Knowledge Exchange

Case study

The role of research funders in the consolidation of the PID landscape

August 2022

This case study is part of a series that has been produced within the study on “Risks and Trust in pursuit of a well-functioning PID infrastructure for research” commissioned by the Knowledge Exchange in July 2021. The main outcome of this study will be a report examining the current PID landscape with an emphasis on its risks and trust-related issues. The report; *"Building the Plane as We Fly It": the Promise of Persistent Identifiers* (DOI https://doi.org/10.5281/zenodo.7258286), will be published soon.

This complementary series of case studies aims to provide a deeper insight into specific areas of activity, workflows and stakeholders within this wider PID landscape.

DFG CSC Jisc cnrs SURF DeiC

Title: The role of research funders in the consolidation of the PID landscape.

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1. Rationale

This case study aims to explore the key role research funders are expected to play in the gradual adoption of an ever wider range of PIDs across European countries.

The involvement of national-level funders in the awareness-raising exercise around the role of PIDs will contribute to the achievement of the various use cases for PID implementation – many of which, such as their use in internal workflows for project proposal submission and review, cannot be realised without a firm support from funders. A particularly critical role will be played by the European Commission via the efforts for the consolidation of the European Open Science Cloud (EOSC). The fact that the PID Graph underpinning the vision for a widespread PID implementation lies at the core of the plans the EOSC has laid out to support a wide range of research data management-related PIDs may provide a much-needed harmonisation in the approach to multiple PIDs, some of which may not be that relevant for national funders at an early stage.

The case study also explores the possible mechanisms and forums for coordination across funders so that best practices in PID adoption by a number of them can gain traction on a wider scope. The ORCID consortia already available in many European countries – in which specific funders are already represented – may also play a relevant role by gradually expanding the scope of the PIDs whose implementation they support.

Same as in other case studies in this series, the final section of this case study on the role of funders will be devoted to perceived issues around risks and trust from a research funder perspective. These include the risk of fragmentation that has been highlighted in other case studies – meaning that funders might take diverging approaches towards the implementation of specific PIDs or be left behind altogether due to the lack of awareness of the appropriate mechanisms to follow. The lack of effective forums to discuss and agree on a coordinated cross-funder approach is also seen as a potential risk, closely connected with a possible lack of trust in the real usefulness of the implementation of specific PIDs such as grant IDs.

Why should a research funder like the Wellcome Trust, the NWO or the DFG with its own internal and functional ID adopt a new, global ID?

Even if a specific funder has its own well-maintained identification system for its grants, there are three main factors that justify adopting DOI-based, Crossref-issued grant IDs:

I. With so many funders out there there is always a risk of duplicate grant numbers across funders. Even if the combination of funder name + full grant number will typically be unique, this is potentially problematic and easy to fix via persistent grant IDs
II. Authors often make mistakes when including the full grant numbers for their projects in their manuscript acknowledgements. The more complex the grant number structure, the more frequent such typos are
III. Self-managed grant numbers issued by funders do not allow the full power of the PID Graph to be exploited. Once DOI-based grant IDs start regularly featuring in published papers that can be shared in the article metadata by publishers, it will be simple to link publications and datasets to a funded project in an automated, machine-readable way. This is already theoretically possible on the basis of self-managed project grant numbers issued by funders, but it's much more difficult because there are hardly any links between internal grant numbers and the landing pages containing the project information.

2. Endorsement of PIDs by research funders and opportunities for cross-funder collaboration

Funders are often aware that persistent identifiers effectively support research funding workflows and have subsequently endorsed PIDs such as ORCID. However, a perceived lack of coordination forums for funders, especially on a technical level, could prevent a more widespread PID adoption.

