Visual Analytics in VIALACTEA ed EOSC-Pilot

Data Knowledge, Processing and Visual Analytics Framework for Astrophysics

EOSC Science Demonstrator Team

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EOSCpilot

- The EOSCpilot project will support the **first phase** in the development of the **European Open Science Cloud (EOSC)**;
- Establish the **governance framework** for the EOSC;
- Contribute to the development of European **open science policy** and **best practice**;
- Develop a number of **pilots** that integrate services and infrastructures to demonstrate **interoperability** in a number of scientific domains; and
- Engage with a broad range of stakeholders, crossing borders and communities, to build the trust and skills required for **adoption** of an open approach to scientific research.

Science Demonstrators in EOSCpilot

- The Science Demonstrators play an essential role as **early adopters** of EOSC from a range of **science areas**.
- Stimulate the **engagement** of the science communities and stakeholders in Open Science
- **Building on expertise of the <u>research infrastructures</u> and their <u>service providers</u>**
- Their **input** will be used to <u>drive</u> and <u>prioritise</u> the integration of the EOSC services in a common homogeneous platform.

Science Demonstrators in EOSCpilot: Selection Criteria

- Have a **strong and well defined scientific challenge** addressed by the **use of e-infrastructure**;
- Be representative of a **broader scenario** that, when established in EOSC, will have i**mpact across Europe and beyond;**
- Be supported by **mature research infrastructures** and/or research organisations at a European/National level that will be the long-term consumers of the EOSC;
- Commit to publishing or consuming third-party research artefacts (e.g. publications, datasets, tools, workflows) as part of the **Open Science model**, with the application of **FAIR principles**, and also as part of the EC Open Research Data Pilot.;
- Be **mature** and has **demonstrated to be working at scale on existing computational/data/connectivity** and other infrastructures that would become part of the EOSC.

Science Demonstrators in EOSCpilot: Engagement Model

Funding model

Initialisation → work plan and roadmap

Execution

Reporting and Feedback → Three reports are proposed: an initial (4 months), a middle (8 months), and a final report (12 months)

Review and Improvement of the Engagement Model

EOSCpilot Science Demonstrator Topics

- Social Sciences and Humanities
- Generic Technology
- Physical Sciences / Astronomy
  - **LOFAR**
  - **VisIVO** - *Data Knowledge Visual Analytics Framework for Astrophysics*
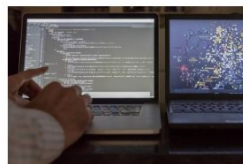- Physics / Materials Science
- High Energy Physics
- Energy Research
- Life Sciences and Health Research
- Environmental & Earth Sciences

