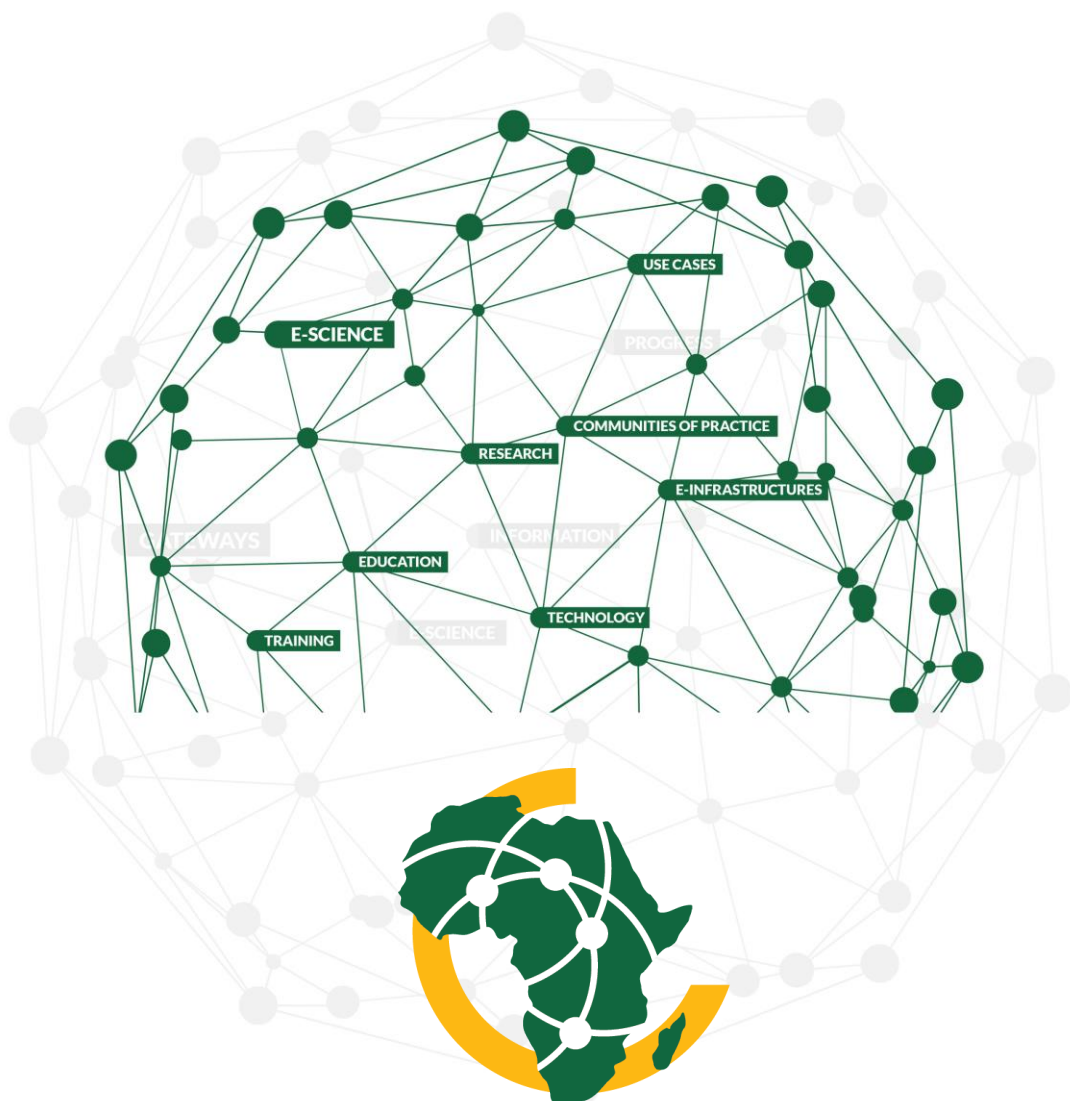




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E-INFRASTRUCTURE & SCIENCE GATEWAY DEVELOPMENT GUIDE FOR NRENS AND COMMUNITIES OF PRACTICE

June 2016



Sci-GaIA

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

PROJECT DOCUMENTATION SHEET

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Coordinator	: Dr. Simon J. E. Taylor, Brunel University London (UK) - BRUNEL
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Lead Beneficiary	: UBRUN
Author(s)	: Roberto Barbera (UNICT) – roberto.barbera@ct.infn.it : Bruce Becker (CSIR) – bbecker@csir.co.za : Rita Ricceri (UNICT) – rita.ricceri@ct.infn.it : Mario Torrisi (UNICT) – mario.torrisi@ct.infn.it
Contributor(s)	: Simon Taylor, Anastasia Anagnostou (UBRUN)
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Executive summary