ORCID as a best-practice approach to PID implementation from a research funder perspective

Being aware that persistent identification of researchers and the interoperability of the research information kept in their profiles effectively supports their needs, research funders in various countries have already endorsed the most consolidated PIDs such as ORCID and have often made it a requirement for their funded researchers to use them in their various research information processing workflows[i]. The UK Research and Innovation specifically mentions the value of ORCIDs in their Sep 2020 statement "UKRI reducing unnecessary bureaucracy"[1] and ORCID implementation – alongside other relevant PIDs from a funder perspective – plays a key role in the NWO persistent identifier strategy issued by this large research funder in the Netherlands in Apr 2021[2]. As early as May 2016, the German Research Foundation (DFG) launched the ORCID DE project to – initially – expand the adoption of the ORCID identifier by researchers and institutions in Germany[3]. As the project has progressed, additional PIDs such as OrgIDs have also become part of the scope of this initiative.
A presentation on the steps taken by the DFG to implement a national-level database of organisational identifiers was delivered in Dec 2020 within the 4th national ORCID DE workshop by the Director of the Group Research Information Management at the DFG Jürgen Güdler[4]. This presentation includes a snapshot of the poster contributed to the PIDapalooza event held in Lisbon in 2020.

Research funders and their coordination: a complex landscape

These are some best practice examples of the role that specific research funders in Knowledge Exchange member countries are already taking in order to promote the adoption of PIDs within their research communities. These practices are however not as widespread as they could be due to a number of factors:

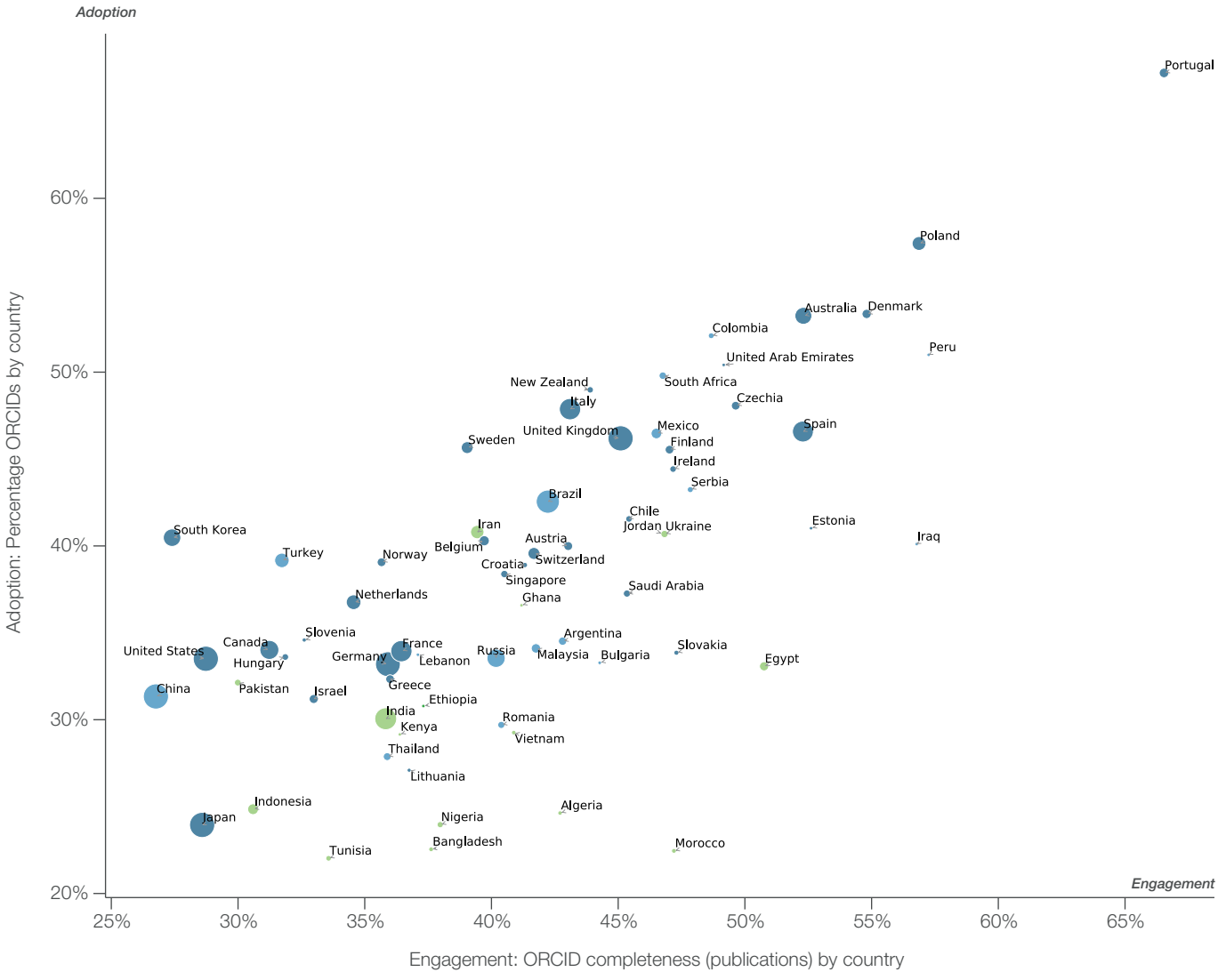
- The structure and relevance of public research funders shows strong variations across countries, see **Table 1 (page 8)** for KE member countries. Some public funders, especially in small countries, have both the required resources and awareness to be able to drive the PID adoption in their countries. The Portuguese Foundation for Science and Technology (FCT) may provide the best example for such an 'hegemonic' national-level public funder in

