

The (Sci-GaIA) Open Science Vision



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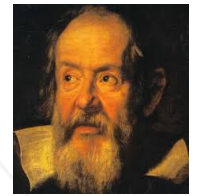
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 654237



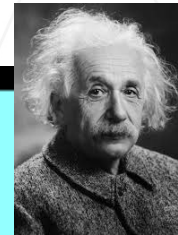
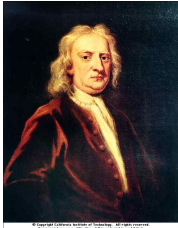
Outline

- Introductory concepts, definitions and driving considerations
- The Sci-GaIA Open Science Platform
- Summary and conclusions

The Scientific Method



G. Galilei



Inductive Reasoning

Deductive Reasoning

OBSERVATION / EXPERIMENT

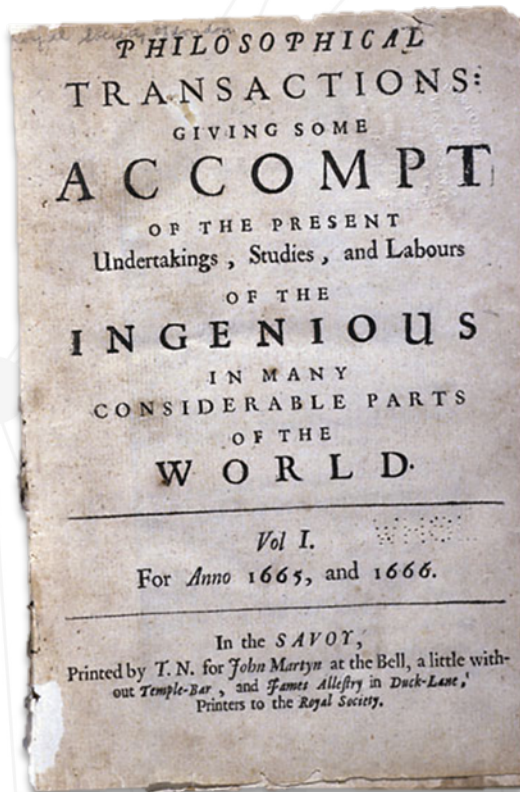
Generalizations

Predictions

PARADIGM / THEORY

- **Examples of IR:**
 - Classical Mechanics
 - Newton's Gravitation Theory
- **Examples of DR:**
 - General Relativity
 - Standard Model of Particle Physics

The “output” of the Scientific Method: papers and publications



arXiv.org > hep-ex > arXiv:1207.7214

High Energy Physics – Experiment

Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC

The ATLAS Collaboration
(Submitted on 31 Jul 2012 (v1), last revised 31 Aug 2012 (this version, v2))

A search for the Standard Model Higgs boson in proton-proton collisions with the ATLAS detector at the LHC is presented. The datasets used correspond to integrated luminosities of approximately 4.8 fb⁻¹ collected at sqrt(s) = 7 TeV in 2011 and 5.8 fb⁻¹ at sqrt(s) = 8 TeV in 2012. Individual searches in the channels H → ZZ(γ*) → llll, H → γγ and H → WW → eμ in the 7 TeV data and results from improved analyses of the H → ZZ(γ*) → llll and H → γγ channels in the 8 TeV data are combined with previously published results of searches for H → ZZ(γ*) → llll, H → γγ and H → WW → eμ in the 8 TeV data are combined with previously published results of searches for H → ZZ(γ*) → llll, H → γγ and H → WW → eμ in the 8 TeV data and results from improved analyses of the H → ZZ(γ*) → llll and H → γγ channels in the 7 TeV data. Clear evidence for the production of a neutral boson with a measured mass of 126.0 ± 0.4 (stat) ± 0.4 (sys) GeV is presented. This observation, which has a significance of 5.9 standard deviations, corresponding to a background fluctuation probability of 1.7 × 10⁻⁹, is compatible with the production and decay of the Standard Model Higgs boson.