Work-Package 1 (WP1) “Promote the uptake of Science Gateways and e-Infrastructures in Africa and Beyond”, as described in the Sci-GaIA Description of Work (DoW), aims to:

The objectives of this work package are to:

1. Create Science Gateway and e-Infrastructure development guidelines and materials for African NRENs and CoPs;
2. Create Science Gateway and e-Infrastructure development guidelines and materials for African educational programmes;
3. Monitor the successful implementation and uptake of e-Infrastructures in Africa;
4. Ensure the interoperability and interoperation between the African, the EU and the global e-Infrastructures.

This deliverable presents the status of the activities of Tasks 1.1 and 1.2, which are related to the above objectives 1 and 2, and how they are framed in the context of the federated Open Science Platform deployed by the Sci-GaIA project.

This deliverable has been delayed by slightly more than a month to include some preliminary conclusions on the outputs and outcomes of the Winter School, which officially ended on the 30th of May 2016.

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1 – INTRODUCTION

1.1 – INTRODUCTORY CONCEPTS AND DRIVING CONSIDERATIONS

At the onset of the 21st century, all the efforts done in distributed scientific computing have led to the new concept of *e-Infrastructure* - defined as:

“an environment where research resources (hardware, software and content) can be readily shared and accessed where necessary to promote better and more effective research; such environment integrate hard-, soft- and middle-ware components, networks, data repositories, and all sorts of support enabling virtual research collaborations to flourish globally”⁽¹⁾.

Indeed, e-Infrastructures have been built over several years both in Europe and the rest of the world, to support diverse multi- and inter-disciplinary Virtual Research Communities (VRCs)². There is a shared vision for 2020 that e-Infrastructures will allow scientists across the world to do better (and faster) research, irrespective of where they are and of the paradigm(s) adopted to build them.

E-Infrastructure components can be key platforms to support the Scientific Method³, the “knowledge path” followed in many aspects by scientists since the time of Galileo Galilei (see the deliverable D3.1 “Guidelines to setup and configure an appliance for the deployment of standard compliant open access repositories”). One of the cornerstones of the Scientific Method, which is a key driver through the knowledge path, is science reproducibility. In recent years, the issue of the reproducibility of scientific results has attracted increasing attention worldwide, both inside and outside scholarly communities, to which a recent Special Edition of Nature⁴ is testament. Real science reproducibility should include full access to papers, datasets, data collections, algorithms, configurations, tools and applications, codes, workflows, scripts, libraries, services, system software, infrastructure, compilers, hardware, etc. In order to ensure all that, besides and beyond that of e-Science⁵, the new concept of Open Science⁶ is emerging.

The Sci-GaIA project very much supports the Open Science “paradigm” and has a strong focus on the application of the guidelines of the so-called “infrastructure school”⁷. The whole Consortium is committed to setup a platform for re-producible and re-usable science across Europe and Africa, which is outlined in the next sub-section in relation to the project objective of producing clearly structured

¹ This definition of e-Infrastructure appears in an European Commission web page: <http://cordis.europa.eu/ictresults/index.cfm?ID=90825§ion=news&tpl=article>.

² G. Andronico et al, “E-Infrastructures for International Cooperation”, in “Computational and Data Grids: Principles, Applications and Design” (N. Preve Editor), IGI Global 2011, DOI: 10.4018/978-1-61350-113-9; see also www.igi-global.com/book/computational-data-grids/51946.

³ There are many equivalent definitions and depictions of the Scientific Method, both on the web and on textbooks. In this document we refer to http://home.badc.rl.ac.uk/lawrence/blog/2009/04/16/scientific_method/, from which we have re-used the picture included in Figure 1.

⁴ www.nature.com/nature/focus/reproducibility/.

⁵ <https://en.wikipedia.org/wiki/E-Science>

⁶ “Opening Science – The Book”. DOI: 10.1007/978-3-319-00026-8. <http://book.openingscience.org>.

⁷ Fecher, B., Friesike, S.: “Open Science: One Term, Five Schools of Thought”. A chapter of: “Opening Science – The Book”. DOI: 10.1007/978-3-319-00026-8.

guides and educational documents that can be used to train and support various stakeholders (National Research and Education Networks, Communities of Practice, Universities, etc.) in developing Science Gateways and e-Infrastructures in Africa.

