Conjugating Open Science & Open Education: The Sci-GaIA e-Research Hackfest model

Prof. Roberto Barbera – University of Catania - Italy (roberto.barbera@ct.infn.it)
1st of November 2017 – Open Science Workshop – Addis Ababa (Ethiopia)
Outline

- Introduction concepts, definitions and driving considerations
- The (educational services of the) Sci-GaIA Open Science Platform
- The “e-Research hackfest” model
- Summary and conclusions
Opening Science enablers

OPEN ACCESS

Open Educational Resources

Open Source Code

Linked Data

Open Data

CITIZEN SCIENCE
Building e-Infrastructures is a waste if we don’t “build”, at the same time, their users.

Along with e-Infrastructures, **t-Infrastructures and training programmes** are thus needed as well as **Open Education Resources (OER)**.
The Sci-GaIA Project
(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
- End date: 30 April 2017
The main aim of the Sci-GaIA Coordination and Support Action is to create a sustainable foundation of educational material and procedures for the development and management of Science Gateways and e-Infrastructures in Africa and beyond to energise scientific endeavor. The approach is based on several objectives that are articulated around concrete activities.
The Sci-GaIA Federated Open Science Platform

www.sci-gaia.eu/osp/
The Sci-GaIA Courseware Infrastructure

Ready to be adopted in university curricula in EU and Africa

courses.sci-gaia.eu

www.sci-gaia.eu

A&A ROC

Sc. Gateway Frameworks

GitHub

GitHub

Read the Docs
Create, host, and browse documentation.

Other OER’s

OPEN edX

WordPress
### Sci-GaIA Training & Educational Material

(www.sci-gaia.eu/materials)

<table>
<thead>
<tr>
<th>Lecture</th>
<th>#</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td></td>
<td>Sci-GaIA Project</td>
</tr>
<tr>
<td></td>
<td></td>
<td>INDIGO DataCloud Project</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>The FutureGateway framework</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overview – APIs – Tutorial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Video recordings (1, 2, 3, 4, 5, 6, 7)</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>The INDIGO PaaS (Overview, Tutorial)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Video recordings (1, 2, 3, 4, 5, 6, 7, 8)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>The gLibrary framework</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Video recordings (1, 2)</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Programmatic Interaction with Open Access Repositories</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Video recordings (1, 2, 3)</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>The Onedata platform</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Video recordings (1, 2, 3, 4)</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>The Ophidia platform (Overview, Tutorial)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Video recordings (1, 2, 3)</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>The Kepler workflow manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Video recordings (1, 2)</td>
</tr>
</tbody>
</table>
Open Educational Resources

- Textbook, virtual appliance and video-lessons (on http://oar.sci-ga.eu)

Each OER has a Digital Object Identifier (DOI) → can be linked to the ORCID profile of the author and make her more visible.

OERs are harvestable using OAI-PMH → educational contents can be semantically enriched.

Virtual appliance for assignments and hands-ons.
DataCite DOI prefixes for the whole Africa

• in January 2017, an agreement was established between UNICT and the Conference of Italian University Rectors (CRUI) to extend the possibility to provide DOI-prefixes to all African organisations wishing to deploy an institutional Open Access Repository

• 5 DOI prefixes released so far – Request yours now!

The African Population and Health Research Centre (KE and Intl.)
The Eko-Konnect Research and Education Initiative (NG)
The Ministry of Education of Ethiopia, for EthERNet
The Ubuntunet Alliance (MW and Intl.)

Press release; North and South join forces to promote Open Science In Africa

The African Population and Health Research Center (APHRC) in Kenya and the Eko-Konnect Research and Education Initiative in Nigeria are among the very first organizations in Africa to begin use of DataCite Digital Object Identifier (DOI) prefixes.

The partnership with the Sci-GaIA project and the Conference of Italian University Rectors will help the research organizations generate persistent identifiers for their datasets, essentially long-lasting references that will help locate the datasets no matter where they appear online. It is also another step to realize a global data revolution – ensuring that research data are open, discoverable, navigable, machine-readable, and open to being tested for replicability and reusability.

