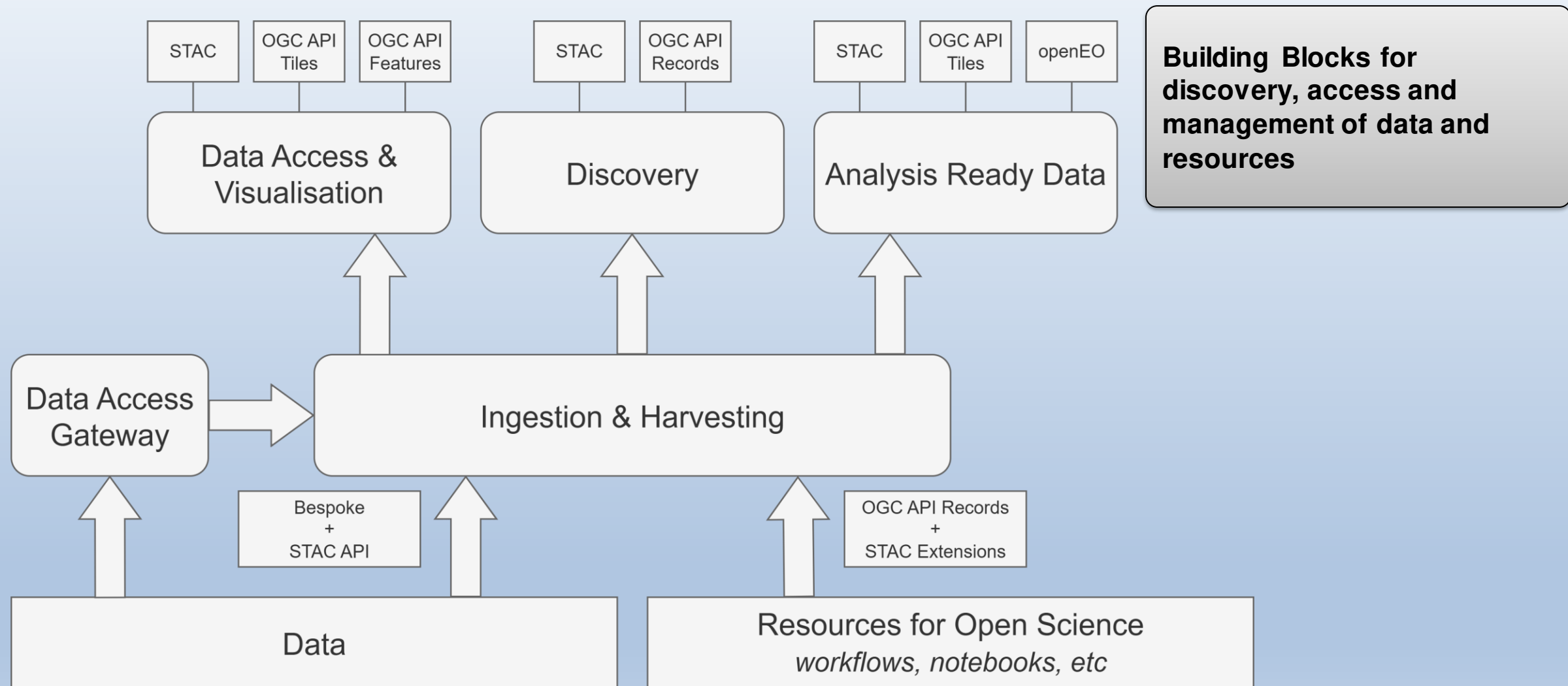
- Software component that implements a specific platform capability
- Typically provides a service interface (REST API) -> standards
- Designed to be used on their own, or in combination as a system
- Open Source

