CRIS systems as key e-infrastructure elements to support Open Science implementation within the European Research Area

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Hagmarksvägen 36

When Stieg Larson was nine years of age his parents found jobs in Umeå and the family moved to Hagmarks. He shared a room with his three year younger brother Joakim and before they went to sleep Stieg often told fictional and other exciting bedtime stories.

Norra Ersmarksg. 52

After a few years on Hagmarksvägen, the Larson family moved the short distance to Norra Ersmarksgatan 52. He realised that Stieg loved writing. Consequently, his parents gave Stieg a Facit typewriter.

Vretgatan 12

To prevent that Stieg Larsson’s writing would disturb the neighbors’ night rest, his parents rented a room for him at Vretgatan 12. From their balcony, the family could often see Stieg’s lights burning late into his nights of creativity.

Stieg Larsson

The Mekka coffee shop

Stieg and a one year older chum, Rune Forsgren, together published Stärken, a

Regiment

After his trip through Europe, Stieg Larson did his military service as a
“Been there, done that, got the T-shirt.”

— Stieg Larsson, The Girl Who Kicked the Hornet's Nest
Open Science and availability of information: The role of CRISs

Take home messages

- Open Science assumes the availability of optimal (meaning enough complete and detailed) information on research.

- Therefore, a Research Information Infrastructure (RII) is to be considered a vital, underlying and inextricable part of an Open Science Infrastructure, a.o.t. to guarantee the FAIR-aspect.

- In order for such a RII to function optimally, interoperability between the resources in the infrastructure is necessary, this means: the use of standard and persistent identifiers, standard vocabularies, and a standard exchange format.

- CRISs are to be considered (the) primary resources in the information infrastructure, due to their broad and detailed coverage of aspects and the available, “pre-defined” interlinkage between the information elements in a CRIS.

- A big advantage of CRISs is the accountability of the information: data registered in a CRIS are being controlled and checked by the institution that manages the CRIS. As such a CRIS-based Research Information Infrastructure has a kind of built-in trustworthiness that is difficult if not impossible to achieve in the concept of a self-regulating scientific community.

- The researcher (motivation, commitment) is the key.
FOSTER Open Science Taxonomy Tree
• Innovation
• Transparency
• Validation
• Reproducibility
• Accountability
• Accessibility
• Re-usability
European Commission’s 8 pillars of Open Science

• The future of scholarly publishing
• FAIR data
• The European Open Science Cloud
• Education and skills
• Rewards and incentives
• Next-generation metrics (‘Altmetrics’)
• Research integrity
• Citizen science
Researcher’s view . . .

with the addition of Open Access:

From Bill Hubbard, University of Nottingham
From Bill Hubbard, University of Nottingham
“You're an entropic chaos factor.”

— Stieg Larsson, The Girl Who Played with Fire
CURRENT RESEARCH INFORMATION SYSTEM

- CV-driven
- Fully integrated with complementary systems
- initial population from Human Resources records
- updated & enhanced ‘live’ by researcher,
- mediated input on-demand (Library-based service)
Bibliographic records:
- Started with our institutional Citation Report from ISI
- Now: APIs available from Web of Science, PubMed, Others
- Specifically requested by researchers
<table>
<thead>
<tr>
<th>Publication Type</th>
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<tr>
<td>BOOK</td>
<td>A: Be the author or co-author of one book, published by a recognised publisher.</td>
</tr>
<tr>
<td>JOURNAL ARTICLE</td>
<td>B1: Journal articles (single-authored or co-authored) in refereed or peer-reviewed journals of high standing.</td>
</tr>
<tr>
<td>EDITIONED BOOK</td>
<td>B2: Edited or co-edited books (including an introduction), issues of journals or conference proceedings, published by a recognised publisher.</td>
</tr>
<tr>
<td>EDITIONED CONFERENCE PROCEEDINGS SPECIAL JOURNAL ISSUE</td>
<td>B3: Chapters and other major contributions (single-authored or co-authored) in edited volumes published by a recognised publisher.</td>
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<tr>
<td>CONFERENCE PROCEEDINGS SPECIAL JOURNAL ISSUE</td>
<td>B4: Full length papers in conference proceedings published by a recognised publisher.</td>
</tr>
<tr>
<td>TRANSLATION</td>
<td>B5: Translations (literary, legal, etc.) published by a recognised publisher or for sign language a recognised international equivalent.</td>
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<td>CRITICAL EDITION (BOOK)</td>
<td>B6: Manuscript editing (including electronic dissemination thereof) published by a recognised academic publisher.</td>
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<tr>
<td>CRITICAL EDITION (CHAPTER)</td>
<td>B7: Manuscript editing (including electronic dissemination thereof) published by a recognised academic publisher.</td>
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<td>DATASET</td>
<td>B8: GIS, databases, data sets and other research-based websites, as well as transferable uses of information technology, hosted by TCD or a recognised international equivalent.</td>
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<tr>
<td>DIGITAL RESEARCH RESOURCE PRODUCTION MAP GIS MAP SOFTWARE</td>
<td>B9: Publicly available public service reports.</td>
</tr>
<tr>
<td>BIBLIOGRAPHY, FILMOGRAPHY, ETC.</td>
<td>B10: Questions of an exhibition, which includes a published catalogue.</td>
</tr>
<tr>
<td>MAJOR DICTIONARY/ENCYCLOPEDIA ITEM</td>
<td>B11: Fieldwork collections for archives (speech, folklore, music, material culture).</td>
</tr>
<tr>
<td>PUBLICLY AVAILABLE REPORT</td>
<td>B12: Publicly-available tests and protocols for educational, developmental, psychological, and other assessments.</td>
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<tr>
<td>EXHIBITION CATALOGUE</td>
<td>B13: Published report of an archaeological excavation.</td>
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Edit Book Chapter