i. See the June 2022 UK Research and Innovation Guidance for ORCID [funding proposal] reviewer recognition" at https://bit.ly/3JSOaDj

Europe, and through the early mandate issued for its funded researchers[5] it has effectively driven the highest national-level adoption for ORCID in any country worldwide, see **Figure 1 (below)**;

- Funders come in many sizes and often lack the technical resources to devise a policy for PID adoption or simply do not see this area as a priority;
- While the best practices mentioned above are publicly available online and the case for PID adoption by funders has been extensively made, these initiatives are relatively recent and there are not that many forums for funder coordination that may allow a specific discussion to take place in the domain. This inevitably leads to a certain degree of fragmentation in the landscape, where some countries are frontrunners while other ones are lagging.

Figure 1. ORCID adoption vs completeness by country worldwide (2015-2019)[6]



Income group

- Upper middle income
- High income
- Lower middle income
- Low income

Researcher population

- > 150,000
- > 300,000
- > 450,000
- > 600,000
- > 750,000

Table 1. A snapshot of the key research funders in KE member countries

Country	Research funder	Comments
Netherlands	▸ NWO/ZonMW	▸ Lead 'NWO PID Strategy'[2] ▸ EuropePMC member
Germany	▸ DFG ▸ Volkswagen Foundation	▸ Leads ORCID DE project
United Kingdom	▸ UKRI ▸ Wellcome Trust	▸ UKRI is member of Crossref Funder advisory group ▸ Wellcome is EuropePMC member
Denmark	▸ Danish National Research Foundation (DNRF) ▸ Danish Ministry of Science, Technology & Innovation ▸ Independent Research Fund Denmark (DFF) ▸ Innovation Fund Denmark ▸ Novo Nordisk ▸ Carlsberg Foundation	▸ No 'hegemonic' research funder as in other KE countries, but a mix of public and private funders
Finland	▸ Academy of Finland ▸ Business Finland ▸ Kone Foundation ▸ Svenska litteratursällskapet	▸ Academy of Finland is a member of "cOAlition S"
France	▸ Agence nationale de la recherche (ANR) ▸ Ministère de l'enseignement supérieur et de la recherche ▸ Centre national de la recherche scientifique (CNRS)	▸ French ORCID Consortium ▸ INIST is a member of DataCite and delivers DOIs to research outputs ▸ National Program for Open Science https://www.ouvrirlascience.fr/second-national-plan-for-open-science-npos/

An important factor to bear in mind when assessing the degree of awareness and adoption of PIDs by research funders is that there is no comprehensive snapshot for the research funder landscape in Europe, not to mention worldwide. The research funding picture is a really complex one, with a long tail of small, discipline-specific and private-sector funders. Research funders have traditionally been slow to join community-driven research information management initiatives – with a few well-known exceptions[7].

The effort to adopt persistent grant IDs will be examined below as an area that needs to be specifically driven by research funders, quite a few of whom are already engaging in the process. However, a previous step is required before even considering the implementation of PIDs for grants, namely for funders to collect and make available the information on their funded projects in a standardised and comprehensive fashion. This is only a relatively recent development and it's far from being complete due to the strong variations in research funders' nature (public vs private research funders), size, budget and technical resources.