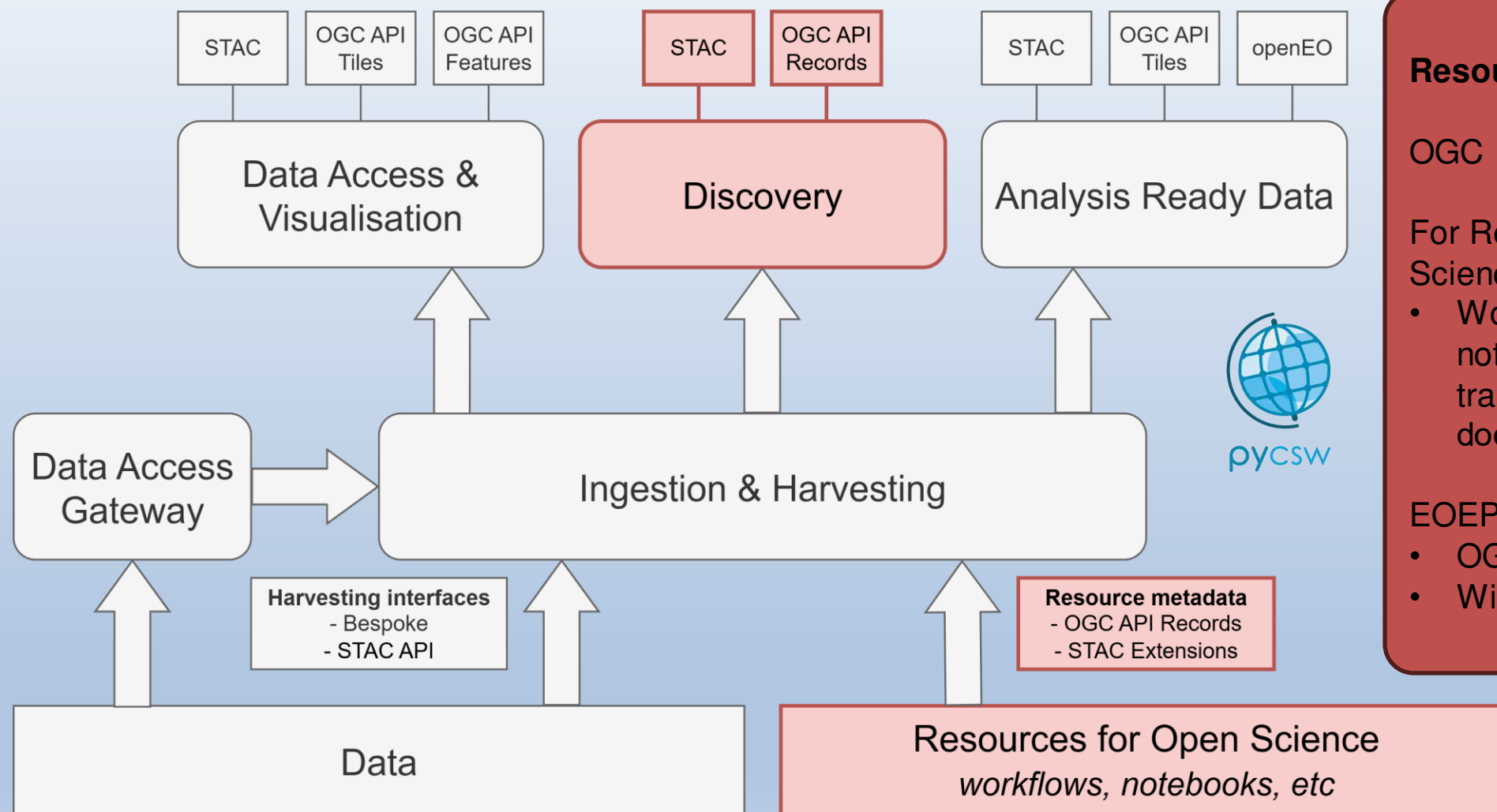
Deployment

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



Data and Resources





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

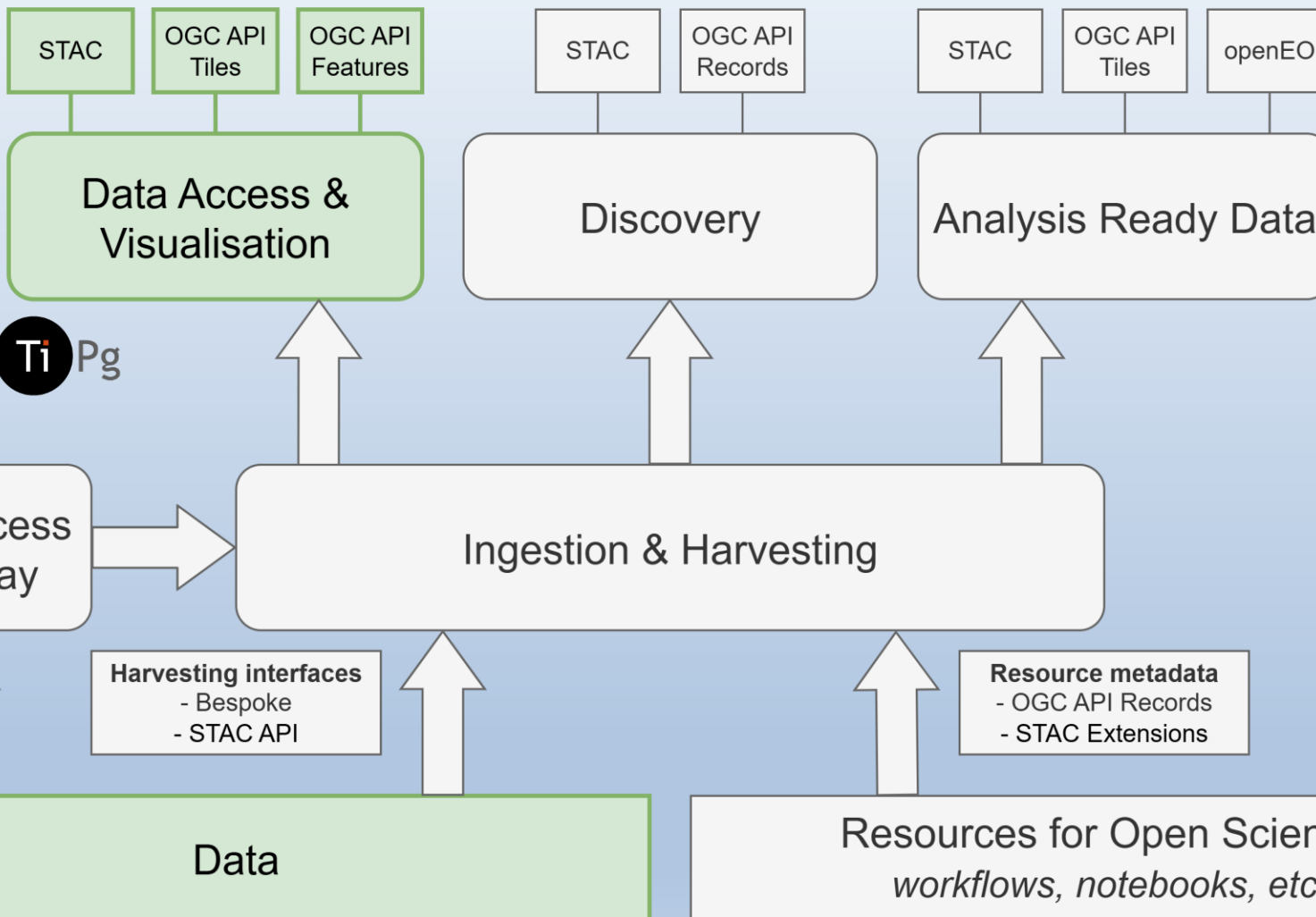