1.2 - THE SCI-GAIA OPEN SCIENCE PLATFORM

“Open science is a means and not an end in itself and it is much more than just open access to publications or data; it includes many aspects and stages of research processes thus enabling full reproducibility and re-usability of scientific results.”⁽⁸⁾

During its first year, one of the most important outputs of the Sci-GaIA project was the development and deployment of a standard-based Open Science Platform⁹ that supports federated authentication (see Figure 1).

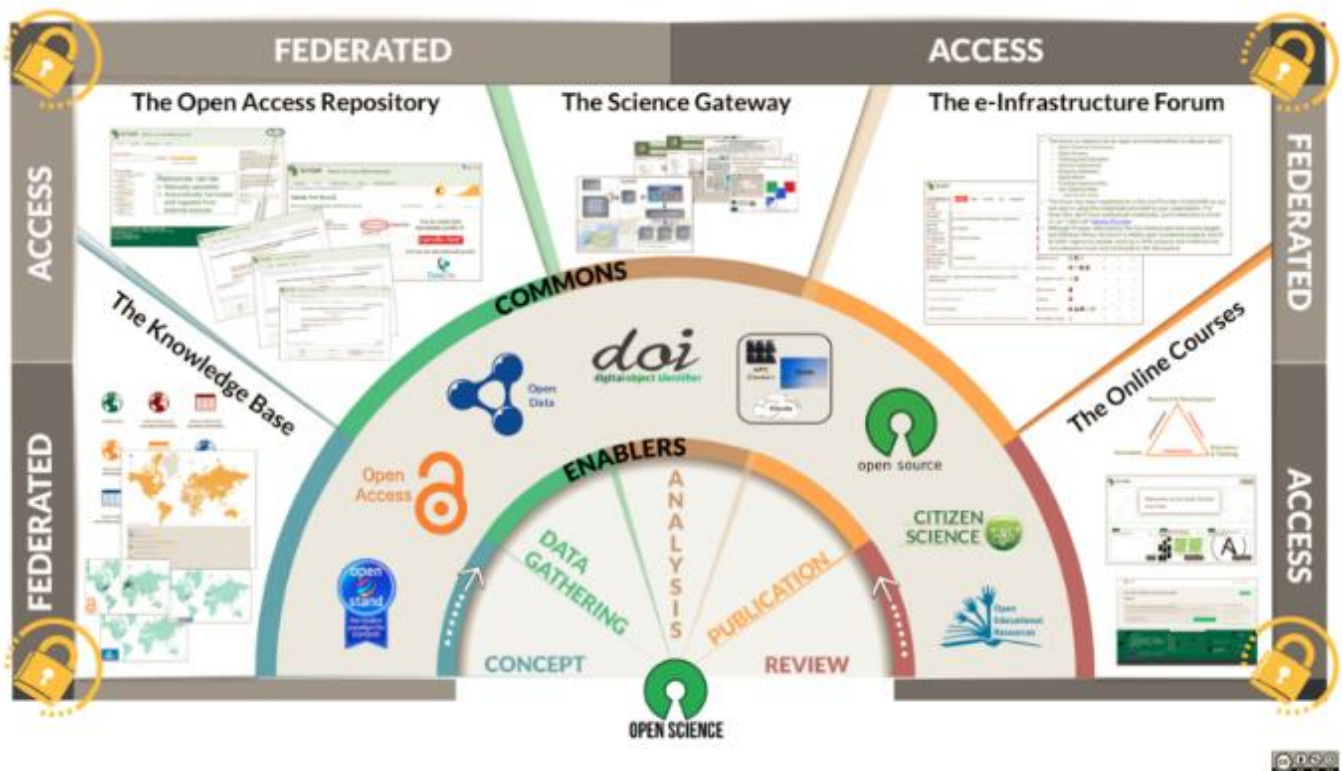


Figure 1: Layout of the Sci-GaIA federated Open Science Platform.

Users can access the federated Open Science Platform to reproduce, re-use and publish their research products and link them to their ORCID¹⁰ profiles to increase the visibility of both (African and European) science and scientists.

⁸ OECD (2015), “Making Open Science a Reality”, OECD Science Technology and Industry Policy Papers, No. 25, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5jrs2f963zs1-en>.