The fact that there are not too many coordination forums available to bridge the gaps across a fragmented research funding landscape is another factor that makes it difficult to have a widespread funder movement towards sharing project data on the basis of a harmonised metadata set. The OpenAIRE project was one of the first international initiatives to push for this kind of housekeeping effort by research funders by using the European Commission-funded research framework programmes as a benchmark. Having an all-European (and beyond) set of National Open Access Desks (NOADs[ii]) for stakeholder engagement purposes, OpenAIRE was able to use this network as a series of contact points and to make the case for a layer of services towards research funders based on the comprehensive collection of funding information and the linking of funded project data to publications and datasets[8]. This reference to OpenAIRE funder services is only dated 2017 though, and even if the list of funders already engaging in this international monitoring effort provided in the slides includes research funders from many different countries both in and outside Europe, the list of funders that are not on the list and may not even be aware of these services is far longer. At the time of writing the OpenAIRE funder dashboard lists 24 funders engaging with the OpenAIRE monitoring services, among them the European Commission, the French National Research Agency (ANR), the Academy of Finland, the Austrian FWF, the Portuguese FCT, the Dutch NWO, Science Foundation Ireland and the Swiss National Science Foundation (SNSF)

Other international initiatives worth mentioning aimed at collecting aggregated funding information and at bringing together research funders include Europe PubMed Central (Europe PMC). National-level efforts include the SweCRIS project in Sweden and the 360Giving initiative in the UK.

Europe PMC lists 36 European Life Sciences research funders across Europe at the time of writing, https://europepmc.org/Funders/, including the Wellcome Trust, the European Research Council (ERC), NWO and ZonMW in the Netherlands, the Austrian Research Fund FWF, Telethon Italy and the Chief Scientist Office (CSO) in Scotland among others. This funder network is strongly supporting the implementation of Open Science by all the funders involved in it, which includes making openly available their project funding information and linking it to the research outputs stemming from these funded projects. The implementation of PIDs for grants is also an area where some cross-funder technical collaboration is already taking place within this group, making it the most suitable forum at present for a harmonised push towards PID implementation from funders.

SweCRIS is an initiative presented at the CRIS2018 Conference to gather funding information from public and private research funders in Sweden in a harmonised way[9]. The SweCRIS database includes research projects funded by 11 different Swedish research funders, https://www.vr.se/english/swecris.html#/. This example for a multiple-funder CRIS (Current Research Information System) highlights the value of such

ii. OpenAIRE NOADs for KE member countries are Syddansk Universitet (DK), Couperin (FR), Universität Konstanz (DE), Helsingin yliopisto (FI), DANS (NL) and Jisc (UK), https://www.openaire.eu/contact-noads

Figure 2. Swedish research funders (public and private) involved in SweCRIS

systems for collecting this kind of research information from funders. The fact that the standards for information exchange between the funders' systems and the SweCRIS national portal are directly discussed and agreed with funders means they are brought into a national-level research information management community that can also be a very useful forum when discussing PID implementation.

360Giving is a UK non-profit launched in 2015 aiming to collect comprehensive funding information in an open and standardised way across a range of UK research funders including charities and Government departments. The data collection workflows are based on the 360Giving Data Standard. At the time of writing the list of UK funders providing their data to 360Giving includes over 220 funders contributing over £170bn of grant funding[10]. The fact that most charities that were part of the former Charity Open Access Fund (COAF) partnership – Arthritis Research UK, Breast Cancer Now, the British Heart Foundation, Cancer Research UK, Bloodwise and Parkinson's UK – are currently not listed among these over 220 data providers shows the difficulty of bringing all research funders under a single umbrella. However, the largest former COAF partner and also largest independent research funder in the UK, the Wellcome Trust is indeed included in 360Giving since April 2018. Both the remarkable growth in the number of 360Giving data providers and the fact that this initiative includes a Data Champions programme to "bring funders together to collaborate and learn how to grow a data culture in their organisations" could make it a suitable candidate to promote the gradual implementation of PIDs across their funder partners.