Data and Resources

Data Discovery & Access

stac-fastapi



pgstac

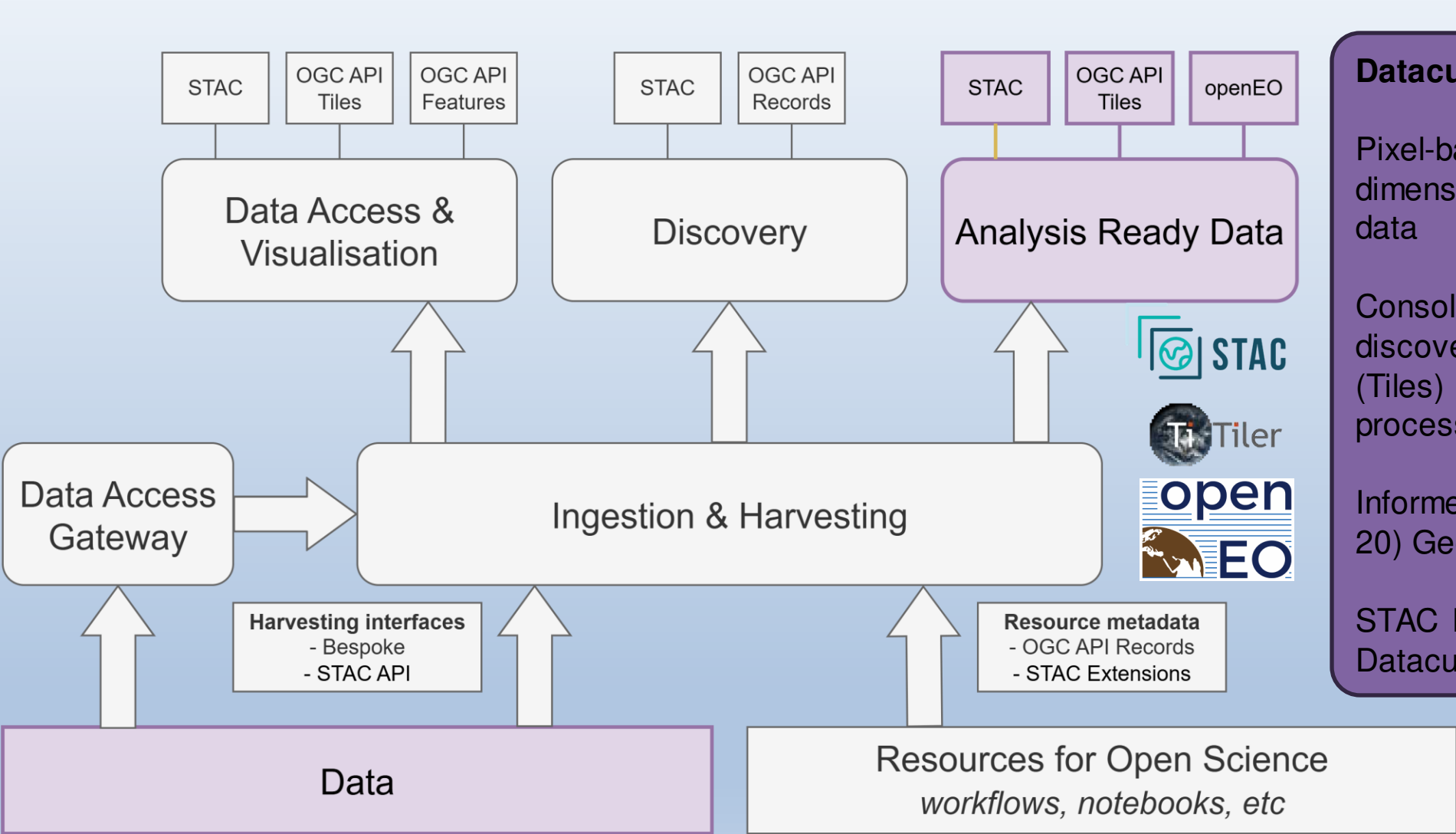


Data Access BB

STAC interface for data discovery

OGC Tiles/Features interfaces for data access and visualisation





