

# Data Repositories and Science Gateways for Open Science



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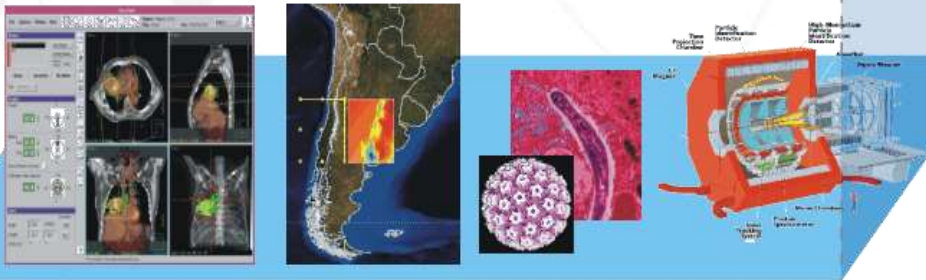
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 654237



## Outline

- Introduction and definitions
- The Sci-GaIA project
- Enabling the Knowledge Workflow with Open Access Repositories and Science Gateways
- Summary and conclusions

# e-Science



⇒ **Virtual Research Communities**

⇒ **e-Infrastructure**

⇒ **Applications**

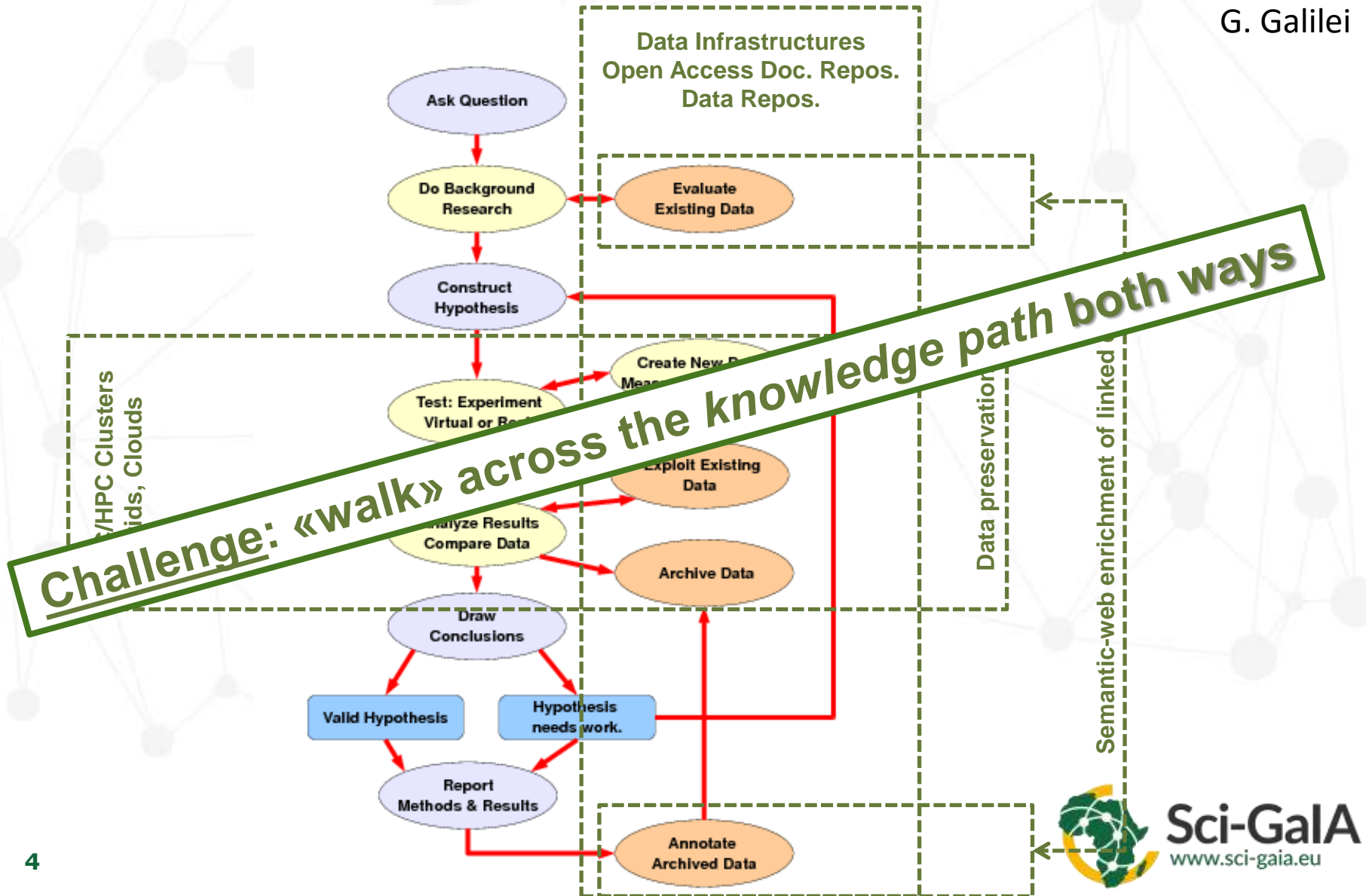
⇒ **Data**

⇒ **Instruments/sensors**



G. Galilei