⁹ <http://www.sci-gaia.eu/osp>

The platform integrates resources provided by a federation of providers, with core services in an Open Science Commons¹¹. Services in the Commons are those which provide uniqueness and persistence to researchers and research output, as well as the services which enable federation of identities and resources. Resources in the federation refer to any kind of compute or data resource, given that they expose standard interfaces which the services in the Commons can use. Ideally, compute, data and adjunct services are instantiable via orchestration services which are expressed using widely-used tools, which make the entire infrastructure executable and permit better collaboration at the technical level between resource providers, as well as ensuring reproducibility of the services across data centres. The transparency and accountability of collaboration via code provides further motivation to contribute to the executable infrastructure. The infrastructure is therefore both Open (Community participation is possible) and Open Source, as well as reproducible (machines rather than people express the state of the infrastructure). The infrastructure itself becomes citable, bringing credit to its authors, and linking it to the research outputs generated on it. The services in the platform allow for open reviews of the platform itself, the individual scientific applications, the datasets generated or analysed by them, and the articles published based on them.

More information on Open Science concepts and enablers, as well as on the commons of the Sci-GaIA platform, can be obtained just clicking on the various areas of the figure shown in the page <http://www.sci-gaia.eu/osp> (move the mouse over the figure to identify them). In the next sub-sections, the various components of the platform, which are more relevant for WP1 and for Tasks 1.1 and 1.2 in particular, are briefly described.

1.3 – THE SCI-GAIA OPEN ACCESS REPOSITORY

Open Access repositories are powered by Digital Asset Management Systems (DAMS), which are intertwined structures incorporating both software and hardware that take care of management tasks and decisions surrounding the ingestion, annotation, cataloguing, storage, retrieval and distribution of digital assets¹². Types of digital assets include, but are not exclusive to, photography, logos, illustrations, animations, audio-visual media, presentations, spreadsheets, Word and/or PDF documents, and a multitude of other digital formats and their respective metadata.

There is a plethora of DAMS's available and some of the most common used in the Open Access domain are listed in Table 1 of the deliverable D3.1 "Guidelines to setup and configure an appliance for the deployment of standard compliant open access repositories". Others, more business- and/or social-oriented, are listed in ref. ¹³.

As stated in D3.1, Sci-GaIA has chosen Invenio as DAMS and the main motivations for the choice were the following:

¹⁰ <http://orcid.org>

¹¹ <https://www.opensciencecommons.org/>

¹² https://en.wikipedia.org/wiki/Digital_asset.

¹³ <http://www.capterra.com/digital-asset-management-software/>.

- It is fully compliant with all most important library standards, such as, for example: DCMI¹⁴, Marc21¹⁵ and OAI-PMH¹⁶;
- It is co-developed by an international collaboration comprising institutes such as CERN¹⁷, DESY¹⁸, EPFL¹⁹, FNAL²⁰, SLAC²¹ and used as institutional DAMS by about 30 scientific institutions worldwide²²;
- INSPIRE²³, SCOAP³⁽²⁴⁾ and ZENODO²⁵ (the OpenAIRE²⁶ flagship archive) repositories are based on Invenio;
- The CERN Document Server²⁷ operates since 2002 and manages more than 1.3 million records in high-energy physics, covering articles, books, journals, photos, videos, and more;
- UNESCO²⁸ and UEMOA²⁹ are leading an initiative³⁰ to create a virtual library based on Invenio in 8 African countries (Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo).

In the context of Sci-GaIA, the UNICT team has extended Invenio functionalities adding:

- The possibility to mint DataCite³¹ Digital Object Identifiers (DOIs) and assign them to the records stored in the OAR;
- If existing, direct links to the altmetrics³² of each of the records contained in the OAR (see, for example, <http://oar.sci-gaia.eu/record/133>);
- The correct metadata structure and the right OAI-PMH³³ endpoint configuration to make the OAR compliant with version 3.0 of the OpenAIRE Guidelines³⁴.

The Sci-GaIA Open Access Repository³⁵ (OAR) allows single researchers to upload their products but also connects to external archives to harvest their products (released under open licences, of course).

¹⁴ <http://dublincore.org/>.

¹⁵ <http://www.loc.gov/marc/bibliographic/>.

¹⁶ <https://www.openarchives.org/pmh/>.

¹⁷ <http://www.cern.ch/>.

¹⁸ <http://www.desy.de/>.

¹⁹ <http://www.epfl.ch/>.

²⁰ <http://www.fnal.gov/>.

²¹ <http://www.slac.stanford.edu/>.

²² <http://invenio-software.org/wiki/General/Demo>.

²³ <https://inspirehep.net/>.

²⁴ <http://scoap3.org/>.

²⁵ <https://zenodo.org/>.

²⁶ <http://www.openaire.eu/>.

²⁷ <http://cds.cern.ch/>.

²⁸ <http://www.unesco.org/>.

²⁹ <http://www.uemoa.int/>.