Edit Publication or Other Research Output Details

Title of Chapter*: Finite element modeling in orthopaedic imp
Book Title*: Orthopaedic implants: Applications, Complications
Subject to Peer Review*: YES

Editor(s) of book: MRI Lindsey, Z Ogawa

Please Published: 
Publisher: 
Year of Publication: 
Start Page: 
End Page: 
Page Range: (Do only if no start/end page entered)

Author(s) Name*: 
Section Type*: 
ISBN: 

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Gate controlled spin pumping at a quantum spin Hall edge

Citation:
Awadhesh Narayan, Aaron Hurley and Stefano Sanvito, Gate controlled spin pumping at a quantum spin Hall edge, Applied Physics Letters, 103, 2013, 142407-

Abstract:
We propose a four-terminal device designed to manipulate by all electrical means the spin of a magnetic adatom positioned at the edge of a quantum spin Hall insulator. We show that an electrical gate, able to tune the interface resistance between a quantum spin Hall insulator and the source and drain electrodes, can switch the device between two regimes: one where the system exhibits spin pumping and the other where the adatom remains in its ground state. This demonstrates an all-electrical route to control single spins by exploiting helical edge states of topological materials.

Author's Homepage:
http://people.tcd.ie/sanvito/
Automatic compliance with funders’ open access mandates
Personal URL/Research Webpage

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PROVOST (Provost’s Office)
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pprender@tcd.ie +3531896 4362

- Biography
- Research Tags
- Research Projects
- Representations
- Membership of Professional Institutions, Associations, Societies
- Publications and other Research Outputs
- Awards and Honours
- Description Of Research Interests
# School of Nursing & Midwifery

## Staff

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<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Email</th>
<th>Phone</th>
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</thead>
<tbody>
<tr>
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<td><a href="mailto:dbrennan@tcd.ie">dbrennan@tcd.ie</a></td>
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Dean of Research Local

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<td><strong>MyRSS</strong></td>
<td>A web application featuring data visualizations communicating your research activity.</td>
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<td><strong>RSS Analytics</strong></td>
<td>A web application featuring data visualizations communicating research activity at the College level.</td>
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<tr>
<td><strong>Your Calendar of Publications and Other Research Outputs</strong></td>
<td>Review which publications and other research outputs will automatically go forward for inclusion in the College Calendar.</td>
</tr>
<tr>
<td><strong>New! Senior Academic Promotions</strong></td>
<td>Use the Promotions Wizard in MyRSS to review your research data and output a Promotions CV</td>
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<td>Launch the Research Quality Metrics Report Application</td>
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<tr>
<td><strong>New! PI Quantitative Analytics</strong></td>
<td>Generate Research Profiles Reports for your school.</td>
</tr>
<tr>
<td><strong>School Research Profiles Reports</strong></td>
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<tr>
<td><strong>RSS School Analytics</strong></td>
<td>A web application featuring data visualizations and reports communicating research activity at your school level.</td>
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<td><strong>Research Audit Report</strong></td>
<td>View interactive publication totals for your school.</td>
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<tr>
<td><strong>Theme Reports</strong></td>
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<tr>
<td><strong>RSS Theme Analytics</strong></td>
<td>A web application featuring data visualizations and reports communicating research activity at your theme level.</td>
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<tr>
<td><strong>Institute Reports</strong></td>
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</tr>
<tr>
<td><strong>RSS Institute Analytics</strong></td>
<td>A web application featuring data visualizations and reports communicating research activity at your research group(s), centre(s) and institute(s).</td>
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<td><strong>Calendar Reports</strong></td>
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<tr>
<td><strong>Calendar of Publications and Other Research Outputs</strong></td>
<td>Application to generate Publications and Other Research Outputs for the Calendar.</td>
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<tr>
<td><strong>RSS Admin App</strong></td>
<td>Launch the RSS Admin Web Application</td>
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</table>
Faculty Research Metrics

% of academic staff per School who meet the Faculty-selected research productive metrics. 20% of School budget.
Senior Academic Promotions

Welcome to the Promotions wizard. You can progress through the wizard by clicking on the Next button.

On most pages the underlying data can be edited in the RSS by clicking on the "Edit in the RSS" button. On some pages, the data is edited locally. The RPAMS research grants cannot be edited here.

On the final "Output" page, you can output your "Promotions CV" to Word and continue with your application.

On subsequent visits, you can rapidly navigate the wizard using the menu on the left e.g. click on "Output" to go straight to the "Output" page and generate a fresh CV.
An exploration of the bone health of older adults with an intellectual disability in Ireland

Bone health matters
Researcher: Eilish Burke

Why was it important to do this research?
This is a study about poor bone health, where your bones become weak and can not grow as it does not cause any pain. 