Comments: 24 pages plus author list (38 pages total), 12 figures, 7 tables, revised author list, matches version to appear in Physics Letters B

Subjects: High Energy Physics – Experiment (hep-ex)

Journal reference: Phys.Lett. B716 (2012) 1–29

DOI: 10.1016/j.physletb.2012.08.020

Report number: CERN-PH-EP-2012-218

arXiv:1207.7214 [hep-ex]

Cite as: (or arXiv:1207.7214v2 [hep-ex] for this version)

Submission history

From: Atlas Publications [view email]

[v1] Tue, 31 Jul 2012 11:59:59 GMT (334kb)

[v2] Fri, 31 Aug 2012 19:29:54 GMT (334kb)

Which authors of this paper are endorsers? | Disable MathJax (What is MathJax?)

Link back to: arXiv, form interface, contact.

Physics Letters B

Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC^{*}

ATLAS Collaboration[†]
This paper is dedicated to the memory of our ATLAS colleagues who did not live to see the full impact and significance of their contributions to the experiment.

ARTICLE INFO

ABSTRACT

A search for the Standard Model Higgs boson in proton-proton collisions with the ATLAS detector at the LHC is presented. The datasets used correspond to integrated luminosities of approximately 4.8 fb⁻¹ collected at sqrt(s) = 7 TeV in 2011 and 5.8 fb⁻¹ at sqrt(s) = 8 TeV in 2012. Individual searches in the channels H → ZZ(γ*) → lll, H → γγ and H → WW → eμ in the 7 TeV data and results from improved analyses of the H → ZZ(γ*) → lll and H → γγ channels in the 8 TeV data are combined with previously published results of searches for H → ZZ(γ*) → lll and H → γγ channels in the 7 TeV data. Clear evidence for the production of a neutral boson with a measured mass of 126.0 ± 0.4 (stat) ± 0.4 (sys) GeV is presented. This observation, which has a significance of 5.9 standard deviations, corresponding to a background fluctuation probability of 1.7 × 10⁻⁹, is compatible with the production and decay of the Standard Model Higgs boson.

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1. Introduction

The Standard Model (SM) of particle physics [1–4] has been tested by many experiments over the last four decades and has been shown to successfully describe high energy particle interactions. However, the mechanism that breaks electroweak symmetry in the SM has not been verified experimentally. This mechanism [5–10], which gives mass to massive elementary particles, implies the existence of a scalar particle, the SM Higgs boson. The search for the Higgs boson, the only elementary particle in the SM that has not yet been observed, is one of the highlights of the Large Hadron Collider (LHC) physics programme.

Indirect limits on the SM Higgs boson mass of m_H < 158 GeV at 95% confidence level (CL) have been set using global fits to precision electroweak results [12]. Direct searches at LEP [13], the Tevatron [14–16] and the LHC [17,18] have previously excluded, at 95% CL, a SM Higgs boson with mass below 600 GeV, apart from some mass regions between 115 GeV and 127 GeV.

Both the ATLAS and CMS Collaborations reported excesses of events in their 2011 datasets of proton-proton (pp) collisions at centre-of-mass energy sqrt(s) = 7 TeV at the LHC, which were comparable with SM Higgs boson production and decay in the mass region 124–126 GeV, with significances of 2.9 and 3.1 standard deviations (σ) respectively [17,18]. The CMS and ATLAS experiments at the Tevatron have also recently reported a broad excess in the mass region 120–135 GeV; using the existing LHC constraints, the observed local significances for m_H = 125 GeV are 2.7σ for CDF [14], 1.1σ for DØ [15] and 2.8σ for their combination [16].

The previous ATLAS searches in 4.8–4.8 fb⁻¹ of data at sqrt(s) = 7 TeV are combined here with new searches for H → ZZ(γ*) → 4l, H → γγ and H → WW(γ*) → eμ in the 5.8–5.8 fb⁻¹ of pp collision data taken at sqrt(s) = 8 TeV in 2012.

The data were recorded with instantaneous luminosities up to 6.8 × 10³¹ cm⁻²s⁻¹; they are therefore affected by multiple pp collisions occurring in the same or neighbouring bunch crossings (pile-up). In the 7 TeV data, the average number of interactions per bunch crossing was approximately 10; the average increased to approximately 20 in the 8 TeV data. The reconstruction, identification and isolation criteria used for electrons and photons in the 8 TeV data are improved, making the H → ZZ(γ*) → 4l and H → γγ searches more robust against the increased pile-up. These analyses were re-optimised with simulation and frozen before looking at the 8 TeV data.