There are of course other international collaboration networks among research funders – **Science Europe** and **cOAlition S** being the two most prominent European examples at present. The emphasis on the three examples shown above is due to the fact that the joint effort across funders for the adoption of PIDs requires a degree of technical collaboration that the above-mentioned initiatives are already conducting. While more policy-making-oriented research funder forums may also provide a valuable contribution in this domain, it is the joint technical work that is expected to truly make a difference.

> "Crossref is already the big one [cross-funder coordination forum] but I have had more one-to-ones with other funders during last year, some of them in America and one in Australia. So I think the awareness is there. And people definitely do reach out – the party was able to find me and contact me to have that chat. So I think there's definitely an awareness, and I guess there's also a demand to know more. We have just discussed, okay, here's the people, here's what we have to do. It isn't just a nice easy case of "Oh, you could just provide the data and off you go". There is always going to be work at some technical level, particularly addressing technical barriers, to produce PIDs. Grants and persistent IDs for researchers, the ORCIDs, I think, are the easiest ones, because you are already collecting a lot of this information anyway".
> *Wellcome Trust representative*

2.1. Early steps for the implementation of grant IDs by research funders

The first attempts to make the case and discuss the technical requirements for issuing persistent grant IDs were made by Crossref. The Crossref Funder advisory group was aimed at promoting cross-funder collaboration in areas like assigning PIDs to funders as organisations and later on in exploring the technical requirements to issue grant IDs for their funded projects. Same as for PIDs in other areas, one of the first tasks was for this group to define the use cases for persistent identification of grants[11].

Some use cases for the grants project

1. **Multi-country funding** e.g. the Australian Research Council wants to know which other countries their awardees get additional funding from.
2. **Government vs. private funding relationships** e.g. which private funders work with which governments to support what kind of research?
3. **Co-funding** e.g. which other funders do my grantees tend to receive support from as well as us?
4. **Portfolio analysis** e.g. a funder invests in centers and individual scientists; which effort generates more products?

One additional use case for grant IDs not specifically mentioned in the list above is to ensure the correct identification of specific grants in the references to them that researchers include in the funding acknowledgements section of their manuscripts. Funders use very different internal identification formats for their funded projects and there are frequent mistakes when typing them in these manuscripts, so an additional use case would be to improve the quality of PID graphs so that research outputs can easily be linked to their funding sources[12].

The list of stakeholders involved in this Crossref advisory group shown in reference[11] includes research funders like the European Research Council, UK Research and Innovation, the Wellcome Trust, Science Foundation Ireland and the Austrian Research Fund FWF (plus a good number of non-European members too).

As the Crossref initiative for funder registration via FundRef (later renamed the Open Funder Registry) consolidated, the case for issuing persistent grant IDs for registered funders became more achievable. The conversation subsequently moved onto the technical requirements for this purpose and whether DOIs would be an appropriate standard to use[13].

The Wellcome Trust adopted a frontrunner role in piloting the initiative to issue the first grant IDs. A Feb 2018 guest post on the Crossref blog by Wellcome representatives announced the forthcoming issuing of their grant IDs and the funder's rationale for implementing these PIDs[14]. The Wellcome Trust being a founding member of Europe PMC, they used this platform to