What did the research want to find out?
To find out how many people with ID have poor bone health.

How did the researchers do the study?
This study is part of the Intellectual Disability Study (IDS-TILDA). We asked a lot of people...

What did the researcher find out?
In total 753 people took part in the study that they had a doctor’s diagnosis of broken bone. People over the age of 65 had the highest rate of osteoporosis.

Why should people care about it?
Osteoporosis among People with Intellectual Disability

Eilish Burke
Project Manager IDS-TILDA
4th April 2016

DARAT: Disability
Accessible Research Archive

(Open access, TARA-based)

P.I.: Dr Edurne Garcia Iriarte. TCD School of Social Work & Social Policy.

With:
- Ashling Hayes
- Kevin Kiely
- Enovation Solutions
Trinity College Dublin Drone Survey Dataset

Citation:

File Type:
Unknown

Item Type:
Dataset

Date:
2017

Author:
DAHYOT, ROZENN
BOURKE, MARY
Byrne, Jonathan
Connelly, Julie
Su, Jing
Moloney, David
Krylov, Vladimir

Access:
openAccess

Download Item:
- 3d_mesh.zip (3D model) 343.0Mb
- point_cloud.zip (Data points used to create the 3D mesh model) 361.5Mb
- Images 1.zip (Collection of approximately 800 images, Part 1, Images 1-200) 909.1Mb
- Images 2.zip (Collection of approximately 800 images, Part 2, Images 200-400) 958.1Mb
- Images 3.zip (Collection of approximately 800 images, Part 3, Images 400-600) 960.7Mb
- Images 4.zip (Collection of approximately 800 images, Part 4, Images 600-800) 1.218Gb
Abstract:
The dataset contains images from the campus and Images 4 points for the paper.

URI:
http://hdl.handle.net

Author's Home:
http://people.tcd.ie
http://people.tcd.ie

Description:
PUBLISHED

Author: DAHYOT, Vladimir
Publisher: School
Type of material
URI: http://hdl.handle.net
Collections: RSS
Series/Report no.
Availability: Full text
Keywords: Drone
Subject (TCD): Crime
Edition: 2017

Cybersecurity and 3D campus

Dahyot®
“Ensure the scholarly infrastructure in Europe is highly interoperable to enable the simple and open sharing of metadata between systems, disciplines and countries, and that credit for research contributions is given to all participants (including citizen scientists). This will need all actors to require the use of standardised, unique persistent identifiers for researchers and outputs, and for the acknowledgement of diversity in researcher contributions. Components of the ecosystem (identifiers, metadata, vocabularies, data citations, repositories and other data-infrastructures) need to be developed where necessary, refined, standardized and implemented through dialogue with relevant research communities. Whatever standards/infrastructures are developed, they need to be capable of adapting to innovations in Open Knowledge practices.”

– Open Science Policy Platform combined recommendations, May 2018
Actionable recommendations from the Open Science Policy Platform (OSPP), May 2018*

- Rewards and Incentives
- Research Indicators and Next-Generati
- Future of Scholarly Communication
- European Open Science Cloud
- FAIR Data
- Research Integrity
- Skills and Education
- Citizen Science

Stakeholder groups responsible for driving the actions:

- Research & E-Infrastructures
- Research Libraries
- Performing Organisations
- Policy Making Organisations
- Research Funding Organisations
- Publishers
- Researchers
- Scientific Societies & Academies
- Citizen Science & Public Engagement Organisations

Libraries are listed as drivers under ALL of the actions.

<table>
<thead>
<tr>
<th>Rewards and Incentives</th>
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<tbody>
<tr>
<td>Funders, research institutions and other evaluators of researchers should actively develop/adjust evaluation practices and routines to give extra credit to individuals, groups and projects who integrate Open Science within their research practice.</td>
</tr>
<tr>
<td>Studies must be commissioned and funded to propose guidelines for best practice and tools for research assessment by 2019, together with an active delivery plan and associated timeline for their implementation. These guidelines must take into account career stage and discipline, and be appropriately tailored to their target such as individual, institution and so forth. Exemplars of innovation and good open science practice must be collated, taking into account the DORA Declaration, the Leiden Manifesto, the OS-CAM and other relevant initiatives.</td>
</tr>
<tr>
<td>Public research performing and funding organisations (RPOs/RFOs) should provide public and easily accessible information about the approaches and measures being used to evaluate researchers, research and research proposals.</td>
</tr>
<tr>
<td>The traditional academic career structure disincentivises Open Science because of the current focus on tenured positions based solely or largely on publication output. Institutions need to have a career and reward structure for all researchers, and particularly for Early Career Researchers (ECRs), that values and promotes a diverse range of outputs, activities and career directions. This should include facilitating a means by which researchers can, for example, move between academia and industry or between national jurisdictions.</td>
</tr>
<tr>
<td>Research Indicators and Next-Generation Metrics</td>
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<tr>
<td>Evaluations of individual researchers or of research groups should not use journal brand or Impact Factor as a proxy for research quality. Those responsible for hiring, promotion, funding and/or the evaluation of researchers must use a broader, tailored range of quantitative and qualitative indicators of research activity, progression and impact that incentivises and rewards open research practice. All publication venues must prominently display a broad range of indicators for all research outputs.</td>
</tr>
<tr>
<td>Quantitative and qualitative indicators need to be identified and developed for research assessment that captures the full range of contributions to the knowledge system. These should reflect the complexity and varied context of the research environment, the specific characteristics of the research being undertaken, as well as the new kinds of questions and results that might emerge in an open system. Experiments, pilots and case studies assessing the validity of such indicators need to be undertaken urgently, and included as part of FP9 with appropriate funding allocated to support them. The results and data of these pilots must be made publicly available as exemplars for further implementation.</td>
</tr>
<tr>
<td>All researchers need to be identified through an ORCID ID. Best practice for CV/biosketch evaluation should be developed and publicly showcased to encourage a broader recognition of the range of verifiable (and especially open) contributions individuals make to the knowledge system, including teaching and peer review, and the production of a broad range of output types. The career narrative should be central to the evaluation of individual researchers as it provides the crucial context in which indicators can be interpreted.</td>
</tr>
<tr>
<td>The data, metadata and methods that are relevant to research evaluation, including but not limited to citations, downloads and other potential indicators of academic re-use, should be publicly available for independent scrutiny and analysis by researchers, institutions, funders and other stakeholders.</td>
</tr>
</tbody>
</table>
Future of Scholarly Communication