In the H → WW(γ*) → eν channel, the increased pile-up degrades the event missing transverse momentum, E_{miss}^T, resolution, which results in significantly larger Drell-Yan background in the same-flavour final states. Since the E_{miss}^T channel provides most of the sensitivity of the search, only this final state is used in the analysis of the 8 TeV data. The kinematic region in which a SM Higgs boson with a mass between 110 GeV and 140 GeV is

Marked a real Scientific Revolution in the 17th century but... it is almost the same since then

The Pillars of the Scientific Method

- **Repeatability**

- The closeness of agreement between independent results obtained with the same method on identical test material, under the same conditions (same operators, same apparatus, same laboratory and/or after intervals of time)
- Affected by *random errors*

- **Reproducibility**

- The closeness of agreement between independent results obtained with the same method on identical test material but under different conditions (different operators, different apparatus, different laboratories and/or after different intervals of time)
- Affected by *systematic errors*

Is science really reproducible?

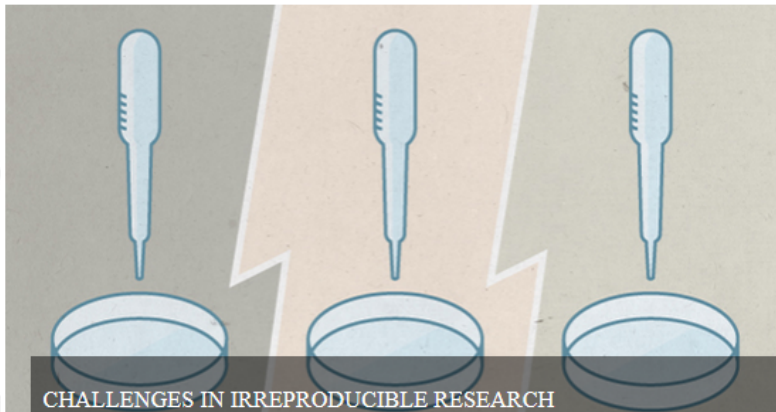
Challenges in irreproducible research

(<http://www.nature.com/nature/focus/reproducibility/index.html>)

The screenshot shows the top navigation bar of the Nature journal website. It includes the 'nature' logo, the tagline 'International weekly journal of science', a search bar with a 'Go' button, and a link to 'Advanced search'. Below this is a horizontal menu with links for 'Home', 'News & Comment', 'Research', 'Careers & Jobs', 'Current Issue', 'Archive', 'Audio & Video', and 'For Authors'. A secondary navigation bar highlights 'Challenges in irreproducible research' under the 'Archive' section. A banner below the navigation bar promotes a survey: 'Take part in Nature Publishing Group's annual reader survey here for the chance to win a Macbook Air.' with a 'Find out more' link.

SPECIAL

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CHALLENGES IN IRREPRODUCIBLE RESEARCH

No research paper can ever be considered to be the final word, and the replication and corroboration of research results is key to the scientific process. In studying complex entities, especially animals and human beings, the complexity of the system and of the techniques can all too easily lead to results that seem robust in the lab, and valid to editors and referees of journals, but which do not stand the test of further studies. *Nature* has published a series of articles about the worrying extent to which research results have been found wanting in this respect. The editors of *Nature* and the *Nature* life sciences research journals have also taken substantive steps to put our own houses in order, in improving the transparency and robustness of what we publish. Journals, research laboratories and institutions and funders all have an interest in tackling issues of irreproducibility. We hope that the articles contained in this collection will help.