As a result of this partnership, the African organizations can create an unlimited number of sub-prefixes from their institutional prefix and, for each sub-prefix, an unlimited number of DOIs for their knowledge repositories. It is hoped that this will boost the promotion of e-Infrastructures in Africa and the deployment of key services such as Open Access document and data repositories, which can make scientific products (papers, reports, datasets, etc.) stored in African digital repositories more easily citable and discoverable, worldwide.
Sci-GaIA courses available: The “SP Course” and the “Winter School”

Course on how to turn web-based services into Service Providers of Identity Federations

Sci-GaIA Winter School

Overview

The goal of the Sci-GaIA Winter School is to create the skills to integrate scientific applications in the Africa Grid Science Gateway and/or in other domain-specific Science Gateways.

This will allow the creation of an intercontinental pool of experts that can act as “Interface” between the end-users of the Communities of Practice (CoPs) supported by the project and the e-infrastructure services.
The e-Research Hackfest model (1/2)
The e-Research Hackfest model (2/2)

- **Day 1 and 2**
  - Presentation of technologies & tools
- **Day 3**
  - Presentation of the use cases (with indication of the technologies & tools to be adopted)
- **Other days**
  - Implementation of the use cases
- **Final day**
  - Presentation of final results (with real time demonstrations)
DevOps-compliant Reproducible t-Infrastructure
“Everything is code” … and it is available on GitHub

To our knowledge, no other project has done this before
The e-Research Summer Hackfest
(See all details at www.sci-gaia.eu/summer-hackfest)

“Bring your science to the web and the web to your science”

• Overview and objectives
  • The e-Research Summer Hackfest was held at the Department of Physics and Astronomy of the University of Catania (Italy) in two editions: the first on July, 4-15, 2016 and the second on July, 18-29, 2016 (the second edition was held to allow the participation of selected candidates from Africa who could not come to the first edition due to the time required for visa issuance in their country)
  • The event was co-sponsored by the Sci-GaIA, INDIGO-DataCloud, and COST ENeL projects
  • The main objective of the event was to integrate scientific use cases through a pervasive adoption of web technologies and standards and make them available to their end users through Science Gateways
  • Promoting and fostering open and reproducible research was the ultimate goal of the hackfest

• Topics:
  • Big Data analytics
  • Distributed computing services
  • Distributed storage services
  • Programmable access to Open Data repositories
  • Semantic federation of Open Access repositories
  • User interfaces (web, desktop, mobile, etc.)
  • Workflows

• Tools and technologies:
  • FutureGateway
  • gLibrary
  • Kepler
  • Invenio
  • OAI-PMH
  • Onedata
  • Ophidia
The e-Research Summer Hackfests
(www.sci-gaia.eu/summer-hackfest)

- 36 participants from 9 countries:
  4 African and 5 European
- 10 instructors
- 22 full days of intense work
- More than 10 hours of professionally edited video lectures and tutorials
- Almost 20 hours of video streamed and recorded
- 18 video interviews with live feedback from participants
- **13 use cases: 7 from Africa and 6 from Europe**
The WACREN e-Research Hackfest
(www.sci-gaia.eu/wacren-hackfest)

- 31 participants from Ethiopia, Ghana, Italy, Nigeria and South Africa
- 9 instructors
- 13 use cases: 12 new and 1 extension of a use case developed at the e-Research Summer Hackfest (MIPAR)
The EthERNet e-Research Hackfest
(http://agenda.ct.infn.it/e/ethernet-hackfest)

- Overview and objectives
  - The EthERNet e-Research Hackfest was held at the EthERNet premises in Addis Ababa, Ethiopia, on February, 13-24, 2017
  - The event was supported by the European Commission through EthERNet’s participation in the Ubuntunet Alliance that is partner in the Horizon 2020 Sci-GaIA project
  - The main objective of the e-Research Hackfest was to integrate scientific use cases through a pervasive adoption of web technologies and standards and make them available to their end users through Science Gateways
  - Promoting and fostering open and reproducible research was the ultimate goal of the hackfest

- Topics:
  - Distributed computing services
  - Distributed storage services
  - Programmatic access to Open Data repositories
  - Semantic federation of Open Access repositories
  - User interfaces (web, desktop, mobile, etc.)
  - Identity Federations
  - Open courseware

- Tools and technologies:
  - FutureGateway
  - gLibrary
  - Invenio
  - OAI-PMH
  - OPEN edX
  - SAML / Shibboleth
The EthERNet e-Research Hackfest
(www.sci-gaia.eu/ethernet-hackfest)

- 20 participants from Ethiopia, Italy and South Africa
- 8 instructors (3 in person and 5 from remote)
- 4 use cases selected
  - 3 fully implemented
- The last one (the Identity Provider) has been finished at the end of May
The EthERNet Open Access Repository
(http://oar2.ethernet.edu.et)

EthERNet Repository

EthERNet Repository use case final report

Eyuel Mulatu
14 March 2017

Abstract: Ethiopia has over 33 public universities and these Universities in Ethiopia do not have repositories to publish research papers, student thesis and other publications and to be visible in the national and international research community.