All published research outputs from public funding in Europe must be made public in a way that ensures both immediate Open Access and full text and data mining rights of that content, while being sensitive to disciplinary differences. Venues used for the publication of research outputs must ensure long-term archiving and provide clear, consistent and easily accessible and machine-readable information on their Open Science policies.

Each Member State, together with its respective stakeholders, must develop policies to guarantee compliance with the EU Open Access mandate, including both incentives and enforcement, by 2020. This needs to happen in ways that are sensitive to disciplinary differences, the financial investment required and fast-changing publishing systems.

All authors must make their data and software (i.e. excluding, if relevant, data owned by third-parties, etc) appearing in their open access publications FAIR (Findable, Accessible, Interoperable and Reusable). To this end, a key requirement is deposition in a trusted repository that adheres to FAIR principles. In addition, all publications must include a statement of FAIR compliance for the source data underpinning their claims and the licence for its reuse.

All publication venues must prominently display their Open Access and FAIR data policies.
Future of Scholarly Communication

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### FAIR Data

- **Funders and Research Performing Organisations** should give credit for Findable, Accessible, Interoperable and Reusable (FAIR) data resulting from research work, similar to publications, methods, code etc.

- **Output Management Plans (OMPs)**, including Data Management Plans (DMPs) and their implementation should be mandatory for all research projects. OMPs should be machine readable and regularly modified to reflect ongoing research developments.

- Data resulting from publicly funded research must be made FAIR and citable, and be as open as possible, as closed as necessary.
Research Integrity

All research organisations must have a research integrity policy, including promotion of good research practices, clear procedures for dealing with allegations of research misconduct and a description of possible sanctions for proven cases of misconduct. This policy must be enforced and adequately staffed and financed to investigate any allegation pertinent to their staff. The processes for dealing with such issues should be public, transparent and prominently displayed. Outcomes should be published where the allegations are upheld, taking into account the sensitivity of the issues involved.

All published research outputs should be reported according to recognised community standards where they exist.

For any research project, researchers should define conditions by which their work can be replicated or otherwise verified by others.

All researchers must receive regular training and accreditation on research integrity pertaining to Open Science, including the ethical, legal and social implications of their research practices.

Funders (including the EC through FP9) must ensure that there is adequate training given to the researchers they fund, either through the researcher’s institution, or provided via other means.

Publishers, data platform and infrastructure providers must agree a standardised set of minimum quality control checks on outputs and openly display the results. The task of undertaking these independent checks needs to be adequately funded. Outputs that pass these checks should be recognised and rewarded in research and researcher evaluation systems, such as FP9.
Skills and Education

Research Performing Organizations (RPOs) need to work towards the design of appropriate Open Science training that is consistent across Member States, including data literacy, ethics and research integrity, for:

- All researchers, at all levels from early career researchers to senior researchers (R1-R4). Open Science skills need to be explicitly tailored to diverse career paths.

- Research managers and administrators, and other staff involved in the research ecosystem (librarians, repository managers, IT services, data stewards, etc.).

- Students (both undergraduate and graduate levels).

Policy makers, funders and institutions must provide incentives and support towards developing Open Science mentoring and training within a supportive culture and environment.

A fundamental part of a researcher’s education is to have a common set of baseline skills on Open Science which must be integrated in the European Framework of Research Careers (EFRC) and the Innovative Doctoral Training Principles (IDTP).
Citizen Science

Publicly funded Citizen Science projects (as part of FP9 projects) should actively apply the principles of Open Science (including openness and reuse of all research outputs, data and publications).

Research-performing organisations (RPOs) are encouraged to promote infrastructures and human capacity to create a supportive and open environment for Citizen Science, which can further strengthen the outreach of RPOs to society. Research libraries are well placed, amongst others, to contribute actively to the necessary coordination and communication infrastructures as well as relevant training, fostering skills such as community management, co-production of knowledge, Open Science standards and social diversity. Appropriate funding and incentives need to be put in place to support this endeavour.