Free full access

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EDITORIAL

Journals unite for reproducibility

Consensus on reporting principles aims to improve biomedical research.
Nature 515, 7 (6 November 2014)

Code share

Papers in *Nature* journals should make computer code accessible where possible.
Nature 514, 536 (29 October 2014)

Reducing our irreproducibility

Nature 496, 398 (25 April 2013)

Further confirmation needed

A new mechanism for independently replicating research findings is one of several changes required to improve the quality of the biomedical literature.
Nature Biotechnology 30, 806 (10 September 2012)

Error prone

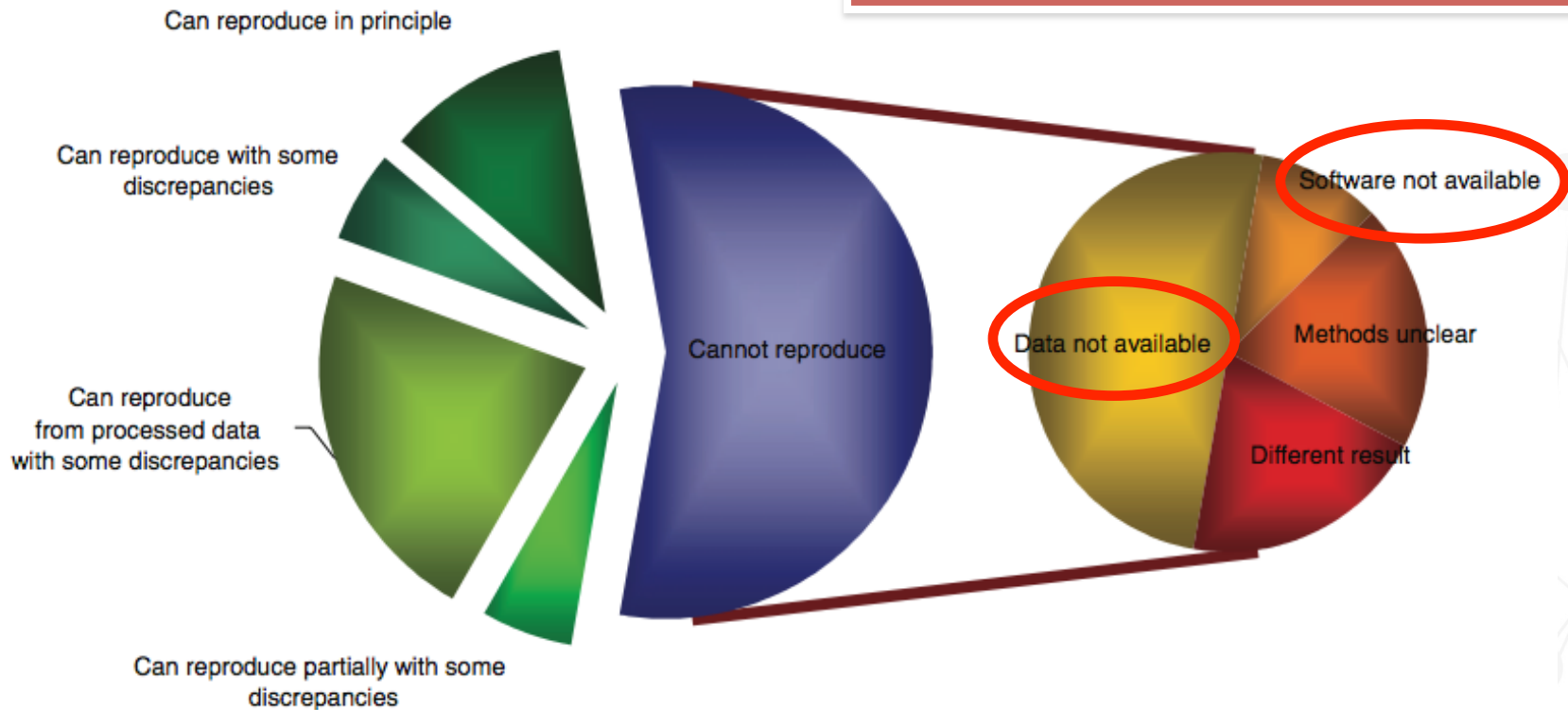
Biologists must realize the pitfalls of work on massive amounts of data.
Nature 487, 406 (26 July 2012)

Must try harder

Too many sloppy mistakes are creeping into scientific papers. Lab heads must look more rigorously at the data — and at themselves.
Nature 483, 509 (29 March 2012)

The “reproducibility crisis”