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VisIVO

VisIVO is the core of the presented visual analytics environment, it offers a unique integrated ecosystem for visualization, including services for collaborative portals, mobile applications for visualization and data exploration and a number of key components such as workflow applications, analysis and data mining functionalities.
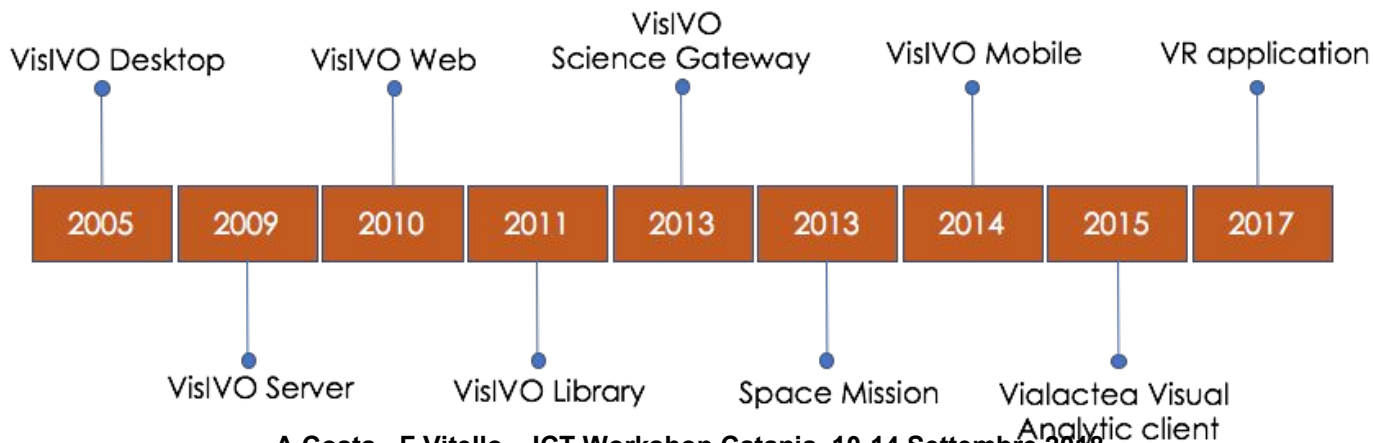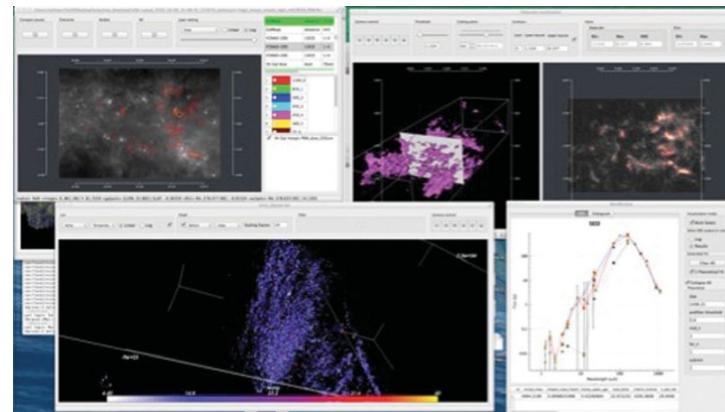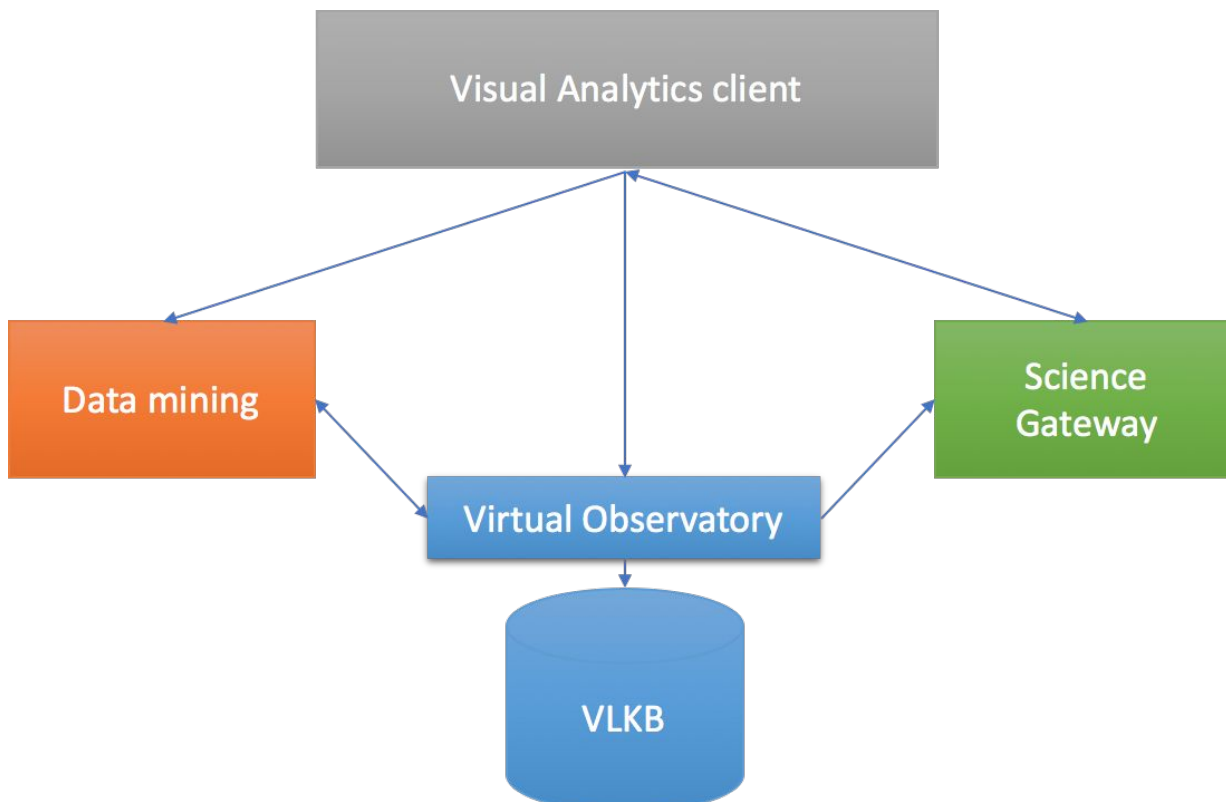
Visual Analytics in VIALACTEA