# e-Infrastructures support the Scientific Method



## Open Science (definition)

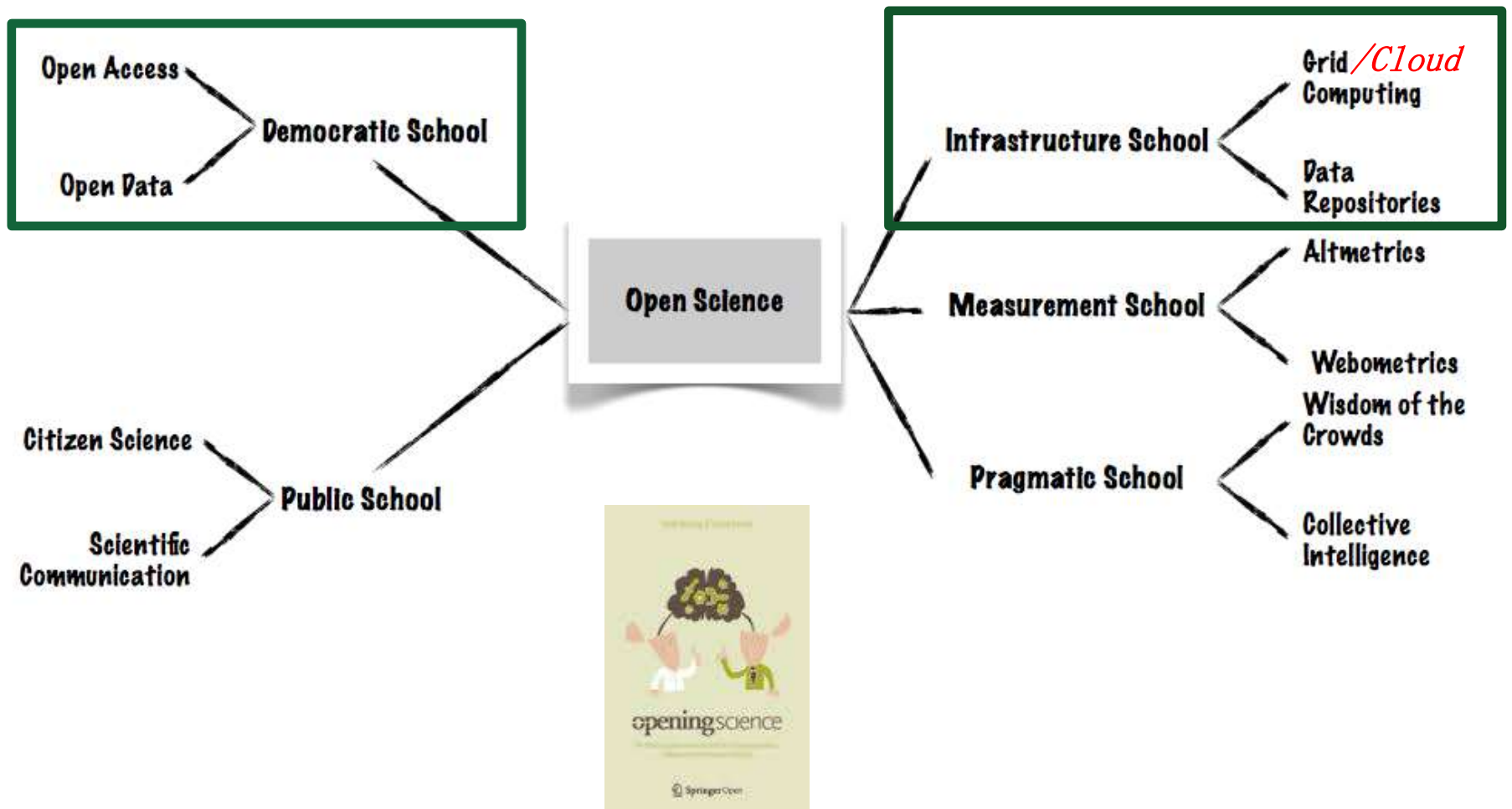
(<http://book.openingscience.org>)

- ▶ **“Open Science** refers to a scientific culture that is characterized by its openness. Scientists share results almost immediately and with a very wide audience”



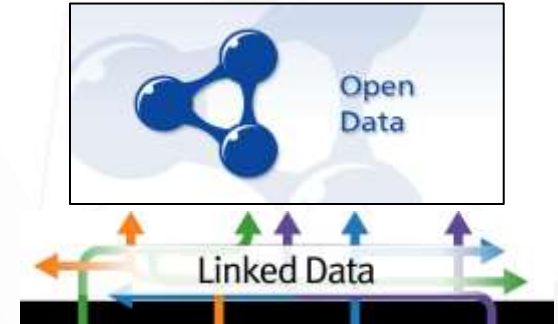
# Open Science Schools of Thought

(<http://book.openingscience.org>)



# Open Science (tools)

**OPEN**  **ACCESS**



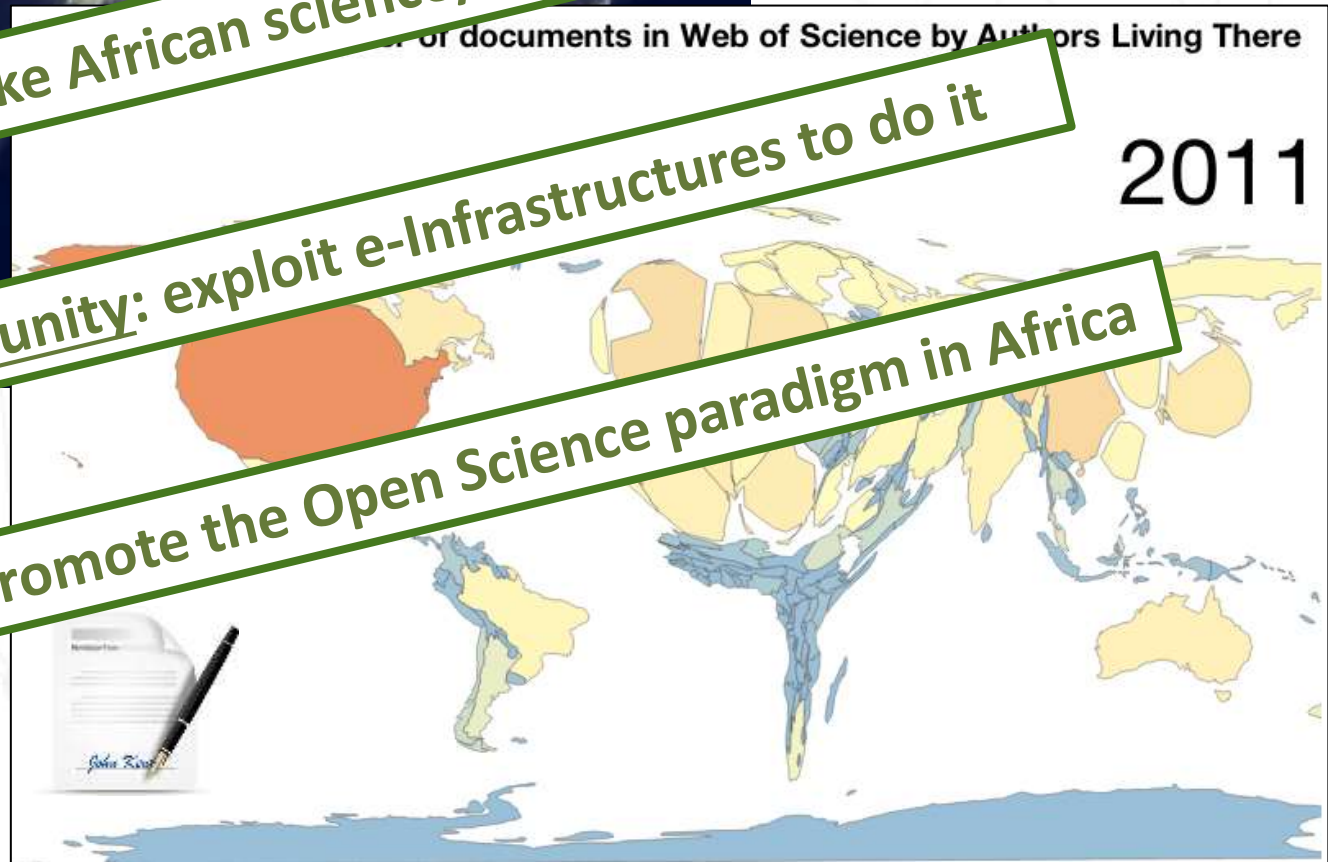
## Different kinds of global “connections”