Coming
Soon

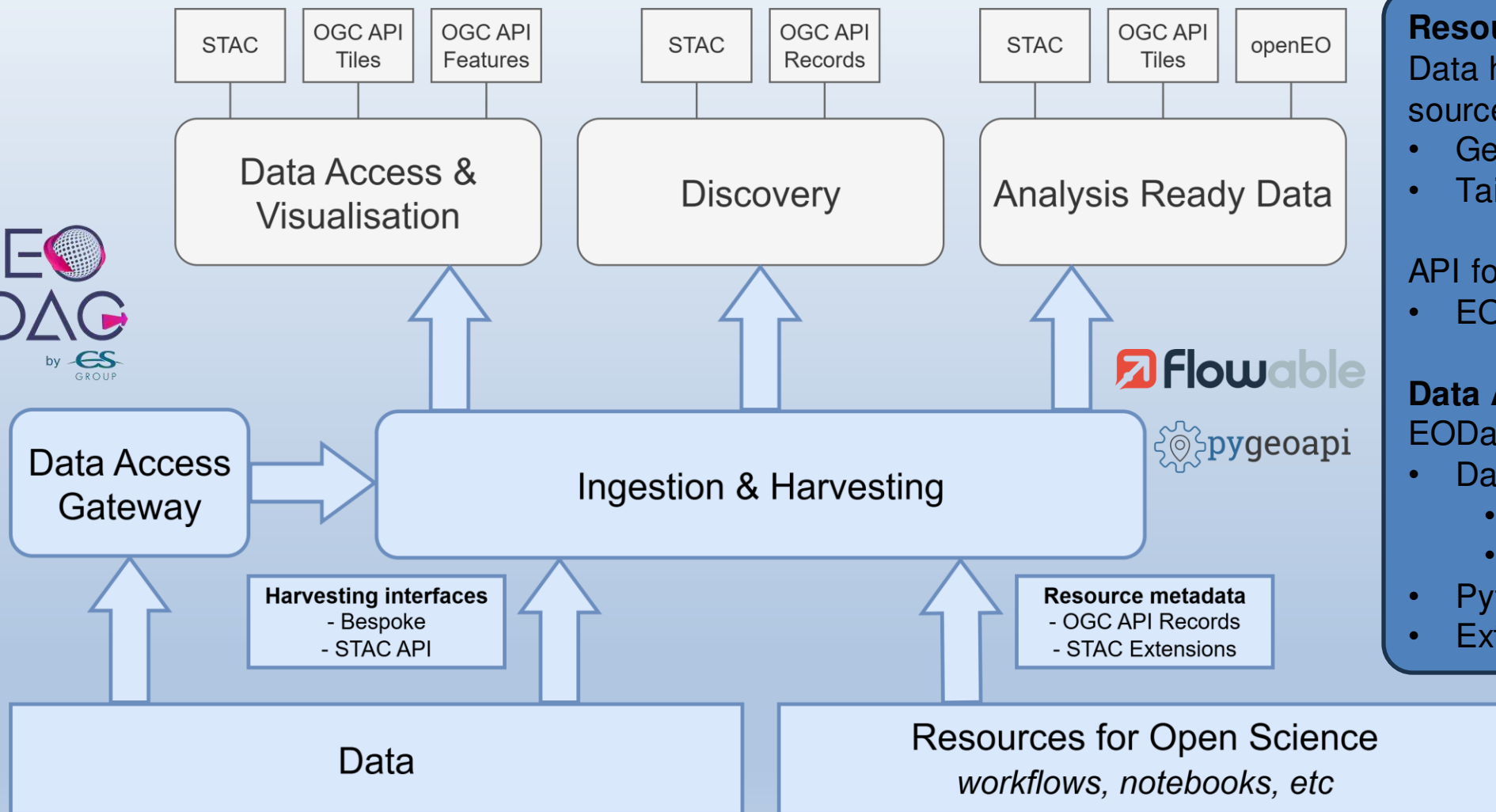
Datacube Access BB

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



Resource Registration BB

Data harvesting from external sources:

- Generic STAC harvester
- Tailored workers

API for resource registration

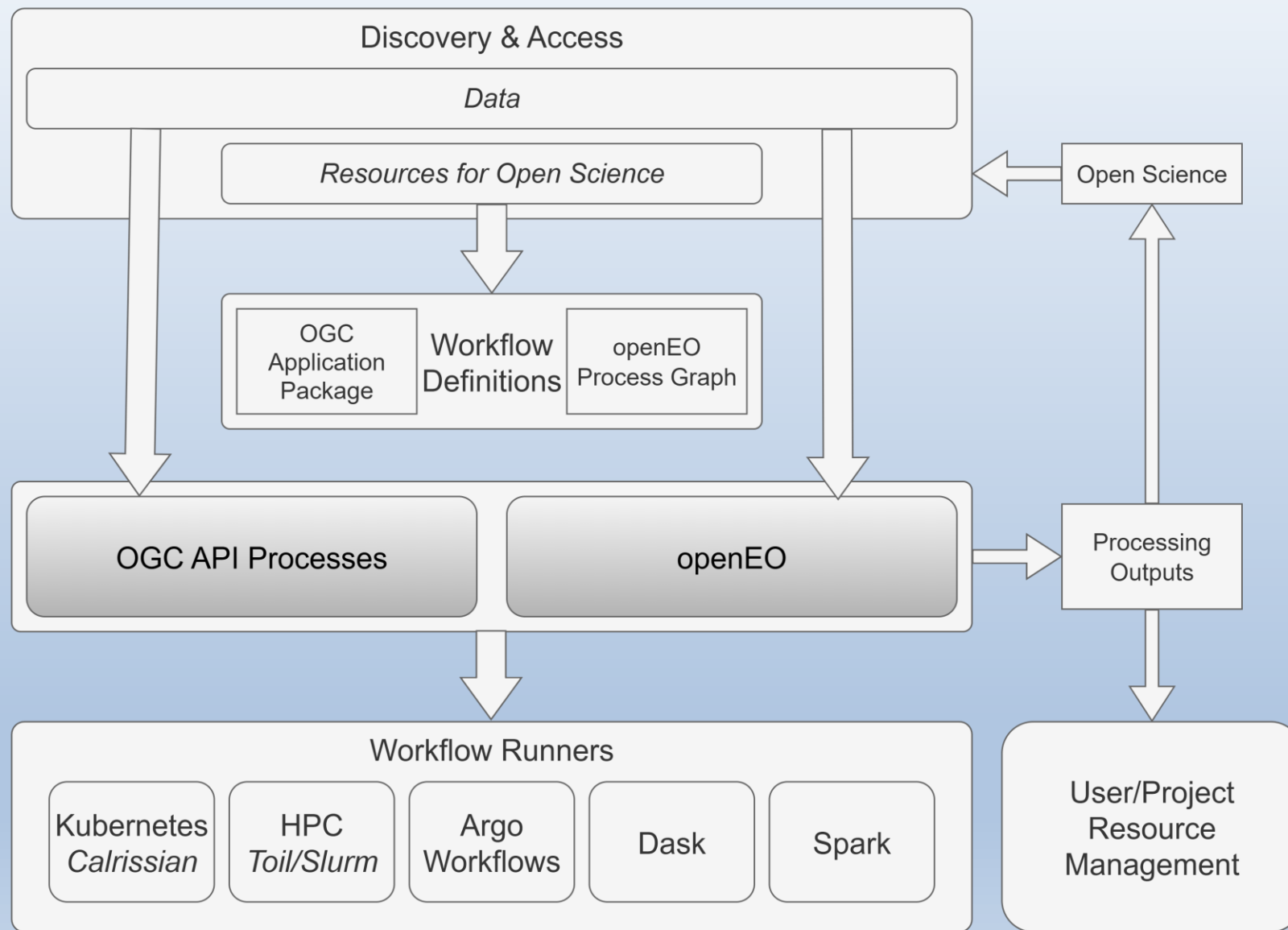
- EOEPKA Metadata Profile

Data Access Gateway BB

EODag:

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

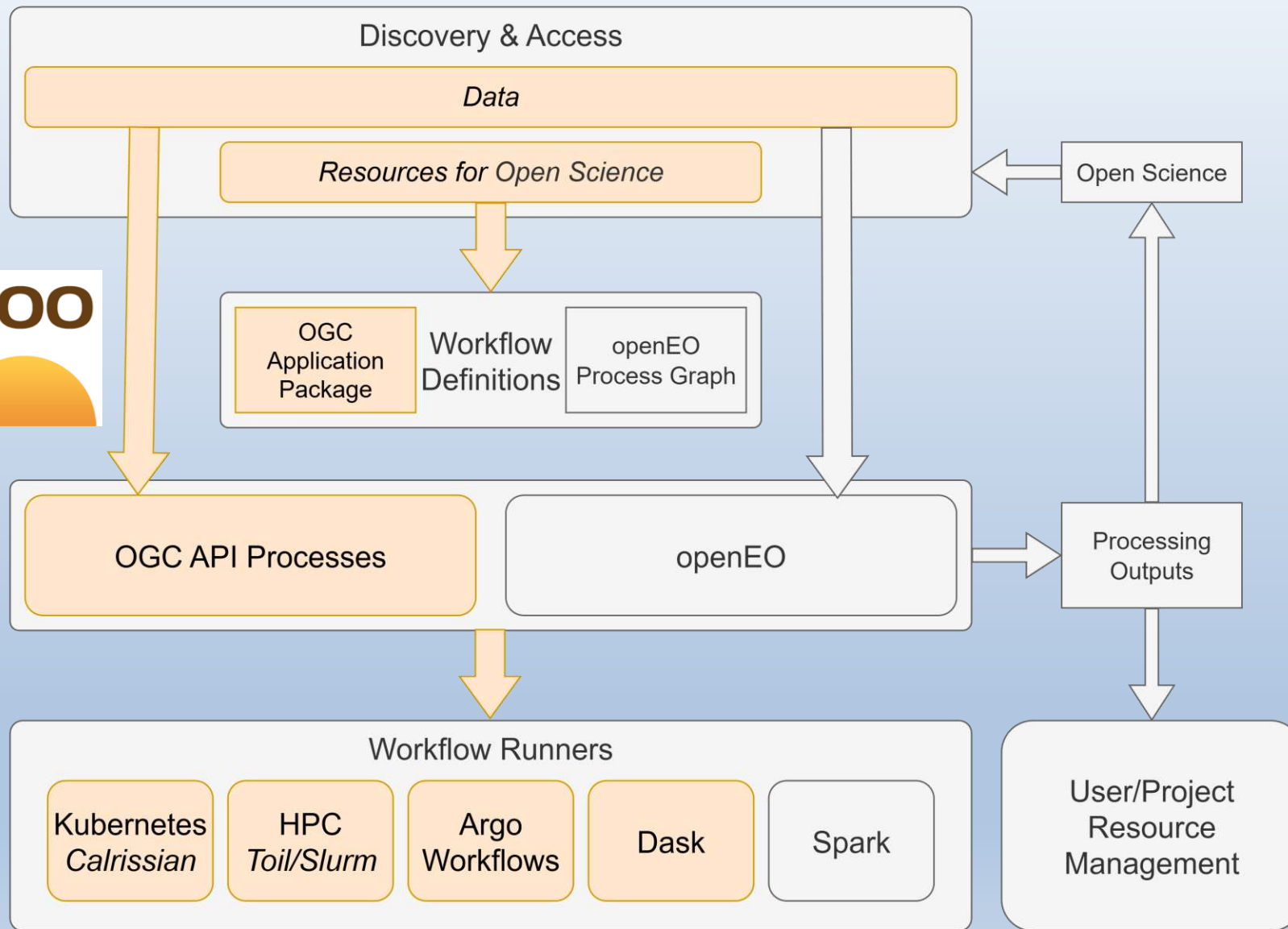
Processing



Bring the processing to the data

Building Blocks for user-defined processing and analysis

Two complementary approaches



OGC Application Package

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

Processing BB

OGC API Processes

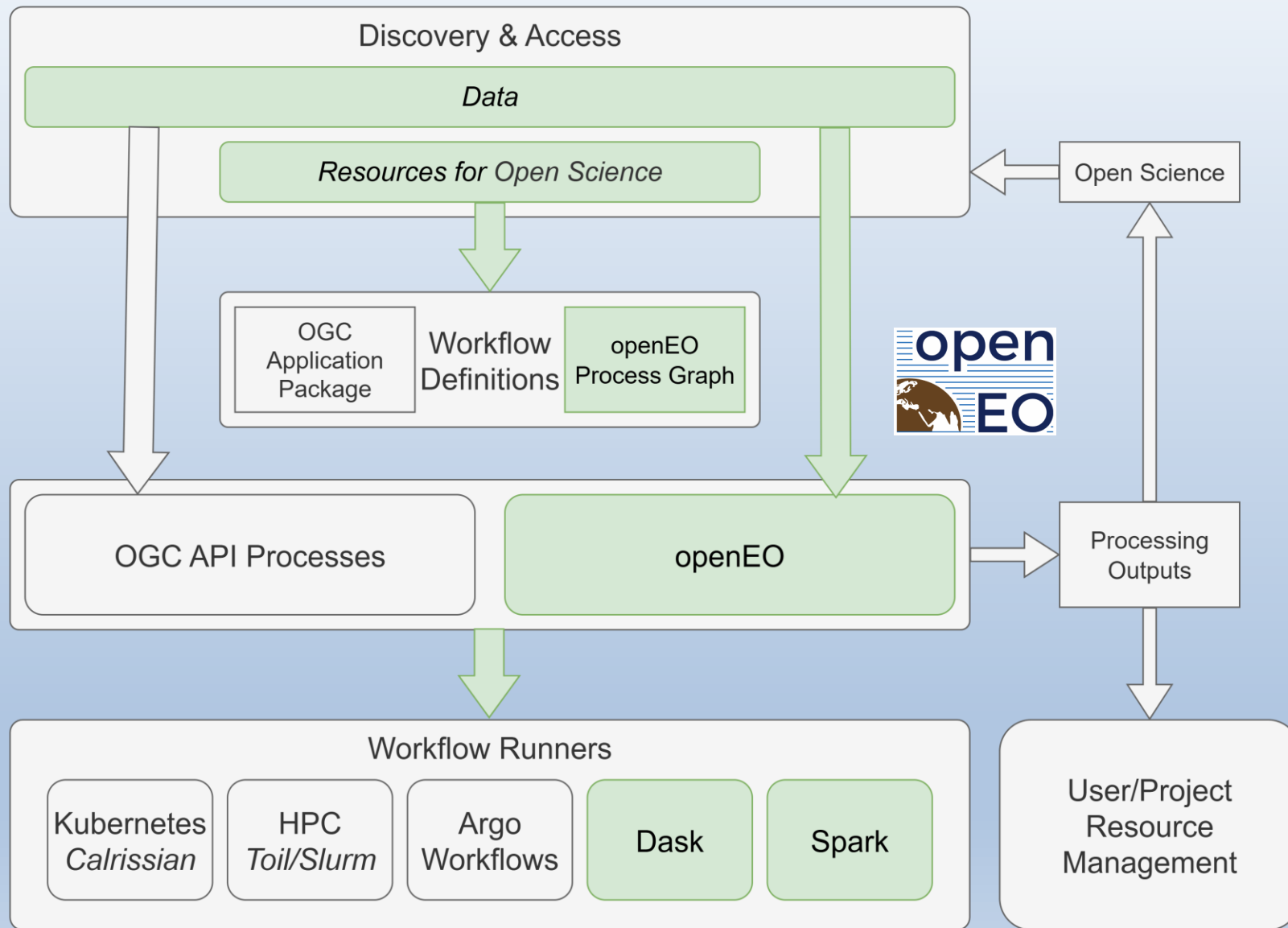
- General Purpose Processing
- Containerised workflows
- OGC Application Package
- Suited to batch processing