The EC must support an online toolkit for Citizen Science in Europe. This tool must promote Citizen Science as a European asset, offering an entry point and mutual learning space, interconnecting with existing activities and infrastructures at the European, national and local level. It should highlight particular achievements and best practices, and promote a clear set of principles, guidelines & quality criteria for Citizen Science.

Funding for Citizen Science projects should be flexible, long-term and allow for small or experimental projects in collaboration with key stakeholders to be funded. A small section of FP9 should be set aside for citizens to propose research topics or projects. These should be chosen on the basis that they are high risk, beyond traditional research fields and conform to the rigorous standards expected of other projects. Successful proposers will need to work with compliant institutions.
3.1. Categories of Open Science Skills

Aligned with the EU Open Science Monitor, researchers’ Open Science skills can be regrouped into four larger categories, i.e.:

- Skills and expertise necessary for open access publishing.
- Skills and expertise regarding research data, data production, management, analysis/reuse, dissemination and a change of paradigm from "protected data by default" to "open data by default", respecting legal, and other constraints.
- Skills and expertise to act in and beyond one's own scholarly and disciplinary community.
- Skills and expertise resulting from a general and broad concept of citizen science, where researchers interact with the general public to enhance the impact of science and research.

All of these skills are needed at different levels by the research system, whether by researchers or technicians as well as support and administrative staff, depending on the role that these various functions have in an Open Science research environment.

- Skills Related to Open Access Publishing

Library and research information skills (technical/library research support). These refer to a rapidly evolving specialist skill-set amongst a specific cohort of academic and research library and information professional staff which includes research support, development and management of CRIS (current research information systems) and (ideally, integrated) institutional repositories, some discipline-specific e-research methods, new Open Publication strategies, in terms of contracts and relations with publishers, new funding models, and the related changes in publication modes for researchers. They include licensing and copyright advice, bibliometrics and research impact reporting. Some of these functions may be performed by research management staff.

Open publication literacy skills (research user level). These are skills researchers need to have about Open Publication options in order to make the correct choices about where and how to publish their results, how and what to self-archive and how to communicate their research for scholarly and societal impact.

- Skills Related to Data Management and Open Data

Technical skills, in particular data science skills. Data science skills relate to the collation of relevant scientific data, their annotation and documentation, metadata creation, use of taxonomies and ontologies, data mapping, how to handle big data sets, how to properly mine for data, knowledge about existing repositories and how to use them. We note that a distinction should be
First Stage Researcher (R1)

Includes individuals doing research under supervision in industry, research institutes or universities. It includes doctoral candidates. Researchers with this profile will:

- Carry out research under supervision.
- Have the ambition to develop knowledge of research methodologies and discipline.
- Have demonstrated a good understanding of a field of study.
- Have demonstrated the ability to produce data under supervision.
- Be capable of critical analysis, evaluation and synthesis of new and complex ideas.
- Be able to explain the outcome of research and value thereof to research colleagues.

Desirable competences
- Develops integrated language, communication and environment skills, especially in an international context.

Open Science competences:
- Research integrity/ethics,
- Information literacy, open access, publishing/dissemination, DMPs etc.

Optimal training/learning modes & incentives.
- Formal, structured, learning, standardised, accredited and badged. Use of hands-on, applied, PBL.
- Mentoring by senior researchers

ADDED:
Recognised Researcher (R2)

- Doctorate degree (PhD) holders who have not yet established a significant level of independence,
- Researchers with an equivalent level of experience and competence.

Necessary competences (All competences of ‘First Stage Researcher’ plus:)

- Has demonstrated a systematic understanding of a field of study and mastery of research associated with that field.
- Has demonstrated the ability to conceive, design, implement and adapt a substantial programme of research with integrity.
- Has made a contribution through original research that extends the frontier of knowledge.
- Demonstrates critical analysis, evaluation and synthesis of new and complex ideas.
- Can communicate with their peers - be able to explain the outcome of their research and value thereof to the research community.

Desirable competences

- Understands the agenda of industry and other related employment sectors
- Understands the value of their research work in the context of products and services from industry & related employment sectors
- Can communicate with the wider community, and with society generally
- Can be expected to promote technological, social or cultural advancement in a knowledge based society
- Can mentor First Stage Researchers

Open Science competences: as per R1 plus impact, innovation, research evaluation level 1.

Optimal training/learning modes & incentives: Structured, accredited professional development training; Mentoring, rewards & funder incentives.
Established Researcher (R3)

Includes: Researchers who have developed a level of independence.

Necessary competences All necessary and most desirable competences of ‘Recognised Researcher’ plus:

• Has an established reputation based on research excellence in their field
• Makes a positive contribution to the development of knowledge, research and development through co-operations and collaborations.
• Identifies research problems and opportunities within their area of expertise.
• Identifies appropriate research methodologies and approaches.
• Conducts research independently which advances a research agenda.
• Can take the lead in executing collaborative research projects in cooperation with colleagues and project partners.
• Publishes papers as lead author, organises workshop or conference sessions.

Desirable competences

• Establishes collaborative relationships with relevant industry research or development groups.
• Communicates their research effectively to the research community and wider society.
• Is innovative in their approach to research.
• Can form research consortia and secure research funding / budgets / resources from research councils or industry.