Out of 18 microarray papers, results from 10 could not be reproduced



1. Ioannidis et al., 2009. Repeatability of published microarray gene expression analyses. *Nature Genetics* 41: 14
2. Science publishing: The trouble with retractions <http://www.nature.com/news/2011/111005/full/478026a.html>
3. Bjorn Brembs: Open Access and the looming crisis in science <https://theconversation.com/open-access-and-the-looming-crisis-in-science-14950>

Repeatability and Reproducibility are not all...

repeat

same
experiment
same lab

replicate

same
experiment
different lab

test

same
experiment
different set up

different
experiment
some of same

reproduce

reuse

Open Science (definitions)

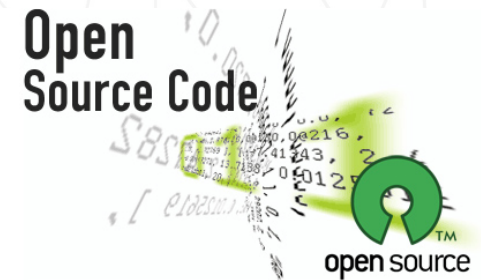
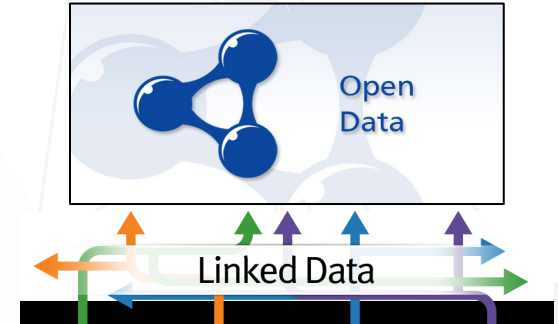
- ▶ *“**Open science** is a means and not an end in itself and it is much more than just open access to publications or data; it includes many aspects and stages of research processes thus enabling full reproducibility and re-usability of scientific results”*
 - ▶ OECD (2015), “Making Open Science a Reality”, OECD Science Technology and Industry Policy Papers, No. 25, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5jrs2f963zs1-en>

- ▶ *“**Open Science** refers to a scientific culture that is characterized by its openness. Scientists share results almost immediately and with a very wide audience”*
 - ▶ <http://book.openingscience.org>