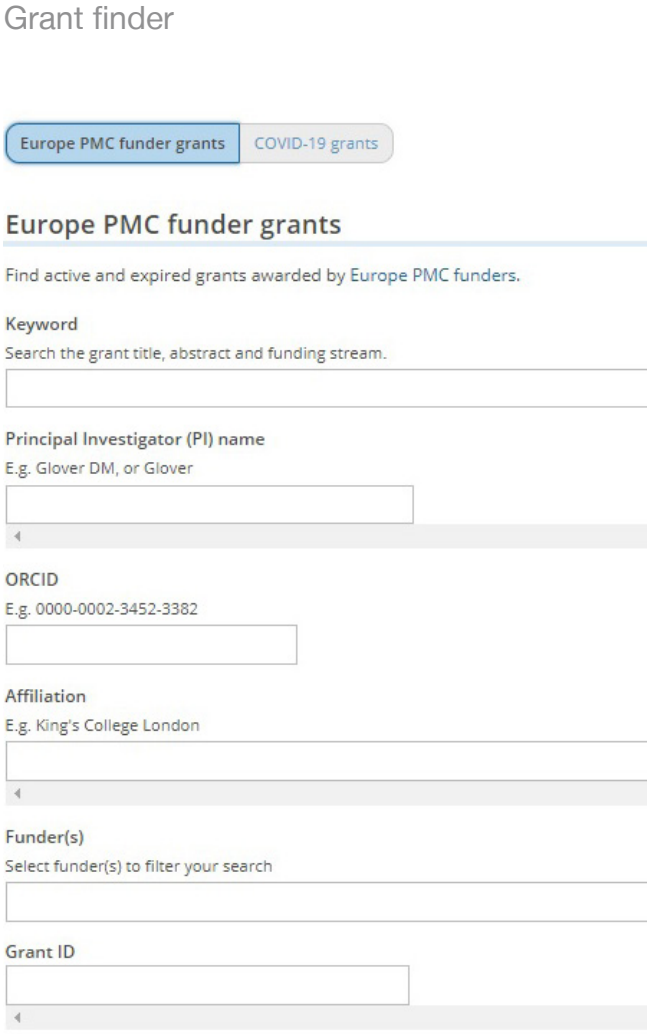
provide landing pages for the DOIs assigned to their grants – thus opening the door for other Europe PMC member funders to follow the same procedure. A June 2020 post on the Europe PMC blog[15] announced the first grant IDs had been made available for Wellcome-funded grants in Sep 2019 and provided the technical details (DOIs and metadata sets) for these two first examples that had already been included in the funding acknowledgements for a paper published Oct 2019 in PLoS ONE at https://doi.org/10.1371/journal.pone.0222922.

Critically, the DOI for the first of these two persistently identified Wellcome-funded grants, https://doi.org/10.35802/207522, a snapshot of whose landing page in Europe PMC is still shown in [15] at the time of writing, does not resolve due to a minor mistake in the URL following an update in the grant record in Europe PMC (grant holder name Prof MC English was updated to Prof M English after the hyperlink has been set). This is particularly revealing in a case study looking into the risks associated with PIDs and highlights the need to be extremely careful when updating any metadata element in a third-party hosted grant ID page at which a PID is pointing. Teething issues aside, the fact that the persistently identified funding acknowledgements have already been included in a published research paper shows the way forward in terms of enhancing the PID Graph via the collaboration of multiple stakeholders in the scholarly communications community.

Funding: MM, GK, JM, MZ and OT were supported by funds through a grant from the Economic and Social Research Council ESRCS ES/P004938/1) awarded to ME. A Senior Research Fellowship awarded to ME by The Wellcome Trust (#207522, https://doi.org/10.35802/207522) supported PM. MM received additional support from a grant to the Initiative to Develop African Research Leaders (IDeAL) through the DELTAS Africa Initiative (DEL-15-003), an independent funding scheme of the African Academy of Sciences (AAS)'s Alliance for Accelerating Excellence in Science in Africa (AESA) and supported by the New Partnership for Africa's Development Planning and Coordinating Agency (NEPAD Agency) with funding from the Wellcome Trust (#107769, https://doi.org/10.35802/107769) and the UK government.

Moreover, it is now already possible to search Europe PMC for at the time of writing, just Wellcome-funded grants in order to identify their DOIs via the Europe PMC grant finder feature at https://europepmc.org/grantfinder/, see **Figure 3 below**. This will allow any interested user to check if their Europe PMC member funder of choice is also already issuing grant IDs for their funded projects.