Challenge: make African science/scientists more «visible»

Opportunity: exploit e-Infrastructures to do it

Goal: promote the Open Science paradigm in Africa



# The Sci-GaIA Project

([www.sci-gaia.eu](http://www.sci-gaia.eu))

- **Energising Scientific Endeavour through Science Gateways and e-Infrastructures in Africa**
- Research Infrastructures – Coordination & Support Action
- Grant Agreement no. 654237
- EC contribution: ~1.4 MEuro
- Start date: 1 May 2015
- Duration: 24 Months



ROYAL INSTITUTE  
OF TECHNOLOGY



UNIVERSITÀ  
degli STUDI  
di CATANIA



our future through science



## Sci-GaIA objectives



Promote the uptake of Science Gateways & e-Infrastructures in Africa and beyond



Support new & already emerging Communities of Practice



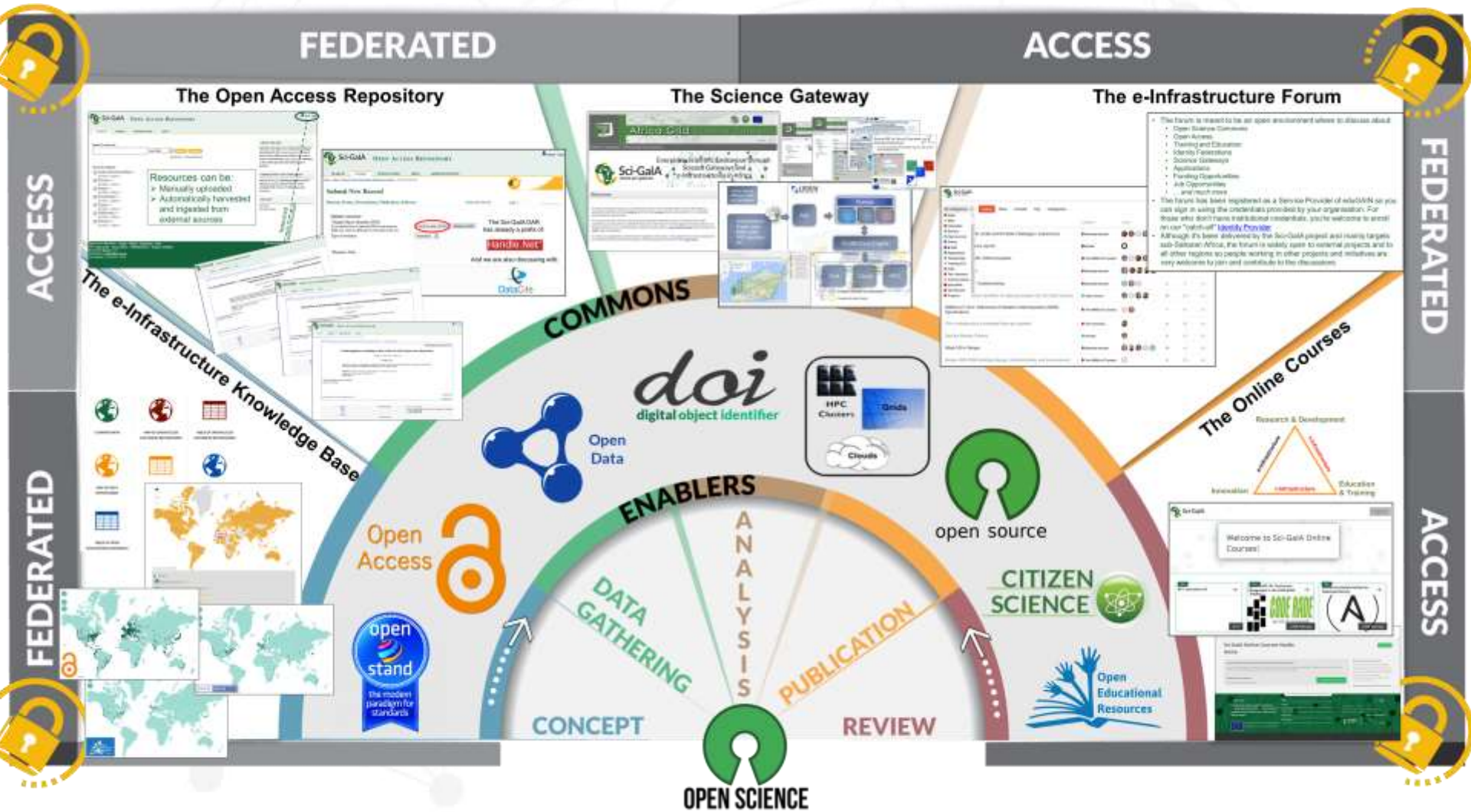
Strengthen & expand Science Gateways & e-Infrastructure related services