The tool has been developed within the VIALACTEA project, founded by the 7th Framework Programme of the European Union.

Visual analytics environment allows to easily conduct research activities for multidimensional data and information visualization. It provides real-time data interaction to carry out complex tasks for multi-criteria data/metadata queries on subsamples selection and further analysis.

Visual analytics combine **data mining** algorithms and **advanced analysis techniques** with highly **interactive visual interfaces** offering scientists the opportunity for in-depth understanding of **massive, noisy, and high-dimensional data**.

Visual Analytics in VIALACTEA

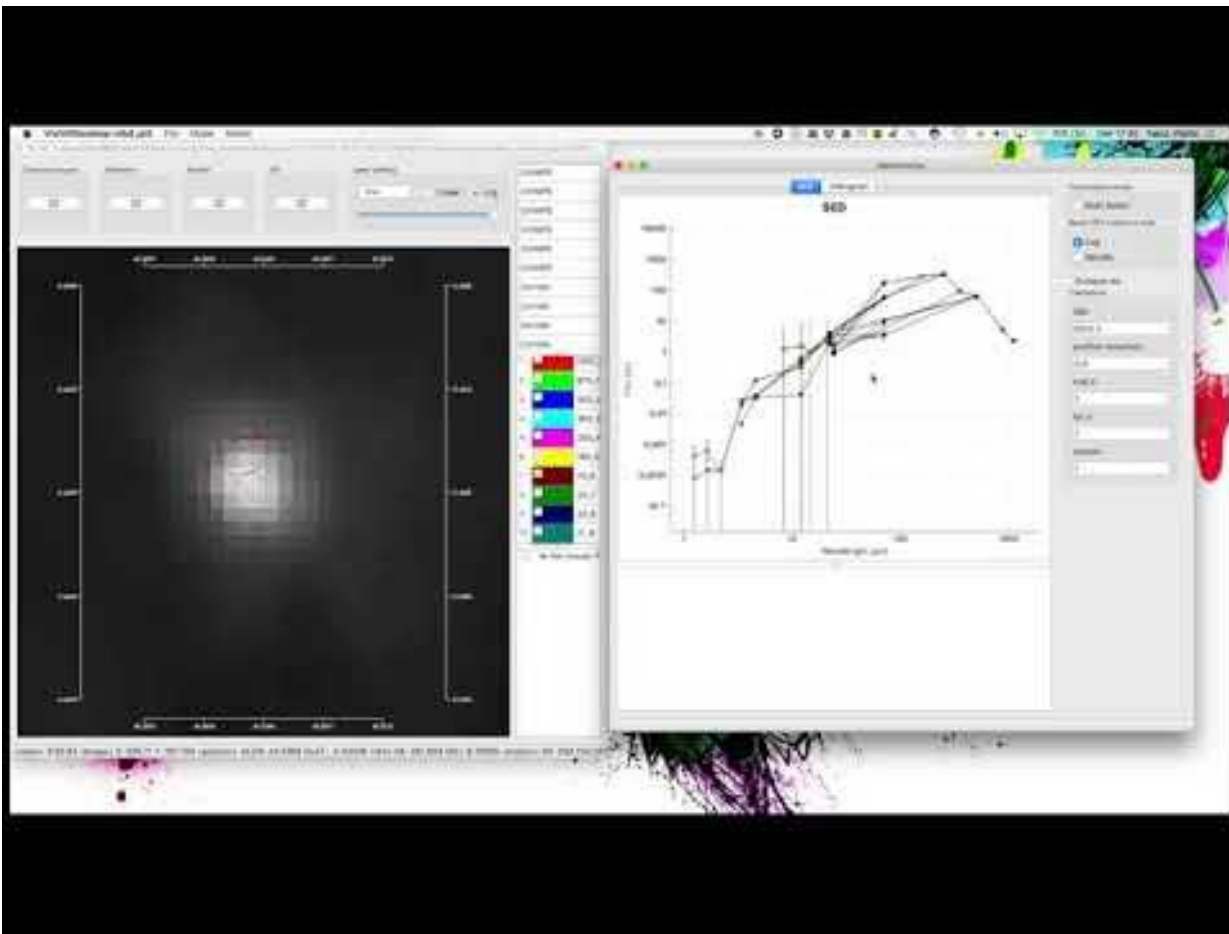A.Costa - F.Vitello   ICT Workshop Catania 10-14 Settembre 2018