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

Cross-platform workflow execution
Hybrid workflows, combining:

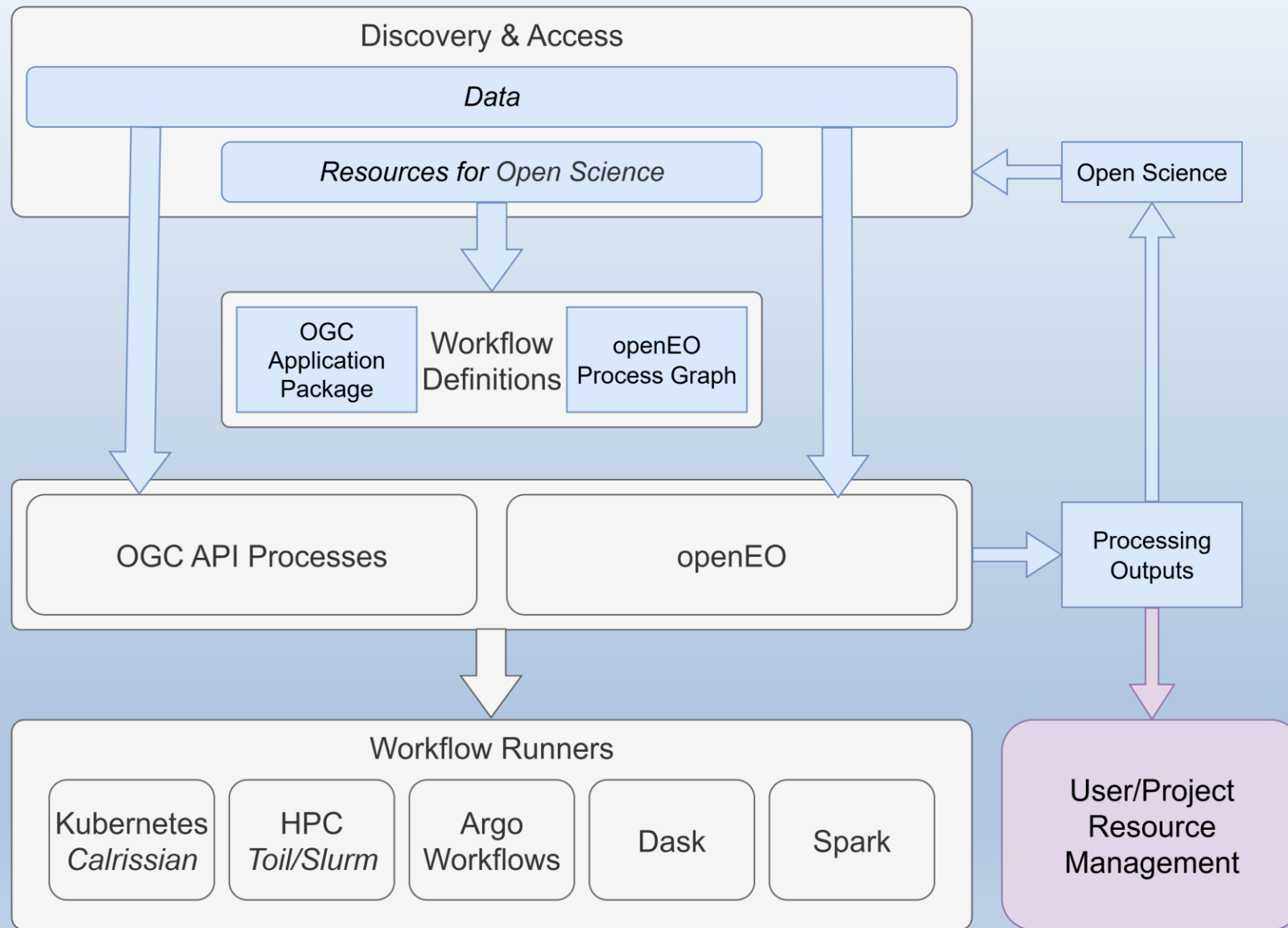
- openEO / OGC API Processes
- Application Packages
- openEO Process Graphs