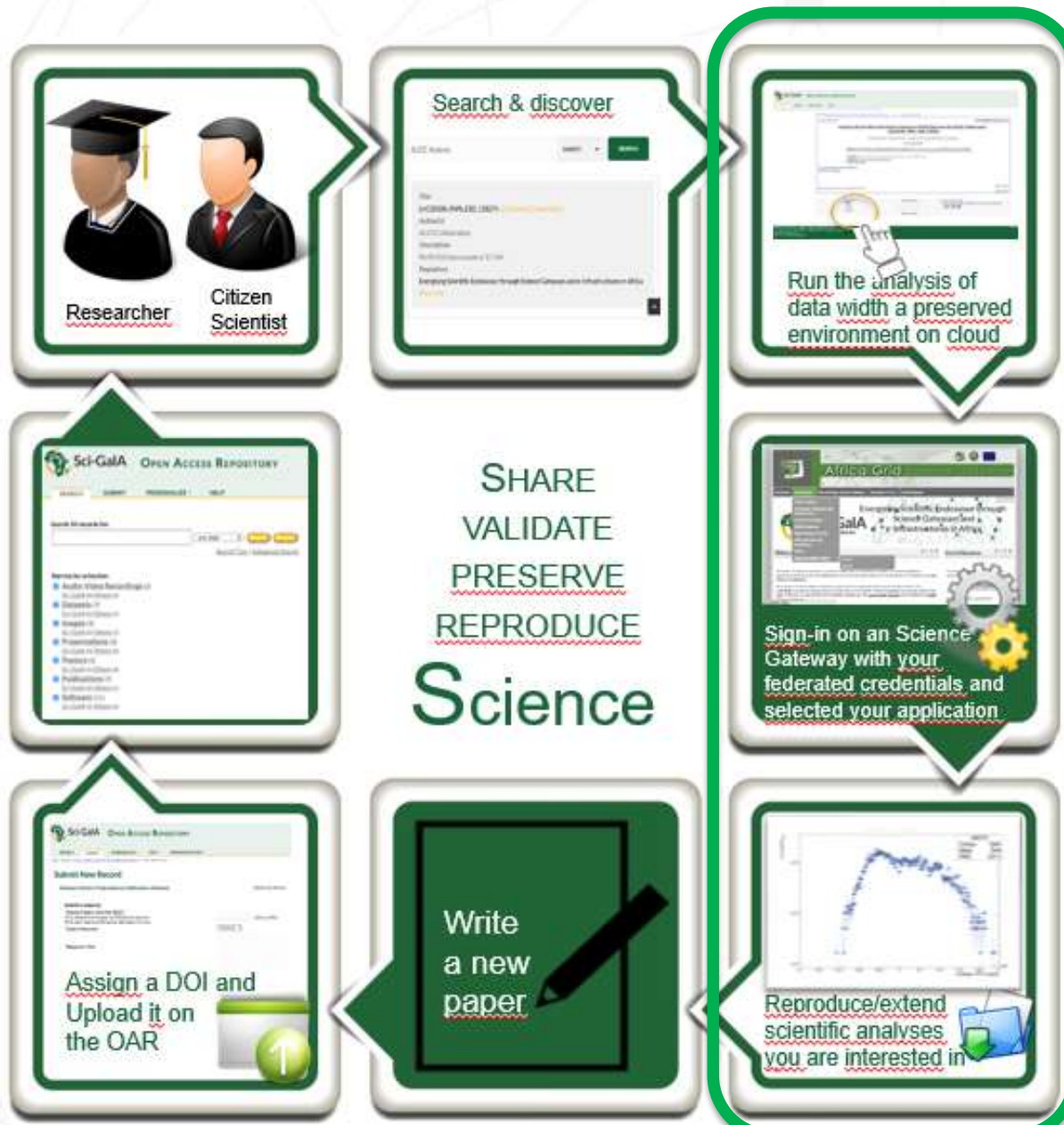
Train, disseminate, communicate & outreach

**Sci-GaIA is strongly committed to promote Open Science**

# The Sci-GaIA Federated Platform for an Open Science Commons in Africa



# The Open Knowledge workflow



# The Sci-GaIA requirements for an Open Access Repository

- Requirements:
  - Open source
  - Standard compliant
  - Well supported
  - Scalable up to  $O(10^6)$ - $O(10^7)$  resources (to begin with)
- Choice:
  - **Invenio** ([www.invenio-software.org](http://www.invenio-software.org)) – actual version: 1.2.1 + our «add-ons»
- Motivations:
  - Fully compliant with OAI-PMH and Marc21 standards
  - Co-developed by an international collaboration comprising institutes such as CERN, DESY, EPFL, FNAL, SLAC and used by about 30 scientific institutions worldwide
  - [ZENODO](#) (OpenAIRE flagship repository), [SCOAP<sup>3</sup>](#) and [inSPIRE HEP](#) repositories are based on Invenio
  - The CERN Document Server (<http://cds.cern.ch/>), based on Invenio, contains more than 1.3 million documents
  - UNESCO and UEMOA are leading an [initiative](#) to create a virtual library based on Invenio in 8 West African countries

# The Sci-GaIA Open Access Repository

(<http://oar.sci-gaia.eu>)

The screenshot shows the Sci-GaIA Open Access Repository website. At the top left is the Sci-GaIA logo and the text "Sci-GaIA OPEN ACCESS REPOSITORY". To the right is the "INVENIO" logo. Below the header are navigation tabs: "SEARCH", "SUBMIT", "PERSONALIZE", and "HELP". A search bar contains the text "Search 21 records for:" and a dropdown menu is set to "any field". There are "Search" and "Browse" buttons. Below the search bar is a "Narrow by collection:" section with several categories, each with a checked checkbox and a count in parentheses: "Audio-Video Recordings (2)", "Datasets (0)", "Images (3)", "Presentations (1)", "Posters (1)", "Publications (7)", and "Software (7)". On the right side, there are sections for "ABOUT THIS SITE", "CERTIFICATION AND COMPLIANCE", and "SEE ALSO". At the bottom left, there is a footer with contact information and a date. At the bottom right, there is a footer with language options and a service provider notice. A dashed line with a green circle around the "login" link points to the text "federated authentication" written vertically. A yellow circle highlights the logos for "GIDP" and "idem" at the bottom right.

Sci-GaIA OPEN ACCESS REPOSITORY

INVENIO

SEARCH SUBMIT PERSONALIZE HELP

Search 21 records for:

any field Search Browse

Search Tips :: Advanced Search

Narrow by collection:

- Audio-Video Recordings** (2)  
[Sci-GaIA](#) (0) [Others](#) (2)
- Datasets** (0)  
[Sci-GaIA](#) (0) [Others](#) (0)
- Images** (3)  
[Sci-GaIA](#) (2) [Others](#) (1)
- Presentations** (1)  
[Sci-GaIA](#) (1) [Others](#) (0)
- Posters** (1)  
[Sci-GaIA](#) (1) [Others](#) (0)
- Publications** (7)  
[Sci-GaIA](#) (6) [Others](#) (1)
- Software** (7)  
[Sci-GaIA](#) (1) [Others](#) (6)

ABOUT THIS SITE

Welcome to the Open Access Repository managed and operated by the [Sci-GaIA project](#). Feel free to browse all the features and contents of this site as well as to download the [virtual appliance](#) containing a clone of the repository and install it at your premises.