Use Cases

Vialactea Visual Analytic provides a key tool in all phases of scientific analysis thanks to its tight integration with the VLKB.

Combines different types of visualization to perform the analysis exploring the correlation between different data, for example 2D intensity images with 3D molecular spectral cubes.

Visualization and Analysis of Compact Sources and SED Analysis, Extended Bubble-like Sources, Filamentary Structures, …

Complete Demo: https://www.youtube.com/watch?v=gsrpejLF3g8

F. Vitello et al 2018 PASP 130 084503 https://doi.org/10.1088/1538-3873/aac5d2

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EOSC-pilot Scientific use case

*"Scientific Use Case: fitting of the Spectral Energy Distributions of Young Stellar Objects using observed monochromatic fluxes from the VLKB and models that can be either simple **analytical grey-body functions**, or a library of pre-computed **theoretical models** that also resides on the VLKB"*

The ViaLactea Visual Analytics (legacy) implementation of this feature can be used only for **one source at a time through an interactively selection using the Client**.

EOSC-Pilot SD will process data from multiple sources at the same time.

Both the fitting to analytical grey-body models or theoretical SED models require that a set of parameters is defined to drive some specific ability of the SED fitting; it is clear that this initial presets have to be considered valid for all sources to be fitted with this new service.
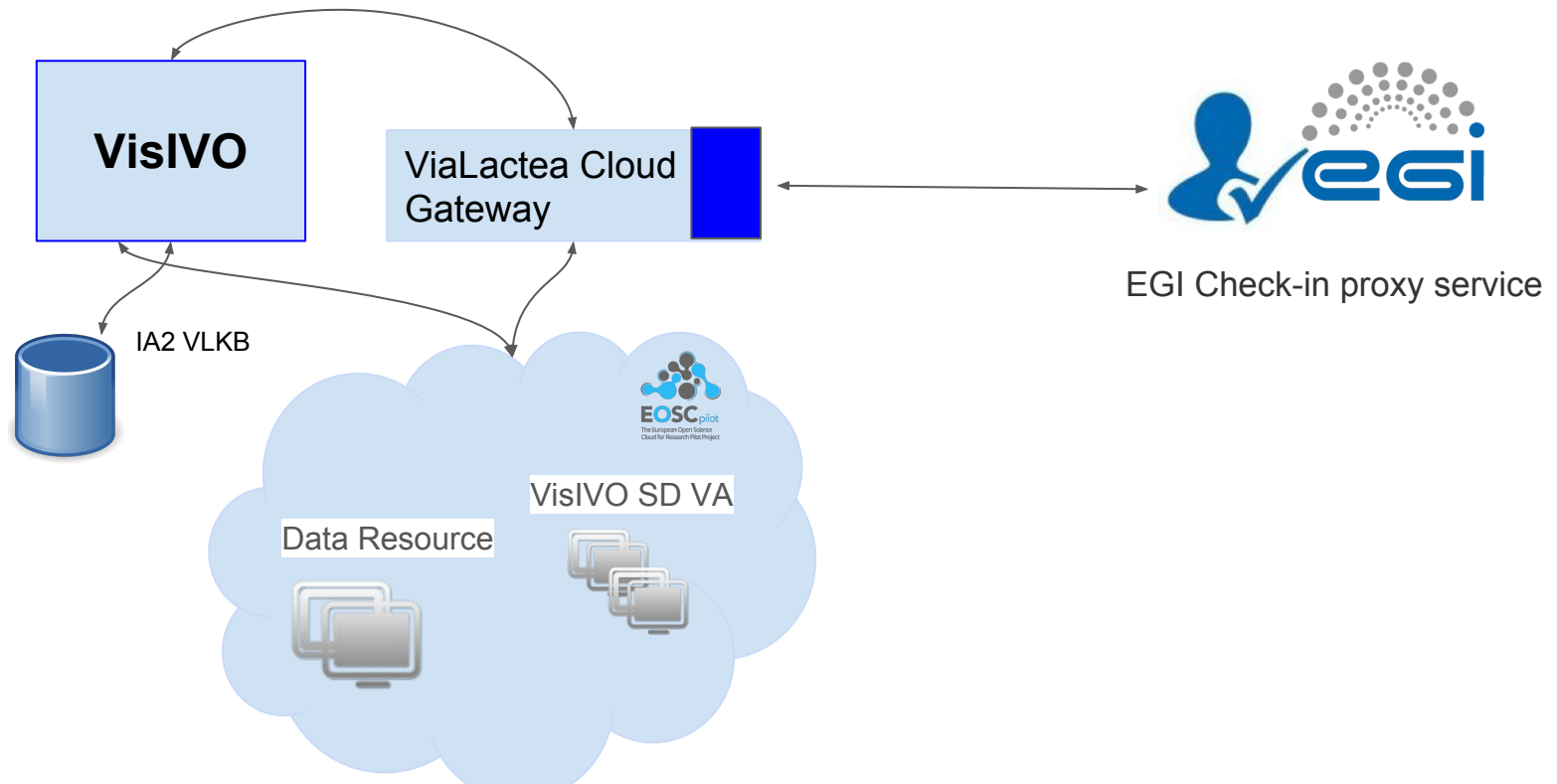
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VisIVO EOSCpilot Science Demonstrator

A number of data visualization tools already exist and yet none of them integrates access to data provider, **IVOA standards**, **analysis of 2D images catalogue source properties**, **3D spectral datacubes**, a <u>cloud integration</u> for **complex computational tasks** (massive spectral energy fitting).