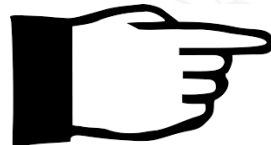
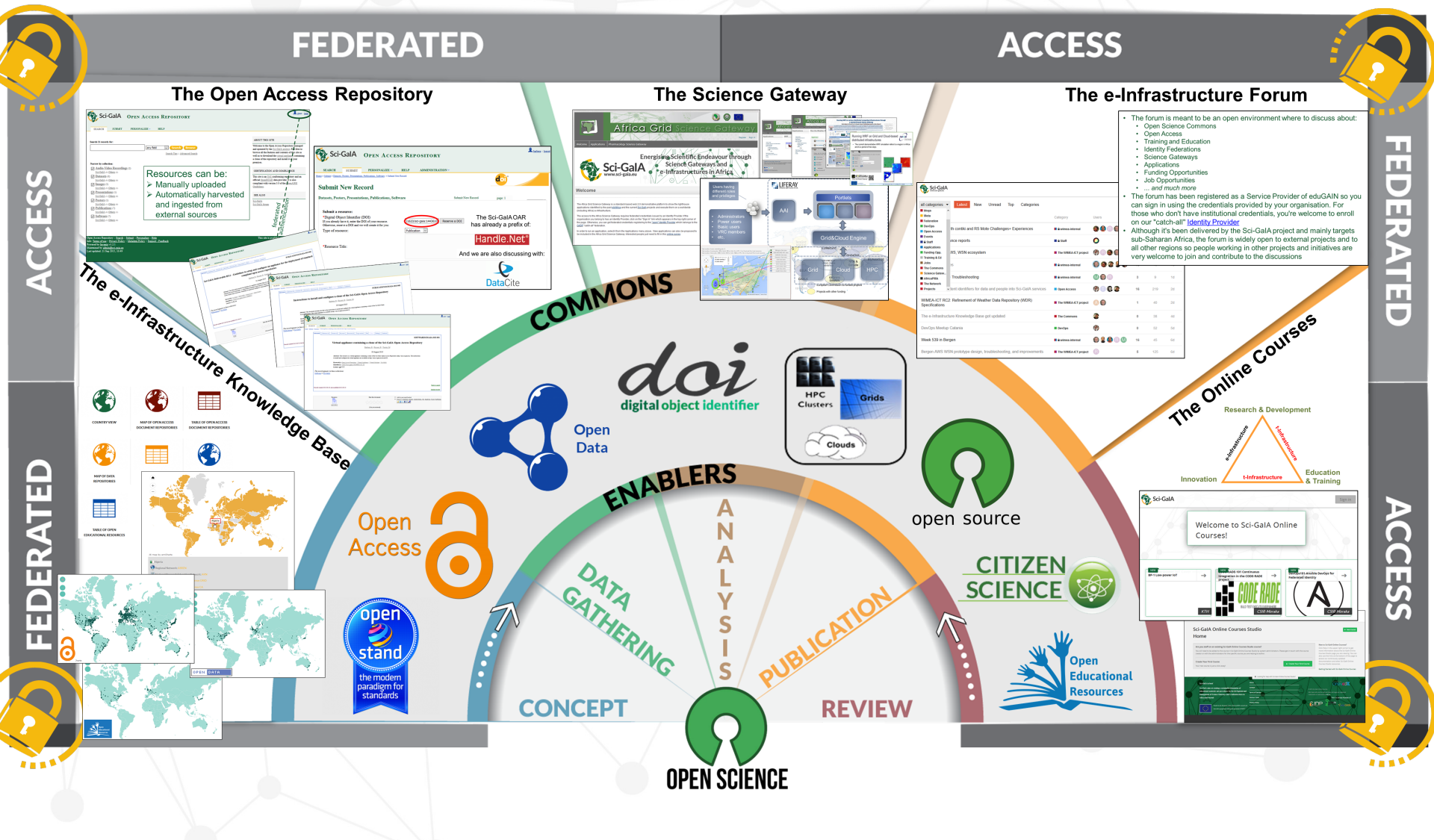


Open Science (enablers)

OPEN  **ACCESS**



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



www.sci-gaia.eu/osp/

“Who’s this science of?”

How to provide authorship to research products?

ORCID

(www.orcid.org – becoming a “de facto” standard)

Search English

ORCID
Connecting Research and Researchers

FOR RESEARCHERS FOR ORGANIZATIONS ABOUT HELP SIGN IN

More than 2 million ORCID IDs so far

DISTINGUISH YOURSELF IN THREE EASY STEPS

ORCID provides a persistent digital identifier that distinguishes you from every other researcher and, through integration in key research workflows such as manuscript and grant submission, supports automated linkages between you and your professional activities ensuring that your work is recognized. [Find out more.](#)

- 1 REGISTER** Get your unique ORCID identifier [Register now!](#)
Registration takes 30 seconds.
- 2 ADD YOUR INFO** Enhance your ORCID record with your professional information and link to your other identifiers (such as Scopus or ResearcherID or LinkedIn).
- 3 USE YOUR ORCID ID** Include your ORCID identifier on your Webpage, when you submit publications, apply for grants, and in any research workflow to ensure you get credit for your work.

LATEST NEWS

Sun, 2015-10-25
Auto-Update Has Arrived! ORCID Records Move to the Next Level

Fri, 2015-10-23
Farewell to #ORCID4OAWWeek!

Tue, 2015-10-20
Contributorship Open Badges on

ORCID: search & link your works having DataCite DOIs

▼ Works (547) + Add works Bulk edit Sort

LINK WORKS

ORCID works with our member organization records. Choose one of the link wizards to

- Airiti**
Enables user to import metadata from Airiti records.
- Australian National Data Service**
Import your research datasets into ORCID.
- CrossRef Metadata Search**
Import your publications from CrossRef.
- DataCite**
Enable the DataCite Search & Link wizard.
- Europe PubMed Central**
Europe PubMed Central (Europe PMC).
- ISNI2ORCID search and link**
Enables user to search the ISNI registry and link records to ORCID.
- MLA International Bibliography**
Search the MLA International Bibliography.
- ResearcherID**
ResearcherID is a global, multi-disciplinary scholarly research community where members can re...