CERTIFICATION AND COMPLIANCE

This site is an [OAI](#) conforming repository and an official [OpenDOAR](#) data provider. It is also compliant with version 3.0 of the [OpenAIRE Guidelines](#).

SEE ALSO

[Sci-GaIA](#)  
[Sci-GaIA forum](#)

federated authentication

Open Access Repository :: [Search](#) :: [Submit](#) :: [Personalize](#) :: [Help](#)  
Info: [Terms of use](#) :: [Privacy Policy](#) :: [Metadata Policy](#) :: [Support - Feedback](#)  
Powered by [Invenio v1.2.1](#)  
Maintained by [admin@sci-gaia.eu](mailto:admin@sci-gaia.eu)  
Last updated: 21 Sep 2015, 10:49

This site is available in the following languages:  
[English](#) [Français](#)  
This is a Service Provider of

GIDP GAIN idem

# (Single) resource upload and DOI registration



## Submit New Record

[Datasets, Posters, Presentations, Publications, Software](#)

Submit New Record

page: 1

### Submit a resource:

#### \*Digital Object Identifier (DOI)

If you already have it, enter the DOI of your resource.  
Otherwise, reserve a DOI and we will create it for you:

Type of resource:

Publication ▾

#### \*Resource Title:

#### \*Author(s) of the resource: *(one per line)*

The Sci-GaIA OAR  
has already a prefix of:

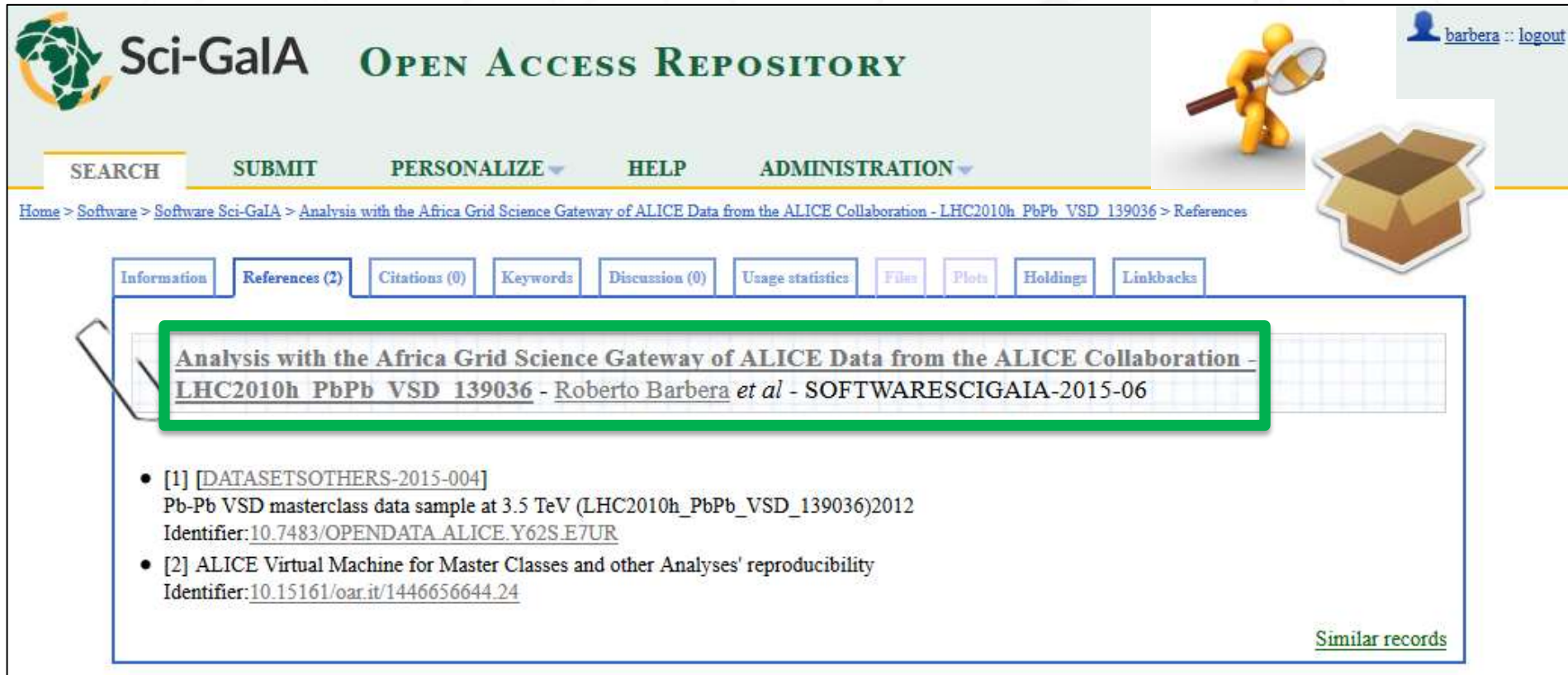


And we are also discussing with:





## Example of “research package”



The image shows a screenshot of the Sci-GaIA Open Access Repository website. The header features the Sci-GaIA logo (a green globe with a yellow path) and the text "Sci-GaIA OPEN ACCESS REPOSITORY". On the right, there is a user profile for "barbera" with a "logout" link. Below the header is a navigation bar with buttons for "SEARCH", "SUBMIT", "PERSONALIZE", "HELP", and "ADMINISTRATION". A breadcrumb trail reads: "Home > Software > Software Sci-GaIA > Analysis with the Africa Grid Science Gateway of ALICE Data from the ALICE Collaboration - LHC2010h PbPb VSD 139036 > References". A yellow 3D figure holding a magnifying glass and an open cardboard box are positioned on the right side of the page. Below the navigation bar is a row of tabs: "Information", "References (2)", "Citations (0)", "Keywords", "Discussion (0)", "Usage statistics", "Files", "Plots", "Holdings", and "Linkbacks". The "References (2)" tab is selected. A green box highlights the title of the first reference: "Analysis with the Africa Grid Science Gateway of ALICE Data from the ALICE Collaboration - LHC2010h PbPb VSD 139036 - Roberto Barbera *et al* - SOFTWARESCIGAIA-2015-06". Below this, two references are listed:

- [1] [DATASETSOTHERS-2015-004]  
Pb-Pb VSD masterclass data sample at 3.5 TeV (LHC2010h\_PbPb\_VSD\_139036)2012  
Identifier:[10.7483/OPENDATA\\_ALICE.Y62S.E7UR](https://doi.org/10.7483/OPENDATA_ALICE.Y62S.E7UR)
- [2] ALICE Virtual Machine for Master Classes and other Analyses' reproducibility  
Identifier:[10.15161/oar.it/1446656644.24](https://doi.org/10.15161/oar.it/1446656644.24)

A "Similar records" link is located at the bottom right of the reference list.