The proposed Science Demonstrator offers the possibility to design and implement a visual analytics technical solution in the EOSCPilot ecosystem
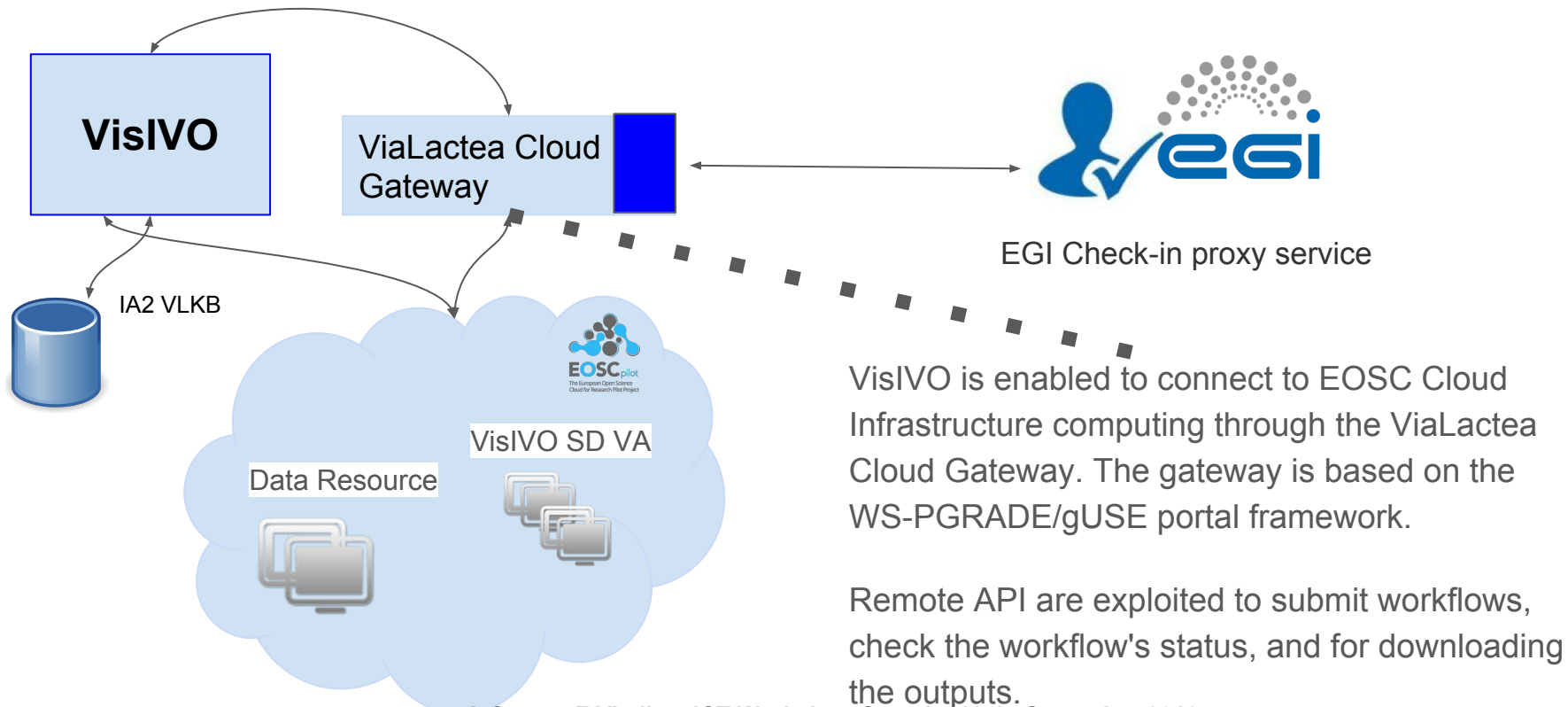
VisIVO Science Demonstrator offers now an integrated solution for visualization including:

- Services for collaborative portals;
- Visualization and data exploration; and
- a number of key components such as workflow applications, data analysis.
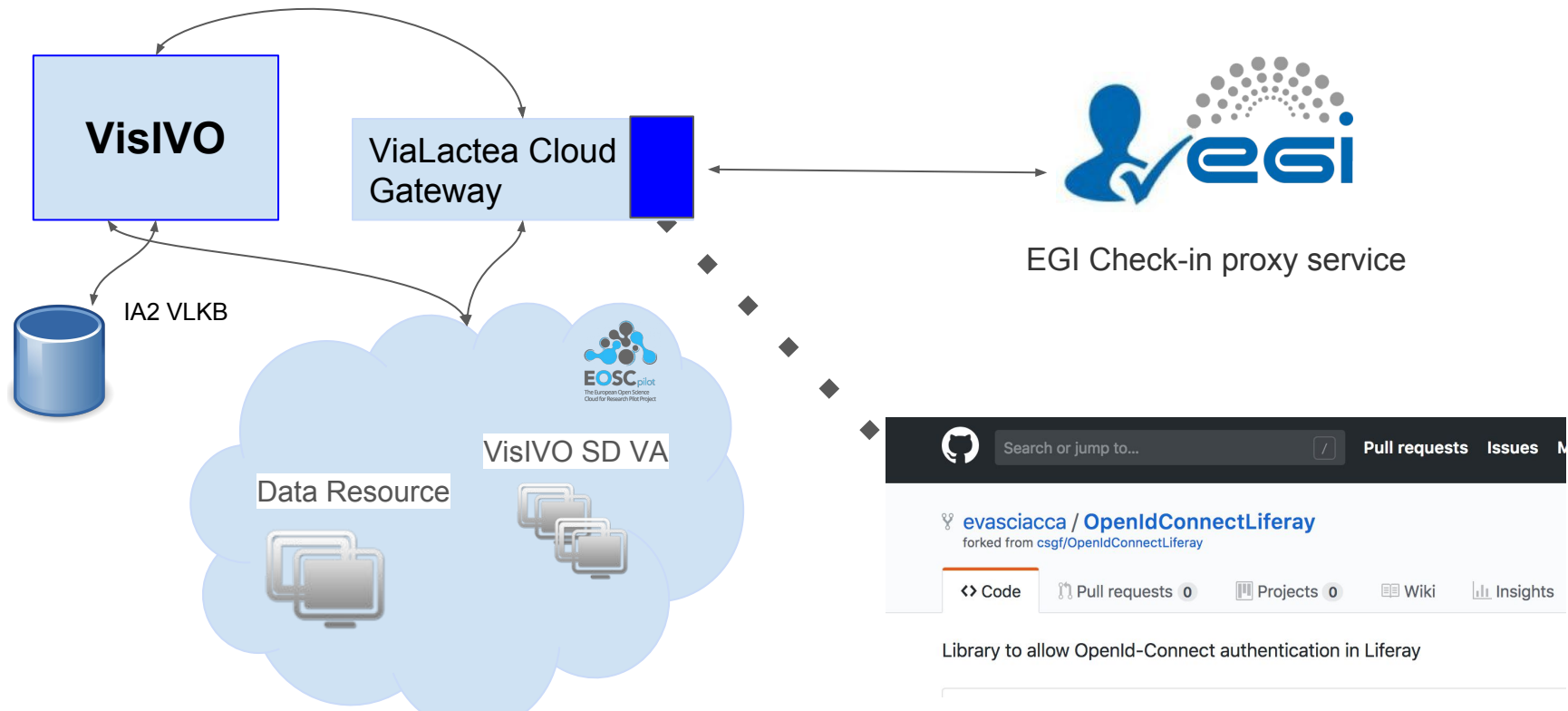
VisIVO in EOSCpilot