Open Science competences: as per R2 plus impact, innovation, research evaluation level 2, funding proposals, research management.

Optimal training/learning modes:
Structured, accredited professional development training; Mentoring, rewards & funder incentives.
Leading Researcher (R4)

This is a researcher leading their research area or field. It would include the team leader of a research group or head of an industry R&D laboratory. In particular disciplines, may include individuals who operate as lone researchers.

Necessary competences (All necessary and most desirable competences of ‘Established Researcher’ plus:)

• Has an international reputation based on research excellence in their field
• Demonstrates critical judgment in the identification and execution of research activities.
• Makes a substantial contribution (breakthroughs) to their research field or spanning multiple areas.
• Develops a strategic vision on the future of the research field.
• Recognises the broader implications and applications of their research.
• Publishes and presents influential papers and books, serves on workshop and conference organising committees and delivers invited talks.

Desirable competences

• Is an expert at managing and leading research projects.
• Is skilled at managing and developing others.
• Has a proven record in securing significant research funding / budgets / resources.

Open Science competences: as per R3 plus impact monitoring and reporting, innovation, research evaluation level 3, funding proposals, research project reporting; communication and engagement with policy-makers, media. Open Science leadership.

Optimal training/learning modes
Integrated into accredited institutional senior management training programmes + prestigious external leadership courses. Open Science Leadership accreditation required by funders for all funded PI’s. plus evidence of open access track record.
14 Core Skills & Competencies for an Open Science Leader*

1. Influencing skills
2. Being able to empower others
3. Being entrepreneurial
4. Creating visions and missions
5. Conveying visions and missions
6. Being able to source facts & figures
7. Networking skills
8. Communication skills
9. Managing people
10. Programme / project management
11. Technical skills (basic) related to TDM or data
12. Managing finances, incl. funding
13. Understanding and addressing sustainability
14. Knowledge of the workings of the scholarly workflow, e.g. Open Access, Open Data, Open software, knowledge of various publishing choices (from working papers, e-notebooks to article or books), funding models, and platforms in ideally a range of disciplines; licensing and collection management; quality management and mechanisms such as (open) peer review; IPR, CC and licensing; the role of scholarly communication in academic integrity; and knowledge of research evaluation systems. Lastly, knowledge of innovative initiatives that challenge current practices.

* http://proud2know.eu/14corecompetenciesopenscienceleader_blog38/
“Research Integrity and Open Scholarship in a Digital Era”
TCD New Course for all incoming doctoral students: September 2018

Course content:

Research Integrity

Copyright and intellectual property; plagiarism

Data protection and research data management

Scholarly communication: publishing, dissemination, impact and open access

Reporting, presentation, evaluation.
TCD Library: Developing layers of support for Open Scholarship

**Level 1** In-depth and up-to-date knowledge and practical skills; skills to train and support people at all levels; expertise and ability to advise, direct and make decisions on policies.

![Gender Icons](image1)

**Level 2** Understanding of general principles, policies and practices; skills to train and support people at early to intermediate stages; knowledge of where to direct people for more support.

![Gender Icons](image2)

**Level 3** Understanding of general principles and policies; knowledge of where to direct people for more support.
Requires Member States to respond with:

a) Coherent policy
b) Implementation plan/s
c) Associated financial planning

for:

• Open Access Publications
• Research Data Management (including Open Access)
• Preservation & re-use of scientific information
• Skills & competences
• Incentives & rewards
• Multi-stakeholder dialogue on open science at national, European and international level

“Member States should ensure that...
innovative companies, in particular small and medium-sized enterprises, independent researchers (for instance citizen scientists), the public sector, the press and citizens at large have, in a transparent and non-discriminatory manner, the widest possible access to [scientific publications and research data of] the results of research that receives public funding in view of enabling innovation, empowering the public sector and informing citizens.”
<table>
<thead>
<tr>
<th>Open Science Career Assessment Matrix (OS-CAM)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Open Science activities</strong></td>
</tr>
<tr>
<td><strong>RESEARCH OUTPUT</strong></td>
</tr>
<tr>
<td>Research activity</td>
</tr>
<tr>
<td>Publications</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Datasets and research results</td>
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<td></td>
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<tr>
<td></td>
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<tr>
<td>Open source</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Funding</td>
</tr>
<tr>
<td><strong>RESEARCH PROCESS</strong></td>
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<tr>
<td>Stakeholder engagement / citizen science</td>
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<td></td>
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<tr>
<td></td>
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<tr>
<td>Collaboration and Interdisciplinarity</td>
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<td></td>
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<tr>
<td>Research integrity</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Risk management</td>
</tr>
<tr>
<td><strong>SERVICE AND LEADERSHIP</strong></td>
</tr>
<tr>
<td>Leadership</td>
</tr>
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<td></td>
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<tr>
<td></td>
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<tr>
<td>Academic standing</td>
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<td></td>
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<tr>
<td>Peer review</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Networking</td>
</tr>
<tr>
<td>RESEARCH IMPACT</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Communication and Dissemination</strong></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td><strong>IP (patents, licenses)</strong></td>
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<td></td>
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<tr>
<td><strong>Societal impact</strong></td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>Knowledge exchange</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEACHING AND SUPERVISION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teaching</strong></td>
<td>Training other researchers in open science principles and methods</td>
</tr>
<tr>
<td></td>
<td>Developing curricula and programs in open science methods, including</td>
</tr>
<tr>
<td></td>
<td>open science data management</td>
</tr>
<tr>
<td></td>
<td>Raising awareness and understanding in open science in undergraduate</td>
</tr>
<tr>
<td></td>
<td>and masters’ programs</td>
</tr>
<tr>
<td><strong>Mentoring</strong></td>
<td>Mentoring and encouraging others in developing their open science</td>
</tr>
<tr>
<td></td>
<td>capabilities</td>
</tr>
<tr>
<td><strong>Supervision</strong></td>
<td>Supporting early stage researchers to adopt an open science approach</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROFESSIONAL EXPERIENCE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Continuing professional development</strong></td>
<td>Investing in own professional development to build open science</td>
</tr>
<tr>
<td></td>
<td>capabilities</td>
</tr>
<tr>
<td><strong>Project management</strong></td>
<td>Successfully delivering open science projects involving diverse research</td>
</tr>
<tr>
<td></td>
<td>teams</td>
</tr>
<tr>
<td><strong>Personal qualities</strong></td>
<td>Demonstrating the personal qualities to engage society and research</td>
</tr>
<tr>
<td></td>
<td>users with open science</td>
</tr>
<tr>
<td></td>
<td>Showing the flexibility and perseverance to respond to the challenges of</td>
</tr>
<tr>
<td></td>
<td>conducting open science</td>
</tr>
</tbody>
</table>