## Science Gateways

*“A Science Gateway is a community-developed set of tools, applications, and data that is integrated via a portal or a suite of applications, usually in a graphical user interface, that is further customized to meet the needs of a specific community.”*



# The Catania Science Gateway Framework (CSGF) in a nutshell

([www.catania-science-gateways.it](http://www.catania-science-gateways.it))

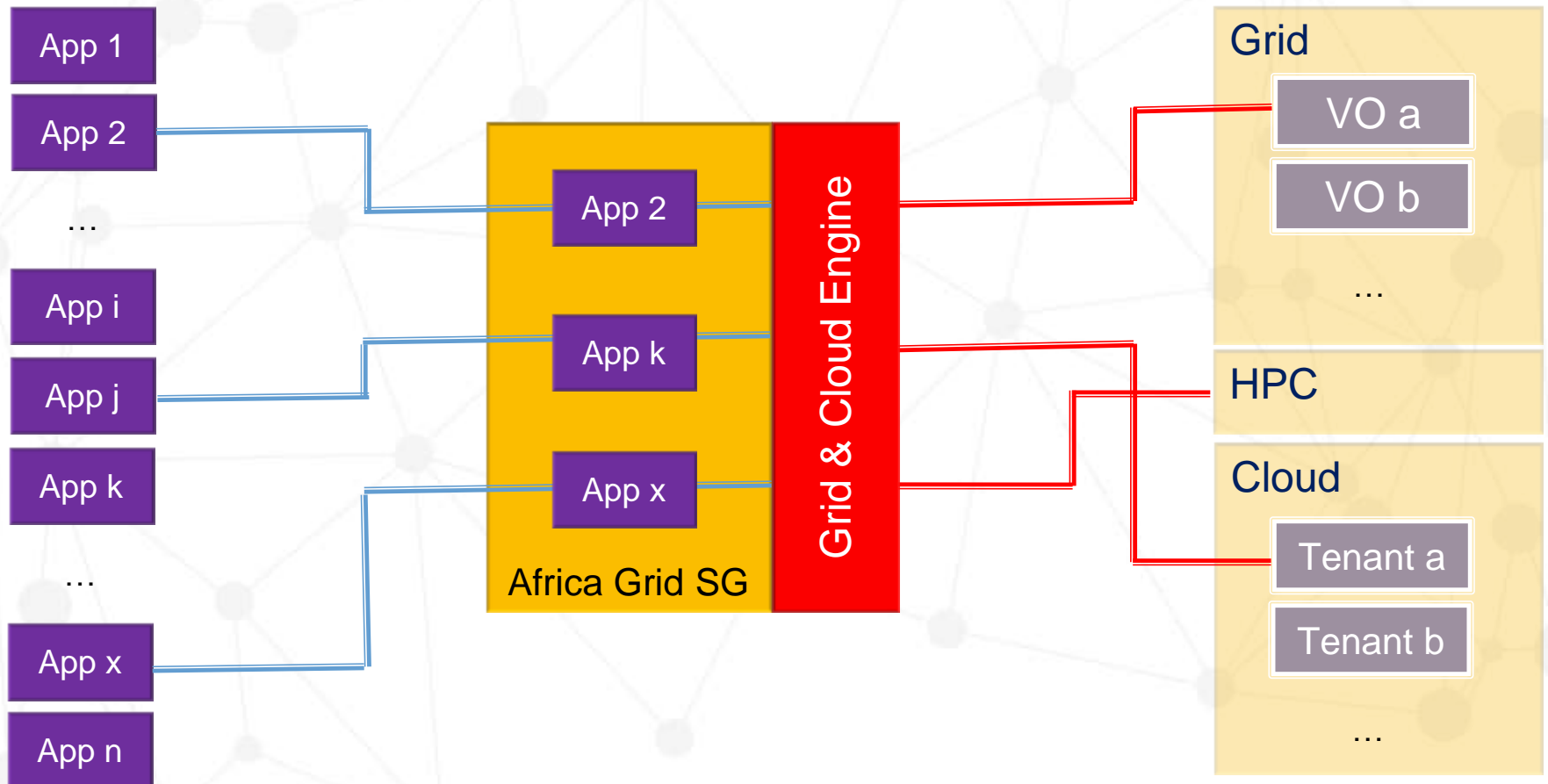


To better access e-Infrastructures Worldwide

- Born in 2010 to hide Grid – and now Cloud - complexity (especially security-wise)
- Designed to be:
  - Sustainable (fully based on standards)
  - Scalable (through “parallel” application servers)
  - Secure (integrated AAAAI)
  - Interoperable (one system → many infrastructures)
  - Accessible anytime from anywhere (including mobile devices)