³⁰ <http://www.unesco.org/new/en/dakar/about-this-office/single-view/news/a-virtual-library-for-8-uemoa-countries-under-discussion-in-dakar/#.Vc7c1PRRQ5z>.

³¹ <http://www.datacite.org/>.

³² <https://www.altmetric.com/>.

³³ <https://www.openarchives.org/pmh/>.

³⁴ <https://guidelines.openaire.eu/en/latest/>.

Furthermore, the OAR allows each resource to be citable and discoverable, through unique identifiers, and reproducible/re-usable, thanks to the connection to the Africa Grid Science Gateway³⁶ and to Grid, Cloud and local High Performance Computing (HPC) infrastructures.

The OAR is available in two languages, English and French, and it is a Service Provider of the GridP³⁷ “catch-all” federation as well as of other Identity Federations being established in Africa³⁸ and of the eduGAIN³⁹ inter-federation.

From an Open Science point of view:

- The Sci-GaIA OAR is already “registered” in the e-Infrastructure Knowledge Base⁴⁰ as well as in the Semantic Search Engine⁴¹ that allows visitors to search for science products stored in the more than 4,000 repositories included so far;
- The Sci-GaIA OAR is also “connected” to the Africa Grid Science Gateway and some applications to demonstrate science reproducibility and reusability are already integrated in that Science Gateway;
- The Sci-GaIA OAR has a DOI prefix provided by DataCite and all records uploaded on it are hence findable, discoverable and citable.

The Sci-GaIA Open Access Repository has the double function of being the project’s document repository (in order to comply with the Open Data Pilot launched by the EC) and the template to be cloned in many places in Africa to make science “made in Africa” more visible, reproducible and reusable. Concerning the second scope, the virtual appliance containing a clone of Sci-GaIA-OAR is available, as one of its own resources⁴². The same holds for the step-by-step instructions⁴³ for installation and configuration.

In the context of Tasks 1.1 and 1.2, the Sci-GaIA OAR hosts all the guides created by the project as well as the lessons (both slides⁴⁴ and video-recordings⁴⁵) of the Winter School (see Section 3.1 below).

1.4 – THE AFRICAN E-INFRASTRUCTURE FORUM

The African e-Infrastructure Forum⁴⁶ has been created by the Sci-GaIA project in response to the need for dialogue and capacity development, which are two key enablers of Open Science. The forum hosts

³⁵ <http://oar.sci-gaia.eu/>

³⁶ <http://sgw.africa-grid.org/>

³⁷ <http://gridp.garr.it/>

³⁸ <http://www.sci-gaia.eu/federated-services>

³⁹ <http://www.edugain.org/>

⁴⁰ <http://www.sci-gaia.eu/knowledge-base>

⁴¹ <http://www.sci-gaia.eu/semantic-search>

⁴² <http://oar.sci-gaia.eu/record/19>

⁴³ <http://oar.sci-gaia.eu/record/20>

⁴⁴ <http://oar.sci-gaia.eu/collection/LESSONS%20Sci-GaIA>

⁴⁵ <http://oar.sci-gaia.eu/collection/AVR%20Sci-GaIA>

⁴⁶ <http://discourse.sci-gaia.eu/>

discussion topics on technical matters, scientific issues, e-Infrastructure policy and procedure aspects, as well as debate around and practice of Open Access and Open Science. The forum is actively moderated⁴⁷ but also community-driven collaboration activities of several communities of practice⁴⁸. The forum has been integrated into most other services that Sci-GaIA is promoting⁴⁹ and is an important part of the e-Infrastructure landscape.

The African e-Infrastructures forum distinguishes itself in that access is exclusively possible via Identity Federations⁵⁰, which has the dual benefit of:

- Promoting use and penetration of identity federation in our regional;
- Enabling transparent access to *other* services in the ecosystem.

The online discussion forum therefore demonstrates good practice, ease of use and an engaging experience as first contact for potential members of communities of practice.

The forum has been configured to allow self-moderation and internal management of individual communities, by delegating roles to the champions of those communities. In doing so the Sci-GaIA project is stimulating the development of the research activities within those communities by providing them with an inviting environment, conducive to constructive discussion and exchange of ideas, know-how and opinions. The forum is actively moderated for quality and direct contact is maintained with most posters, in order to maintain the cohesion of the community. In total, eight separate communities of practice have been added to the discussion forum, apart from the internal project community, and of course the members of the wider e-Infrastructure community in general.