EGI Check-in proxy service

VisIVO

ViaLactea Cloud Gateway

IA2 VLKB

Data Resource

VisIVO SD VA

VisIVO in EOSCpilot

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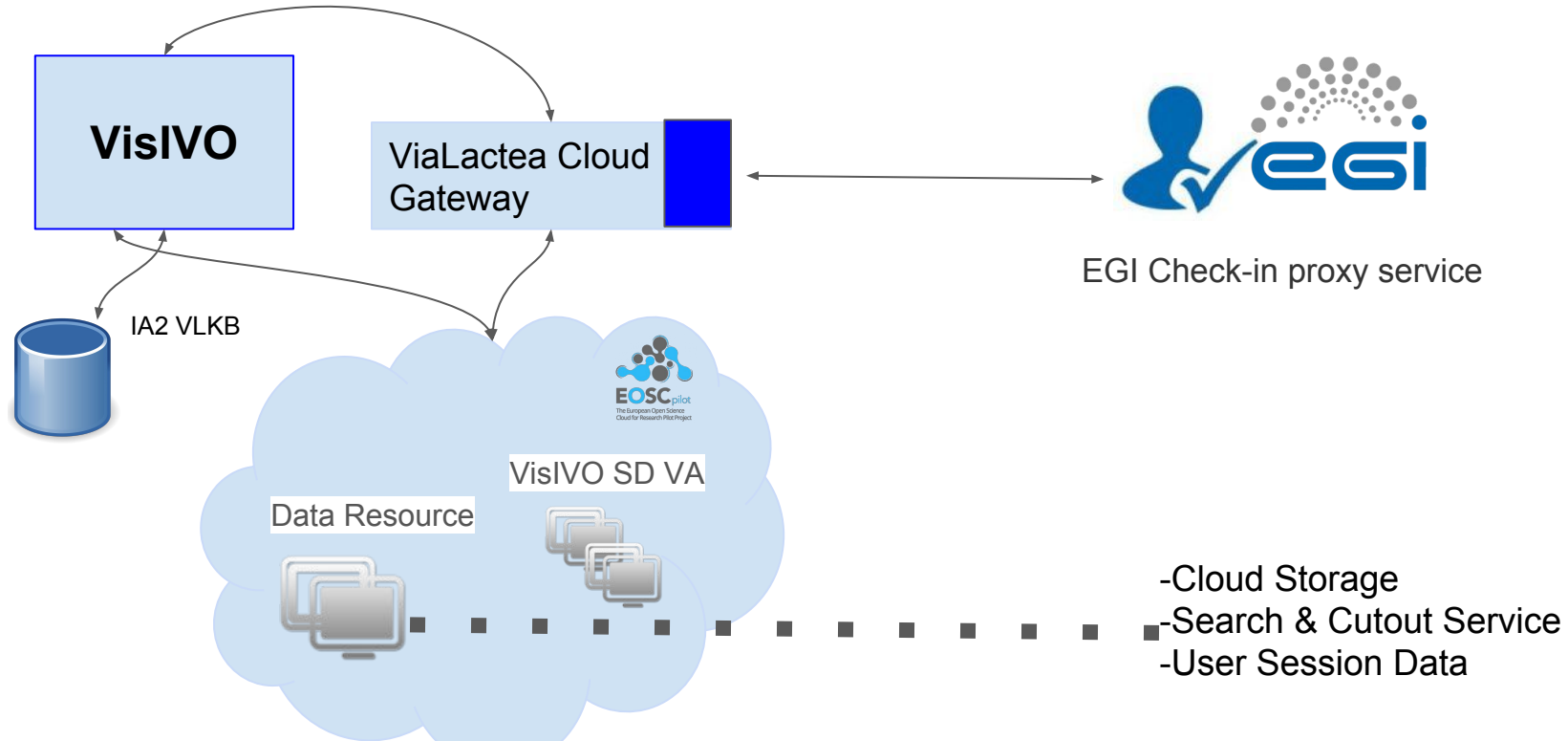
IA2 VLKB

Data Resource

VisIVO SD VA

VisIVO is enabled to connect to EOSC Cloud Infrastructure computing through the ViaLactea Cloud Gateway. The gateway is based on the WS-PGRADE/gUSE portal framework.

Remote API are exploited to submit workflows, check the workflow's status, and for downloading the outputs.

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VisIVO in EOSCpilot

VisIVO

ViaLactea Cloud Gateway

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VisIVO SD VA

evasciacca / **OpenIdConnectLiferay**
forked from csgf/OpenIdConnectLiferay

<> Code   Pull requests 0   Projects 0   Wiki   Insights

Library to allow OpenId-Connect authentication in Liferay

VisIVO in EOSCpilot

VisIVO

ViaLactea Cloud Gateway

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IA2 VLKB

VisIVO SD VA

Data Resource

-Cloud Storage
-Search & Cutout Service
-User Session Data

VisIVO in EOSCpilot

VisIVO

ViaLactea Cloud Gateway

EGI Check-in proxy service

IA2 VLKB

Data Resource

VisIVO SD VA

Conclusioni

- INAF si configura i EOSC non solo come utente ma come **sviluppatore;**

- La partecipazione INAF e le componenti software in EOSD si configurano come **"large project"** ed in particolare come **"system of systems";**

- È stata messa in campo la giusta **"cross-team"** communication;

- E' stato adottato un metodo di sviluppo (development practice) di tipo "agile" ma scalato a livello di un large project dove lo sviluppo è partito da un Science Demonstrator (una collezione di "user story");