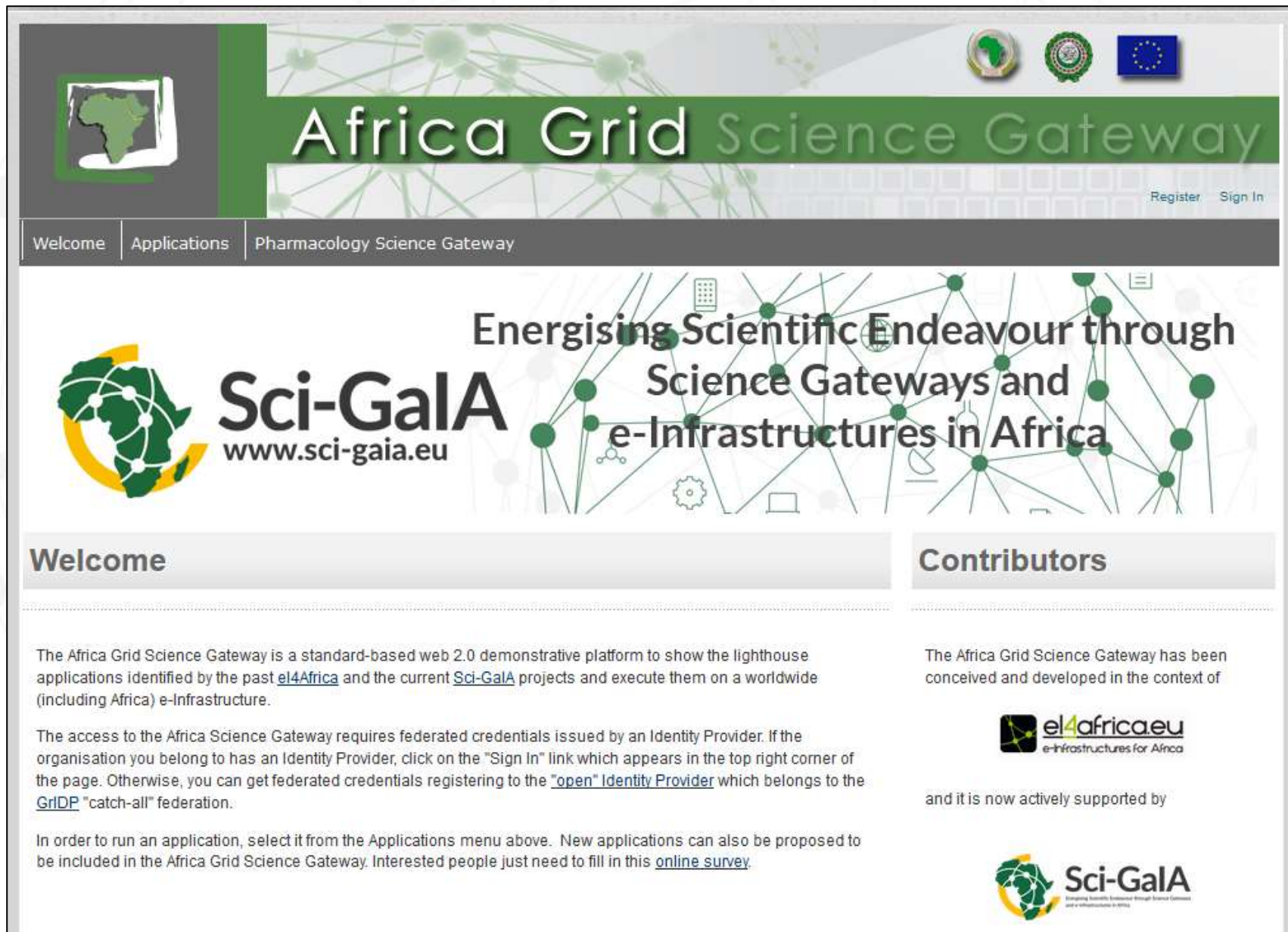
# Science Gateway Framework Architecture

(<http://www.catania-science-gateways.it>)



# The Africa Grid Science Gateway

(<http://sgw.africa-grid.org>)



**Africa Grid Science Gateway**

Register Sign In

Welcome Applications Pharmacology Science Gateway

**Sci-GaIA**  
www.sci-gaia.eu

Energising Scientific Endeavour through  
Science Gateways and  
e-Infrastructures in Africa

## Welcome


The Africa Grid Science Gateway is a standard-based web 2.0 demonstrative platform to show the lighthouse applications identified by the past [el4Africa](#) and the current [Sci-GaIA](#) projects and execute them on a worldwide (including Africa) e-Infrastructure.

The access to the Africa Science Gateway requires federated credentials issued by an Identity Provider. If the organisation you belong to has an Identity Provider, click on the "Sign In" link which appears in the top right corner of the page. Otherwise, you can get federated credentials registering to the "[open](#)" [Identity Provider](#) which belongs to the [GridP](#) "catch-all" federation.


In order to run an application, select it from the Applications menu above. New applications can also be proposed to be included in the Africa Grid Science Gateway. Interested people just need to fill in this [online survey](#).

## Contributors

The Africa Grid Science Gateway has been conceived and developed in the context of

 **el4africa.eu**  
e-Infrastructures for Africa

and it is now actively supported by

 **Sci-GaIA**  
Energising Scientific Endeavour through Science Gateways and e-Infrastructures in Africa

# Example of HEP analyses reproducibility and reusability

Africa Grid Science Gateway

Applications | Pharmacology Science Gateway | Discussion Forum | MyWorkSpace

My Workspace

Jobs | JobsMap | Data | Help

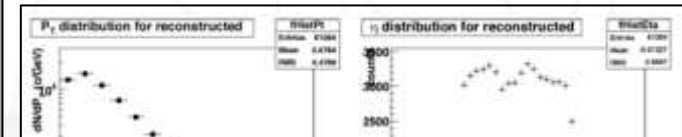
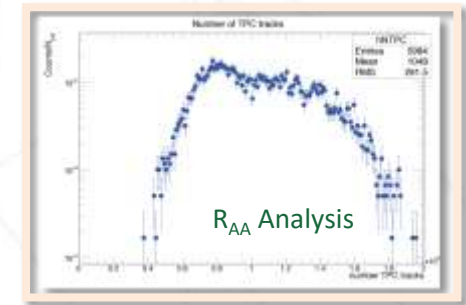
Analyze | VM Login

RAA2 | HT ANALYSIS

Welcome to RAA Analysis!

In this frame you should

Minimum Centrality



Sci-GaIA OPEN ACCESS REPOSITORY

SEARCH | SUBMIT | PERSONALIZE | HELP | ADMINISTRATION

Home > Software > Software Sci-GaIA > Analysis with the Africa Grid Science Gateway of ALICE Data from the ALICE Collaboration - LHC2010h\_PbPb\_ESD\_138275

Analysis with the Africa Grid Science Gateway of ALICE Data from the ALICE Collaboration  
LHC2010h\_PbPb\_ESD\_138275

Roberto Barbera ; Bruno Riccardo ; Carrubba Carla ; Inserra Giuseppina ; Ricceri Rita

01 October 2015

Abstract: This is the software of a JSR 286 compliant "portlet" installed on the Africa Grid Science Gateway that allows the analysis of the dataset mentioned in the title. Click on the External link below to be automatically re-directed to the execution page of the portlet on the Science Gateway.