Wherever online discussion or interaction is required between stakeholders and target communities, the online forum has been used as the engine. **In the context of Tasks 1.1 and 1.2 (and also 4.2), it has been used as the means of discussion and support during the online Winter School**, helping to allay the geographic separation between the lecturers and students, and providing an engaging experience for the participants. During project events and offline training courses, the forum has been used as the means for gathering feedback and discussion following the event, making it easy for interested parties to start and continue collaborating with the project. This melding of “online” and “offline” presence has led to positive engagement and user retention.

⁴⁷ This is done according to the Universal Rules of Civilized Discourse (see <http://www.discourse.org>). The discourse toolkit was specifically selected for its design and features which engender civilised and respectful discourse.

⁴⁸ Communities of practice are assigned a category and their representatives then have free reign to conduct their discussion as they see fit. Communities benefit from the infrastructure, especially identity federation, and are able to better conduct their research. Supported communities are at discourse.sci-gaia.eu/c/projects.

⁴⁹ For example, the discussion forum serves as the comments and discussion engine of the online courses platform, the science gateway and the project website. Activity on the forum is also configured to send messages to other online workspaces such as Slack and Twitter.

⁵⁰ This was done through the development of an SSO application which treats user credentials and passes them to the discourse application. See <https://github.com/AAROC/DiscourseSSO>.

1.5 – THE SCI-GAIA ONLINE COURSES SERVER

The Triangle of Knowledge⁵¹ “connects” Research & Development (R&D) to Education & Training (E&T) and to Innovation. e-Infrastructures are indeed powerful platforms to enable better and faster R&D and to enable Innovation but much less connections have been established so far to E&D. Building e-Infrastructures is a waste of time and efforts if we do not “build”, at the same time, their users and one of the problems to fully establish a Global Research Area is actually the lack of new professional figures such as (big) data scientists.

Furthermore, in order to be realised, the Open Science vision of an openly shared and fully interconnected research has to be taught to the new generations as early as possible. So, along with e-Infrastructures, t-Infrastructures (i.e. training infrastructures) and training programmes are needed as well as Open Education Resources⁵² (OER). On this purpose, the Sci-GaIA project has set-up a service for online courses based on the renowned Open edX platform⁵³, which is more and more used worldwide⁵⁴ for MOOCs⁵⁵.

The Sci-GaIA Online Courses service is meant to host training and education materials related to e-Infrastructure services, e-Science and Open Science, to be eventually adopted in university curricula.

In the context of Tasks 1.1 and 1.2, the Sci-GaIA Online Courses system hosts all the courses developed by the project so far as well as others created in collaboration with other collaborating organisations.

⁵¹ https://en.wikipedia.org/wiki/Knowledge_triangle

⁵² <http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/>

⁵³ <https://open.edx.org/>

⁵⁴ <https://github.com/edx/edx-platform/wiki/Sites-powered-by-Open-edX>

⁵⁵ Massive Open Online Courses, see https://en.wikipedia.org/wiki/Massive_open_online_course.

2 – GUIDELINES AND COOKBOOKS

During the first year, as part of Tasks 1.1 and 1.2, WP1 has created several guides to install and configure Science Gateways⁵⁶ as well as other e-Infrastructure-related services.

Regarding Science Gateway development guidelines and materials for NRENs and Communities of Practice, four topics have been addressed:

1. Science Gateway Installation & Configuration;
2. Science Gateway Integrated Development Environment Installation & Configuration;
3. Virtual Appliance containing the Science Gateway Integrated Development Environment
4. Science Gateway Web Applications' Development Guides (29 complete – both back-end and front-end - examples belonging to several scientific domains).

Regarding, instead, e-Infrastructure development guidelines and materials for NRENs and Communities of Practice, three topics have been addressed:

1. Application Integration and Delivery Guides (separate guides have been created for users and service providers);
2. e-Infrastructure Deployment Guides (with items related to Grid Core, Grid Site and Identity Services);
3. Open Access Repository Deployment and Configuration Guide (a step by step installation and configuration guide, including the customisation of the new Invenio add-ons developed by the UNICT team in the context of Sci-GaIA).

Pointers to all training and education materials that have been created so far, corresponding to the topics listed above, are gathered in the web page: <http://www.sci-gaia.eu/materials/>.

Besides the direct links contained in the above page, the whole section of the project website reachable at the link <http://www.sci-gaia.eu/engagement/> has been created on purpose to provide visitors with an organised and useful information according to their typology. The various sub-sections are organised as cook-books and contain references to guidelines and other installation and deployments guides.

In the framework of Task 1.2, in particular, WP1 has developed training materials also for educational programmes. Besides the full documentation about how to develop and integrate applications inside Science Gateways, <https://csgf.readthedocs.io/>, containing tens of examples of different scale and complexity.