**Figure 1: Open Science Career Assessment Matrix (OS-CAM) representing the range of evaluation criteria for assessing Open Science activities**
Can this model be applied to Open Science & CRIS development, internally & externally?

Engaging researchers at all levels: supporting structure.

[Fig 4.3, OSPP Open Science Skills WG Report]
“Everyone has secrets. It's just a matter of finding out what they are.”

— Stieg Larsson, The Girl Who Kicked the Hornet's Nest
Challenges

Metrics for Open Science
  - Open Science metrics
  - Rewards and incentives

Open Science monitoring

The broader Open Science agenda and the position of CRIS (institutional... )
‘What has become apparent in this study so far, is that information on OA publishing is rather dispersed, which means that our results clearly show that not one single source is sufficiently ‘strong’ to be taken into account for OA labeling of publications...’ – CWTS, 2017
<table>
<thead>
<tr>
<th>ID</th>
<th>Objective</th>
<th>Indicator Type</th>
<th>Source</th>
<th>Requires Development?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Proportion of staff engaged in socially engaged research</td>
<td>COMMUNITY ENGAGEMENT</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>Proportion of students engaged in socially engaged research</td>
<td>COMMUNITY ENGAGEMENT</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>Proportion of staff involved in community based/engaged learning</td>
<td>COMMUNITY ENGAGEMENT</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>5</td>
<td>Proportion of students involved in community based/engaged learning</td>
<td>COMMUNITY ENGAGEMENT</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>6</td>
<td>Proportion of staff involved in volunteering</td>
<td>COMMUNITY ENGAGEMENT</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>7</td>
<td>Proportion of students involved in volunteering</td>
<td>COMMUNITY ENGAGEMENT</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>8</td>
<td>Number of incoming mobility of International Academic Staff and researchers</td>
<td>INTERNATIONALISATION</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>9</td>
<td>Publications with International peers</td>
<td>INTERNATIONALISATION</td>
<td>RSS/SC/VAL</td>
<td>N</td>
</tr>
<tr>
<td>10</td>
<td>Organization of international conferences</td>
<td>INTERNATIONALISATION</td>
<td>RSS</td>
<td>N</td>
</tr>
<tr>
<td>11</td>
<td>Number of publications and field-adjusted percentage share of world output</td>
<td>RESEARCH QUALITY &amp; ACADEMIC IMPACT</td>
<td>RSS/SC/VAL</td>
<td>N</td>
</tr>
<tr>
<td>12</td>
<td>Number of publications per academic staff</td>
<td>RESEARCH QUALITY &amp; ACADEMIC IMPACT</td>
<td>RSS</td>
<td>N</td>
</tr>
<tr>
<td>13</td>
<td>Field adjusted citation rates</td>
<td>INTERNATIONALLY RECOGNISED RESEARCH WHICH WILL ENHANCE THE REPUTATIONS OF STAFF, INSTITUTIONS AND IRELAND</td>
<td>INCTS/SC/VAL/DIRI, MENSIONS</td>
<td>N</td>
</tr>
<tr>
<td>14</td>
<td>Citation impact</td>
<td>INTERNATIONALLY RECOGNISED RESEARCH WHICH WILL ENHANCE THE REPUTATIONS OF STAFF, INSTITUTIONS AND IRELAND</td>
<td>INCTS/SC/VAL/DIRI, MENSIONS</td>
<td>N</td>
</tr>
<tr>
<td>15</td>
<td>Increase in number of research and scholarship activity outputs per research-active academic staff</td>
<td>INTERNATIONALLY RECOGNISED RESEARCH WHICH WILL ENHANCE THE REPUTATIONS OF STAFF, INSTITUTIONS AND IRELAND</td>
<td>RSS</td>
<td>N</td>
</tr>
<tr>
<td>16</td>
<td>Number of staff who have undertaken research integrity training</td>
<td>INTERNATIONALLY RECOGNISED RESEARCH WHICH WILL ENHANCE THE REPUTATIONS OF STAFF, INSTITUTIONS AND IRELAND</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>17</td>
<td>Total number of new patent applications filed during the year</td>
<td>IP AND IP TRANSACTIONS</td>
<td>RSS/SC/VAL</td>
<td>N</td>
</tr>
<tr>
<td>18</td>
<td>Total number of patents granted in year</td>
<td>IP AND IP TRANSACTIONS</td>
<td>RSS/SC/VAL</td>
<td>N</td>
</tr>
<tr>
<td>19</td>
<td>Total number of patents owned by the BPO at year end</td>
<td>IP AND IP TRANSACTIONS</td>
<td>RSS/SC/VAL</td>
<td>N</td>
</tr>
<tr>
<td>20</td>
<td>Total number of licences, options and assignments executed (LOCs)</td>
<td>IP AND IP TRANSACTIONS</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>21</td>
<td>Number of active collaborations between institutions and enterprises</td>
<td>INCREASED COLLABORATIONS WITH ENTERPRISE</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>22</td>
<td>% of publications deposited in Open Access repositories</td>
<td>OPEN SCIENCE</td>
<td>RSS/TARA</td>
<td>N</td>
</tr>
<tr>
<td>23</td>
<td>Number of researchers trained in FAIR</td>
<td>OPEN SCIENCE</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>24</td>
<td>Data management</td>
<td>ENGAGED RESEARCH</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>25</td>
<td>Income generated by successful engaged research projects</td>
<td>ENGAGED RESEARCH</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>26</td>
<td>New skills and competencies generated</td>
<td>ENGAGED RESEARCH</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>27</td>
<td>Dry engaged research findings</td>
<td>ENGAGED RESEARCH</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
<tr>
<td>28</td>
<td>Number of new products (patents) generated by engaged research findings</td>
<td>ENGAGED RESEARCH</td>
<td>POTENTIAL, RSS</td>
<td>Y</td>
</tr>
</tbody>
</table>