Keyword(s): ALICE ; Science Gateway ; Elementary Particle Physics ; INFN ; CERN ; UNICT

Identifier(s): 11623/sci-gaia:1445067195.02

License: apache2.0

The record appears in these collections:  
Software > Software Sci-GaIA

Record created 2015-10-17, last modified 2015-11-15

Back to search

Similar records

External link:  
RUN PAGE

Rate this document:  
(Not yet reviewed)

Add to personal basket  
Export as BibTeX, MARC, MARCXML, DC, EndNote, NLM, RefWorks  
Edit This Record  
Manage Files of This Record  
Push via SWORD

1. From the OAR it is possible to select an "analysis" and run it on the Africa Grid SG

2. Clicking on **RUN PAGE**, the researcher can either reproduce or extend that particular analysis using the Africa Grid SG

## Example of analysis reproducibility and reusability

1. From within the Africa Grid Science Gateway entitled researchers can also book and start VMs already configured to re-use/extend data analyses
2. The VMs are deployed on research cloud, including the EGI Federated Cloud

Applications | Pharmacology Science Gateway | Discussion Forum | MyWorkSpace

My Workspace

- Jobs
- JobsMap
- Data
- Help





Analyze | **VM Login**

By clicking on 'Start new VM' button you will create a new ALICE virtual machine that you can access for about 72 hours. You will be notified via e-mail about the necessary credentials to access the newly instatiated VM. You cannot start more than one ALICE instance until the ALICE VM expires.

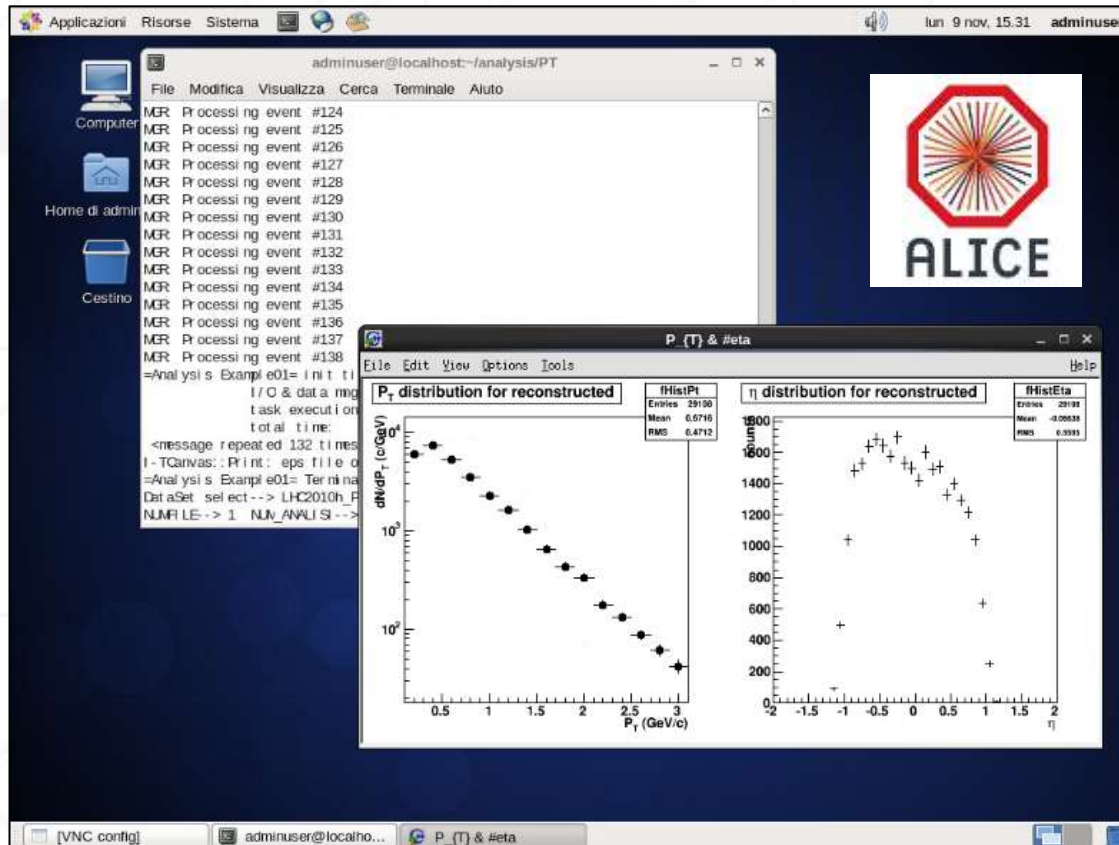
**START NEW VM**

## Example of analysis reproducibility and reusability

1. The VM is available for a customizable amount of time during which the user has full access to the dataset(s) and analysis algorithm(s) and source code(s) of the experiment
2. The user can access the VM using different protocols (e.g., SSH, VNC); clicking on the SSH or VNC icons the user can directly access the VM instantiated on the cloud from within the Science Gateway

- VM INFO -			
Server UUID	StartTime	Status	Connection
 e06bb3ad-83dc-11e5-8b54-000c29238fe8	2015-11-05		 

# Example of analysis reproducibility and reusability



New stable analyses (and their results), generated running the VM, may be registered in the OAR (with DOIs) to further extend the analysis catalogue shared within the Virtual Research Community

## Summary and conclusions

- Open Science vision can be implemented only if the “openness” paradigm becomes pervasive in day-by-day research
- Science outputs’ reproducibility, but also re-usability and extensibility, are key to walk through the “knowledge path” in both directions
- The Sci-GaIA project is strongly committed to promote the uptake of the Open Science paradigm and it’s building a viable federated platform for Open Science Commons across Europe and Africa
- A novel approach connects Open Access Repositories to Science Gateways and exploits Grid/Cloud/local resources worldwide to easily reproduce/reuse/extend scientific analyses
- The Africa Grid SG and the Sci-GaIA OAR can be easily cloned wherever in Africa such services are required/needed; feel free to contact [info@sci-gaia.eu](mailto:info@sci-gaia.eu) if you’re interested

# Thank you!

[sci-gaia.eu](http://sci-gaia.eu)

[info@sci-gaia.eu](mailto:info@sci-gaia.eu)