The main contribution of Task 1.1 during the first year of the project has definitely been, instead, the creation of the education materials for the Sci-GaIA Winter School. Those are of course integrated in the Sci-GaIA Online Courses server mentioned above, at

https://courses.sci-gaia.eu/courses/UNICT/WS2015/201603_01_31/about

⁵⁶ Based on the Catania Science Gateway Framework (<http://www.catania-science-gateways.it>).

and also available as single items on the Sci-GaIA OAR:

<http://oar.sci-gaia.eu/collection/LESSONS%20Sci-GaIA>

and on YouTube:

https://www.youtube.com/playlist?list=PLeWVCbtm_5Q5T5nf1fro1UUimVLpMcoq0.

To make the applications porting to Science Gateways easier, the UNICT team has created two templates of “portlets” that can be used by developers as examples and starting points for their own use cases. The documentation about the two templates is available at the following pages:

- <http://csgf.readthedocs.io/en/latest/template-portlet/docs/index.html>;
- <http://csgf.readthedocs.io/en/latest/template-special-job-portlet/docs/index.html>.

As additional training material for Winter School, a virtual appliance has also been created that provides a pre-configured and ready-to-use development environment for the Catania Science Gateway Framework. The appliance can be downloaded from the page <http://oar.sci-gaia.eu/record/186> of the Sci-GaIA Open Access Repository. For more information about the Winter School, the reader can have a look at the sub-section 3.1 below. The Winter School was not, however, the only course created by the Sci-GaIA project during the reporting period. Indeed, on the Sci-GaIA Online Courses server there is also the “Course on how to turn web-based services into Service Providers of Identity Federations”, created in collaboration with GARR (the organisation managing the Italian National Research & Education Network), which is described in Section 3.3 below.

3 – COURSES

3.1 – THE SCI-GAIA WINTER SCHOOL

The main course developed by the Sci-GaIA project during its first year (actually, across the end of the first year and the beginning of the second), which was actually run as a training event was the Winter School^{57,58}.

The goal of the Sci-GaIA Winter School was 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 school was entirely web-based and included a combination of pre-recorded lectures and interactive sessions where to check the progress of students through their short presentations and the correction of the exercises. Both the inaugural lecture and the final day’s presentations were also held as interactive webinars.

The school followed a project-driven education approach with teams of students working on the development of scientific applications to be integrated in the Science Gateway(s). Here are some relevant numbers concerning the school:

- 5 instructors and 27 registered pupils from 12 countries;
- 11 applications, either proposed or assigned;
- 1 online inaugural lesson, 11 checkpoint web-meetings and 1 online final event, for a total of more than 12 hours of direct teaching and tutoring;
- 7 pre-recorded lessons, including exercises, for a total of several hours of teaching time.

The Winter School started on the 4th of April 2016 and officially ended on the 30th of May 2016. We decided to run it for 2 months instead of 1, as originally foreseen in the DoW, to (i) give more time to pupils to follow the lessons (bandwidth problems made them quite difficult to be followed “on stream”), (ii) to solve the exercises (some of them were quite challenging and required to bridge a knowledge gap), and (iii) to develop the software needed to integrate the proposed/assigned applications in the Africa Grid Science Gateway.

For more information about the status of the school and the applications being developed, the reader can have a look at the page <http://www.sci-gaia.eu/winter-school> while all courseware can be found at:

- The website of the course:
https://courses.sci-gaia.eu/courses/UNICT/WS2015/201603_01_31/about;
- The lesson category on the Open Access Repository:
<https://oar.sci-gaia.eu/collection/LESSONS%20Sci-GaIA>;
- The playlist of the video-recorded lessons:
https://www.youtube.com/playlist?list=PLeWVCbtm_5Q5T5nf1fro1UUimVLpMcoq0.

⁵⁷ <http://www.sci-gaia.eu/winter-school/>

⁵⁸ https://courses.sci-gaia.eu/courses/UNICT/WS2015/201603_01_31/about

As already pointed out above, the links to all education materials created for the Winter School are listed in web page:

<http://www.sci-gaia.eu/materials/>.

A promo-video of the school can be watched on YouTube at

<https://www.youtube.com/watch?v=pjKtJbEaC9Y>

and a final dissemination video is in preparation to be shown at the first periodic review of the project.

For the sake of pedagogical completeness, the online course covered the following topics:

- General concepts and driving considerations;
- Course prerequisites;
- Science Gateway Development Environment;
- Portlet development:
 - General concepts and definitions;
 - Hands-on;
- Portlet User Interface Development:
 - General concepts and definitions;
 - Job Management Portlet Setup;
 - Form design;
 - Form action method implementation;
 - User Interface search container;
 - deleteJob Action;
 - Validation and internationalization;
 - Assignments;
- Liferay portlet preferences;
- The Grid and Cloud Engine;
- Example of portlet for job submission;
- Example of portlet for special job submission.