DataCite Profiles

Roberto Barbera

Settings

Status Works

Your Account

Name	Roberto Barbera
Other Names	Barbera Roberto, R. Barbera
ORCID	http://orcid.org/0000-0001-5971-6415
API Key	DRSeY6ULmLq_iGFFeJYDv
Role	User

ORCID Search and Link

🔍 Add works you find via DataCite Search to your ORCID record.

"Roberto Barbera" OR "Barbera Roberto" OR "R. Barbera" 🔍

ORCID Auto-Update enabled

↔ Have works with your ORCID identifier automatically added to your ORCID record.

disable

ORCID:
add your research products to your ORCID profile

DataCite Search

Roberto Barbera

"Roberto Barbera" OR "Barbera Roberto" OR "R. Barbera"

194 Results

RESTful API for Science Gateways

Barbera Roberto, Calanducci Antonio, Fargetta Marco, Scardaci
Conference Paper published 2014 via Unpublished

<http://doi.org/10.13140/RG.2.1.2076.7843>

Analysis with the Data from LHC2010h

Roberto Barbera, Calanducci Antonio, Fargetta Marco, Scardaci, Inserra G
Software published in Open Access Repository

This is the software for the LHC2010h dataset, a SR 286 compliant "portlet" installed on the Science Gateway that allows the analysis of the dataset mentioned in the link below to be automatically re-directed to the execution page on the Science Gateway.

<http://doi.org/10.15161/OAR.IT/1446741752.95>

The DECIDE Science Gateway

Valeria Ardizzone, Roberto Barbera, Antonio Calanducci, Marco Fargetta, Giuseppe La Rocca, Salvo Monforte ... & Diego Scardaci

Conferencepaper published 2011 via ZENODO

The present paper reports on the implementation of the DECIDE project, a Science Gateway for European citizens irrespective of their place of residence, providing them with access to a wide range of services and prognostic service for the Alzheimer Disease and related disorders. The project is funded by European Commission

<http://doi.org/10.5281/ZENODO.7454> Cite Other Identifiers Add to ORCID

(cc) BY

Open Access Infrastructures - esperienze oa nell'istituto nazionale di fisica nucleare

Stefano Bianco, D. Menasce, L. Perini, M. Maggi, R. Barbera, T. Boccali & L. Dell'Agnello

Presentation published 2015 via Open Access Repository

Esposizione delle attività INFN nell'Open Access Publishing e Open Access Data. Presentazione del progetto di database delle ricerche INFN e suo pilota openaccessrepository.it