Ireland’s Higher Education Authority System Performance Framework

200 indicators for annual reporting on all aspects of Higher Education

2 Open Science metrics:

1. % of publications in open access repository

2. Number of researchers who have undertaken FAIR research data management training.
Open Science Skills in Research, Civil Society and Lifelong Learning*

Elementary School  High School  FE/HE/CE  Lifelong learning

Citizen Scientist=All

R1

R2

R3

R4

Research Information/Management Professionals

Industry / Government / NGOs / Media /

*Niamh Brennan, March 2017
‘1.2 We call on the EC and Member States to incorporate research and scientific skills into high-school education through radical reform of curricula and methods of assessment: students must be given the opportunity to practice research and scientific thinking in schools – not just listen to teachers talk about it.’

“We need to have a talk on the subject of what's yours and what's mine.”

— Stieg Larsson, The Girl with the Dragon Tattoo
OpenAIRE compatibility for CRIS systems: recent progress,
Pablo de Castro, University of Strathclyde/euroCRIS; Jan Dvorak, Charles University Prague/euroCRIS; Ed Simons, Radboud University Nijmegen/euroCRIS

“The gradual addition of CRIS systems to the list of OpenAIRE data providers will mean a qualitative leap in the volume of contextual metadata that gets delivered for research output records, including research data, publications and other text-based outputs.”
Immediate & Transparent Publishing

HRB Open Research is a platform for HRB-funded researchers to rapidly publish their research outputs in an open and accessible way.

SUBMIT YOUR RESEARCH

BROWSE ARTICLES
“Dear Government... I'm going to have a serious talk with you if I ever find anyone to talk to.”

— Stieg Larsson, The Girl Who Played with Fire
National Policy Agenda

Pre-Innovation 2020

National Open Access Forum

2012 National Open Access Principles

- Relating to open access to
- Publications
- Data, where feasible

Innovation 2020

- Refers to National Open Access Principles
- Action 4.7:
  - Provides for support of national and European Access policies and principles for publications
  - Commits to integrate and support open access repositories, the national research classification system, HEI research information systems, research funders’ grant management system and expertise locators systems
- Responsibility: HEA, KTI, SFI, HRB, DRI
National Policy Agenda: Current Developments

The National Open Research Forum (NORF)

Co-Chaired by Patricia Clarke (HRB) and Gemma Irvine (HEA) with Secretariat provided by DJEI

Output from Working Groups by end 2018

Expanding membership

Working Groups established to:

I. Develop a vision for Open Science agenda for Ireland

II. Review national principles for Open Access to publications

III. Propose national principles for open research data in Ireland

IV. Take stock of current capacity and capability and identify future needs re Human resources

V. Infrastructure
‘EU-level action alone will not suffice. Success depends on the commitment and expertise of many players: national governments, regions, local authorities, businesses and employers, workers and civil society, and people themselves, taking up opportunities to make the best of their talents.’

– p3 New Skills Agenda for Europe
Thank you!