Identifier(s): 10.20372/ethernet:1489508994.36

The record appears in these collections:
Presentations > PRESENTATIONS EthERNet

Record created 2017-03-14, last modified 2017-03-14

Resource: PPT

Rate this document:

(Not yet reviewed)
DOI prefix for Ethiopia was requested (and approved) at very high political level
The EthERNet Platform for MOOCs  
(https://ethcourses.sci-gaia.eu)
The EthERNet Platform for MOOCs
(https://ethcourses.sci-gaia.eu)
The e-Research Hackfests media repositories (video playlists)

- **e-Research Summer Hackfests**
  - https://www.youtube.com/playlist?list=PLRNChYjPMFFtuXcTUAQvLtln1Yk2tLQxe
  - https://www.youtube.com/playlist?list=PLRNChYjPMFFuUAylgENB5XBkxVw7ULLRR
  - https://www.youtube.com/watch?v=sGZDdA4RB5E

- **WACREN e-Research Hackfest**
  - https://www.youtube.com/watch?v=Ve75AlaGSLU

- **EthERNet e-Research Hackfest**
  - https://www.youtube.com/playlist?list=PLpDEU1mUCxGYbvYaOo1p8QNjLFJDKEr4o

- **“Champions” videos**
  - https://www.youtube.com/playlist?list=PLpDEU1mUCxGbCCOeKVef7tdCVscXYtiH-X
Evaluation of Sci-GaIA Hackfest for Educational Purpose

What could make Sci-GaIA approach suitable for educational purpose?

1. The objective
2. The selection of the participants
3. The teaching and learning methodology: Sci-GaIA Hackfest participants are independent learners, who have mastered the Cognitive Domains of Knowledge, Comprehension and Application (Bloom’s Taxonomy; Bloom, B. (1964): http://bloomstaxonomy.org) in the subjects of their submitted cases as well as in the handling of digital media. The Sci-GaIA Hackfest addresses the Cognitive Domains in Analysis, Synthesis and Evaluation.
4. The syllabus of the Hackfest: problem-solving and research-oriented methodology to achieve the objectives set out in the application, self-study session for the meet-ups (preparatory course), introduction to the techniques applied, teamwork, presentation of the final result, assessment by experts/faculties/departments.
Evaluation of Sci-GaIA Hackfest for Educational Purpose

5. Lecturers/trainers take on the position of coaches to guide students/participants to the pre-defined results (flipped classroom).

6. **Assessment of students’/participants performance** in the Hackfest could be composed of:
   - Working approach
   - Presentation of the result
   - Usefulness of the project
   - Execution, documentation and judging by the jury or those who will use the interface.

   => **Competence-based assessment**
Conclusion

⇒ The Horizon 2020 Project Sci-GaIA introduces a Hackfest approach that fulfills the requirements of courses in formal education.

⇒ Sci-GaIA Hackfests build on the cognitive domains (analysis, synthesis and evaluation) and allow to describe the objectives, activities, methodology and the evaluation process in a syllabus. Teaching and learning methodologies are set out based on cognitive domains as problem-solving and research-oriented methodology. Subject for assessment is the result achieved and students’ competence.

⇒ Working with ‘big data’ is seen in Sci-GaIA Hackfest as the starting point for an innovative idea.
Summary and conclusions

• Open Science and Open Education are very much intertwined and should be fostered and promoted on the same footing
• All training materials developed by Sci-GaIA are released as Open Educational Resources
• The Sci-GaIA Open Science Platform includes an Open Access Repository and a courseware system, which can be both used and cloned & customized; **clones have been deployed in Ethiopia and should be promoted**
• The e-Research Hackfest model has been/can be key to promote Open Science and pursue the action of training a new generation of Open Science “champions”
• It can be used to foster Open Innovation and/or bridge the “gender gap” in STEM in conjunction with other initiatives (e.g., Girls Can Code in Africa)
Thank you!

sci-gaia.eu
info@sci-gaia.eu