<http://doi.org/10.15161/OAR.IT/1425997488.2> Cite Add to ORCID

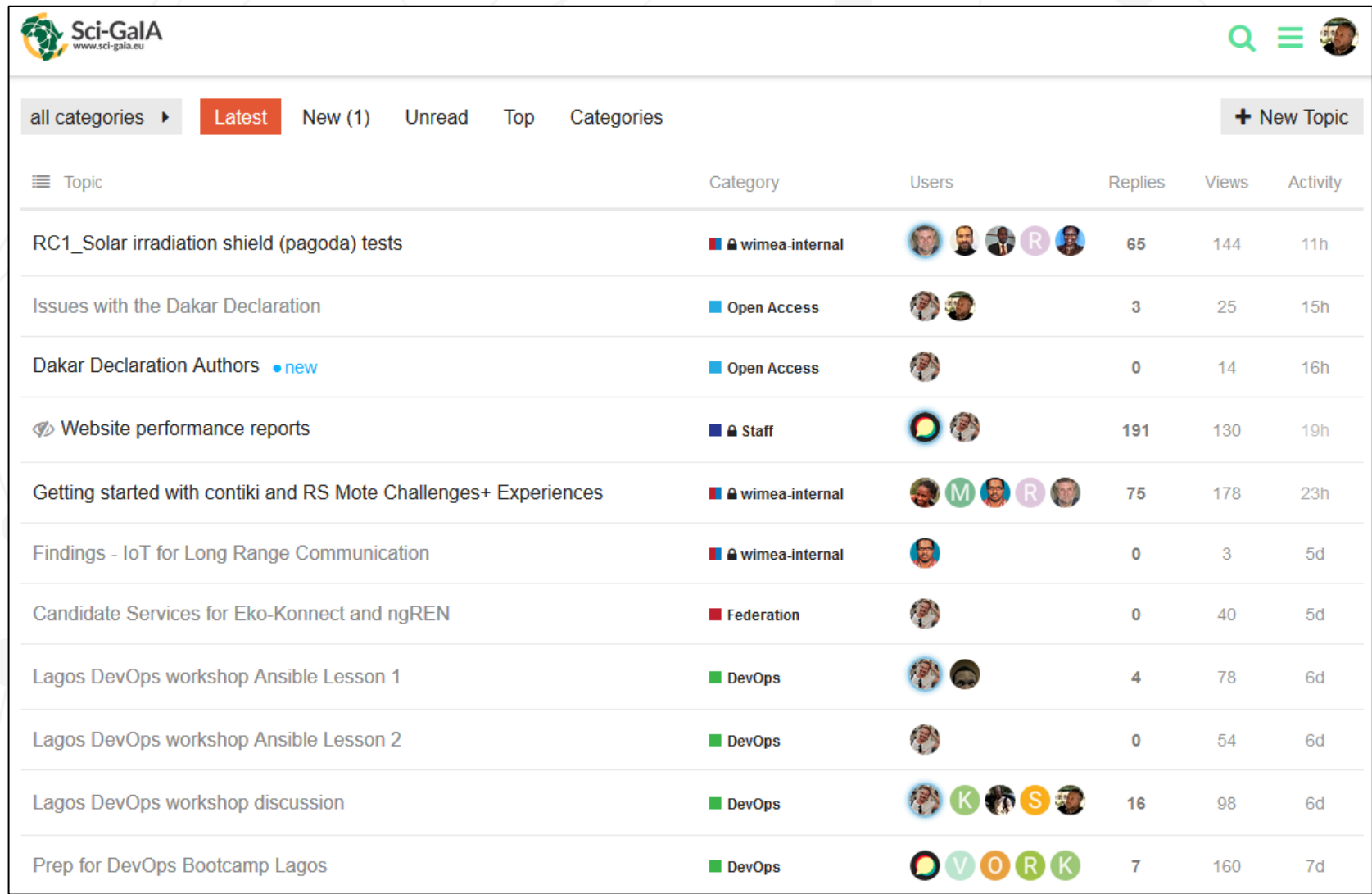
(cc) BY-SA

Sci-GaIA and ORCID officially collaborate in the context of a Memorandum of Understanding

Summary and conclusions

- The 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 exploit e-Infrastructures worldwide to easily reproduce/extend scientific analyses and provide full authorship to researchers
- The connection with DataCite and ORCID will provide full authorship (and hence credit, reputation and visibility) for all products of a scientist → this is key for a correct evaluation of research

Join us on the e-Infrastructure forum: <http://discourse.sci-gaia.eu>



Topic	Category	Users	Replies	Views	Activity
RC1_Solar irradiation shield (pagoda) tests	wimea-internal	[User Avatars]	65	144	11h
Issues with the Dakar Declaration	Open Access	[User Avatars]	3	25	15h
Dakar Declaration Authors • new	Open Access	[User Avatars]	0	14	16h
Website performance reports	Staff	[User Avatars]	191	130	19h
Getting started with contiki and RS Mote Challenges+ Experiences	wimea-internal	[User Avatars]	75	178	23h
Findings - IoT for Long Range Communication	wimea-internal	[User Avatars]	0	3	5d
Candidate Services for Eko-Konnect and ngREN	Federation	[User Avatars]	0	40	5d
Lagos DevOps workshop Ansible Lesson 1	DevOps	[User Avatars]	4	78	6d
Lagos DevOps workshop Ansible Lesson 2	DevOps	[User Avatars]	0	54	6d
Lagos DevOps workshop discussion	DevOps	[User Avatars]	16	98	6d
Prep for DevOps Bootcamp Lagos	DevOps	[User Avatars]	7	160	7d

Thank you!

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