Coming
Soon



Processing

Open Science



Reproducible Open Science

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

Workspace BB

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



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

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

BETA

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

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



DLR



EOFARM



development**SEED**

Resource
Discovery

Resource
Registration

Data Access

Datacube
Access

Workspace

werum
SOFTWARE & SYSTEMS

IAM



a Sopra Steria company

MLOps

Data
Gateway

TERRA**UE**



vito



Geo**Labs**

eurac
research



Matthias Mohr
Softwareentwicklung



Processing

Application
Hub

Federated
Orchestrator

Notification &
Automation

spaceapplications
SERVICES

SENS**metry**

Application
Quality

Resource
Health

EOEPCA+ @ OSGeo

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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.






[Learn more](#)[Quick Start](#)



Documentation:
<https://eoepca.readthedocs.io/>

 EO Exploitation Platform Common Architecture

EOEPCA Documentation

EOEPCA Documentation

[Introduction](#)

Technical

System Architecture

Deployment Guide

Building Blocks (Platform) ▾

Resource Discovery

Resource Registration

Data Access

Datacube Access


Data Gateway

Workspace

Introduction

The EOEPCA documentation is organised as follows...

- Technical**
Descriptions that explain and provide reference information
- Tutorials**
Learning materials to discover EOEPCA capabilities
- How-To Guides**
Guides for achieving specific platform goals

 EOEPCA Deployment Guide

[Introduction](#) [EOEPCA+ Prerequisites](#) [Building Blocks](#) [Further EOEPCA+ Documentation](#)

Introduction

[Introduction](#)

Deployments

EOEPCA+ Prerequisites

Building Blocks

EOEPCA+ Deployment Guide

This guide provides steps to deploy the EOEPCA+ platform's components (Building Blocks) in your environment.

This 2.0-beta2 version of the Deployment Guide represents the EOEPCA+ (Phase 2) building blocks. For deployment of the previous EOEPCA (Phase 1) see the [v1.4-stable version](#).

- EOEPCA+ Prerequisites**
Set up the foundational infrastructure required for the EOEPCA+ platform.
See [EOEPCA+ Prerequisites](#).
- Building Block Deployment**
Deploy EOEPCA+ Building Blocks.
Begin with the [Building Blocks Overview](#).

<https://github.com/EOEPCA>

different resource servers (building blocks) so that a user can efficiently access and consume the disparate services or the "network of EO Resources".

EOEPCA+ Building Blocks

Bugs and Feature Requests
Please report any [bugs](#) encountered, and we welcome [feature requests](#).
These are triaged via our [eoepca-plus](#) umbrella repository.

User-defined Processing...

Building Block	Docs	Deploy	Repo	Notebook	Tutorial	Raise Bug	Feature Request
OGC API Processes - Processing Execution of OGC Application Packages via OGC API Processes	Docs	Deploy	Repo	Notebook	Tutorials Kubernetes HPC	Bug Report	Feature Request
openEO - Processing Programmatic execution of analytic workflows via openEO backends	Docs	Deploy	Repo	Notebook	Coming soon	Bug Report	Feature Request

Platform Resources...

Building Block	Docs	Deploy	Repo	Notebook	Tutorial	Raise Bug	Feature Request
Resource Discovery Catalogue for platform resources	Docs	Deploy	Repo	Notebook	Tutorial	Bug Report	Feature Request
Resource Registration Ingesting resources into catalogue and access services	Docs	Deploy	Repo	Notebook	Coming soon	Bug Report	Feature Request

Central repository:
<https://github.com/EOEPCA>

Interactive tutorials:
<https://killercoda.com/eoepca/>

EOEPCA

Earth Observation Exploitation Platform Common Architecture

EOEPCA is a collaborative platform that simplifies the sharing of Earth Observation data and tools.

[eoepca.org](#) [Github](#) [Github](#)

EOEPCA Prerequisites

Optional and mandatory pre-requisites for deploying EOEPCA Building Blocks.

EOEPCA Resource Discovery BB

Catalogue, search and discover EO data using STAC API.

EOEPCA Processing BB

Data processing with different engines

3 Summaries

EOEPCA IAM BB

Identity and Access Management (IAM) to secure your services



**Demo Area – This afternoon
12.55pm**

**An Interactive Demo
of Cloud-Native EO Processing**

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eoepca.org

Documentation

USER

Application DevOps
Dashboards
Machine Learning

PLATFORM

Processing
Resources
Datacube

FEDERATION

Workflows
User Identity
Data Gateway

Newsletter

LinkedIn





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FOR YOUR ATTENTION

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