3.2 – COURSE ON HOW TO TURN WEB-BASED SERVICES INTO SERVICE PROVIDERS OF IDENTITY FEDERATIONS

The Winter School was not the only course created by the Sci-GaIA project during the first year. Indeed, on the Sci-GaIA Online Courses server there is also the “Course on how to turn web-based services into Service Providers of Identity Federations”, created in collaboration with GARR (the organisation owning and managing the Italian National Research & Education Network).

The course is aimed at those interested in developing applications that provide access control based on the SAML⁵⁹ standard and the program covers the installation and configuration (basic and advanced) of

⁵⁹ <http://saml.xml.org/>

a Shibboleth-based⁶⁰ Service Provider (SP) and includes hands-on exercises that allow participants to experience the ease and speed of the implementation of federated Single Sign On (SSO) mechanisms.

All the courseware is available at:

https://courses.sci-gaia.eu/courses/GARR/SP101/2015_T4/about

while slides and the video-lessons are available, respectively at

<http://oar.sci-gaia.eu/collection/LESSONS%20Others>

and at

<http://oar.sci-gaia.eu/collection/AVR%20OTHERS>.

Furthermore, a promo-video of the course can be watched on YouTube at

<https://www.youtube.com/watch?v=BsWKVzx2zOE>.

For the sake of pedagogical completeness, the online course covered the following topics:

1. Shibboleth SP: installation and basic configuration for Single Sign On (SSO);
2. Shibboleth SP: advanced configuration;
3. The Discovery Service;
4. Register a Service Provider in the IDEM federation and in the eduGAIN inter-federation.

It is also worth noting that the contents of the above course have been “mixed” with the e-Infrastructure development guidelines and materials for NRENs and Communities of Practice, mentioned in Section 2, to create the materials for a tutorial on “DevOps for Federated Services”⁶¹ held for the first time in Lagos (Nigeria) from the 8th to the 10th of March 2016. The contents of the tutorial were organised in the following three lessons (and hand-ons):

1. Foundations: Some theory and background;
2. Introduction to Ansible: The long version;
3. Hands-on Ansible: Getting hands dirty with Ansible.

⁶⁰ <https://shibboleth.net/>

⁶¹ <http://indico.wacren.net/event/25/>

4 – SUMMARY AND CONCLUSIONS

The first Work Package of Sci-GaIA (WP1) aims to promote the uptake of Science Gateways and e-Infrastructures in Africa and beyond. In particular, its Tasks 1.1 and 1.2 have the following objectives, respectively:

1. Create Science Gateway and e-Infrastructure development guidelines and materials for African NRENs and CoPs;
2. Create Science Gateway and e-Infrastructure development guidelines and materials for African educational programmes.

During the first year, as part of Tasks 1.1 and 1.2, WP1 has created several guides to install and configure Science Gateways as well as other e-Infrastructure-related services and has made them available through services integrated the Sci-GaIA federated Open Science Platform.

Pointers to all training and education materials have been made available in the web page: <http://www.sci-gaia.eu/materials/> and the whole section of the project website reachable at the link <http://www.sci-gaia.eu/engagement/> has been created on purpose to provide visitors with an organised and useful information according to their typology. The various sub-sections are organised as cook-books and contain references to guidelines and other installation and deployments guides.

The main contribution of Task 1.1 during the first year of the project has definitely been the creation of the education materials for the Sci-GaIA Winter School. Those are of course integrated in the Sci-GaIA Online Courses server mentioned above, at

https://courses.sci-gaia.eu/courses/UNICT/WS2015/201603_01_31/about

and also available as single items on the Sci-GaIA OAR:

<http://oar.sci-gaia.eu/collection/LESSONS%20Sci-GaIA>

and on YouTube:

https://www.youtube.com/playlist?list=PLeWVCbtm_5Q5T5nf1fro1UUimVLpMcoq0.

In the framework of Task 1.2, instead, WP1 has developed training materials also for educational programmes. Besides the full documentation about how to develop and integrate applications inside Science Gateways, <https://csgf.readthedocs.io/>, containing a plethora of examples.

Both tasks 1.1 and 1.2 are well on track and, in synergy with WP2 and WP4, WP1 will concentrate its efforts in the second year to have the training and education materials created integrated in official curricula in Africa and in Europe.