Figure 3. EuropePMC grant finder

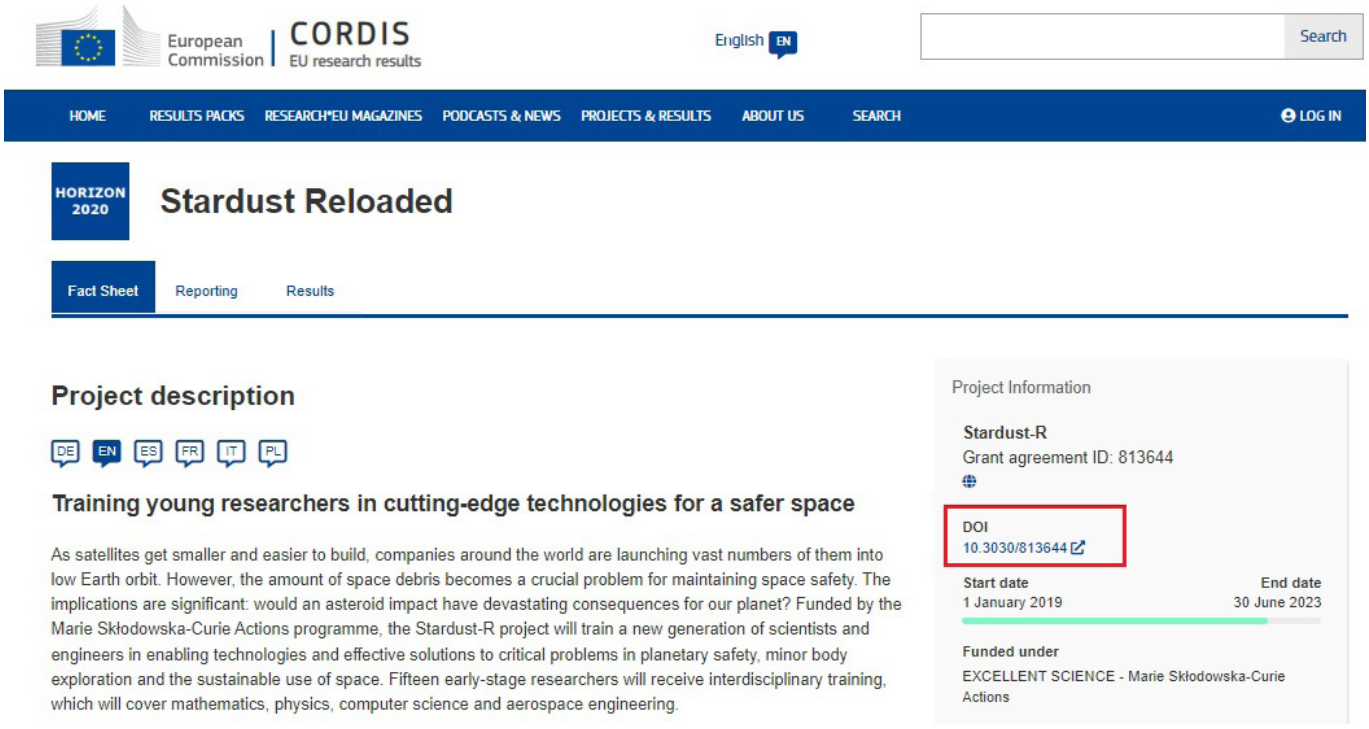


Because there is a pattern in the way (for instance) Wellcome-funded grant ID 202924/Z/16/Z is assigned DOI 10.35802/202924, adding this information into institutional CRIS and/or project management systems should be straightforward, allowing grant IDs to be increasingly used by researchers in their manuscript acknowledgements as soon as they are made available.

Further work around the implementation of grant IDs has recently been undertaken by the European Commission. The EC's Directorate-General for Research and Innovation (DG RTD) in collaboration with the EU Publications Office is currently minting grant IDs (DOIs) for all Horizon 2020 projects. The current effort, which aims to reach 35,000 minted grant IDs for H2020 projects by the end of 2022, is following both the Crossref workflow and schema. Once grant IDs have been issued for all H2020 projects, the plan is to mint additional ones for Horizon Europe projects while at the same time progressing 'backwards' with grant ID minting for projects funded under previous research framework programmes down to FP1.

As shown in **Figure 4 below**, DOIs are already displayed on a number of H2020 project webpages in the CORDIS database. Discussions with publishers are also underway to gradually promote among EC-funded researchers the inclusion of these new grant IDs in their funding acknowledgement statement in their manuscripts[iii].

Figure 4. Example DOI-based grant ID for a EC-funded H2020 project



iii. This is already starting to happen, see for instance June 2022 tweet showing the grant ID for the H2020 FiberEUse project, https://twitter.com/pcastromartin/status/1537350780545540100 in the acknowledgements section of a manuscript

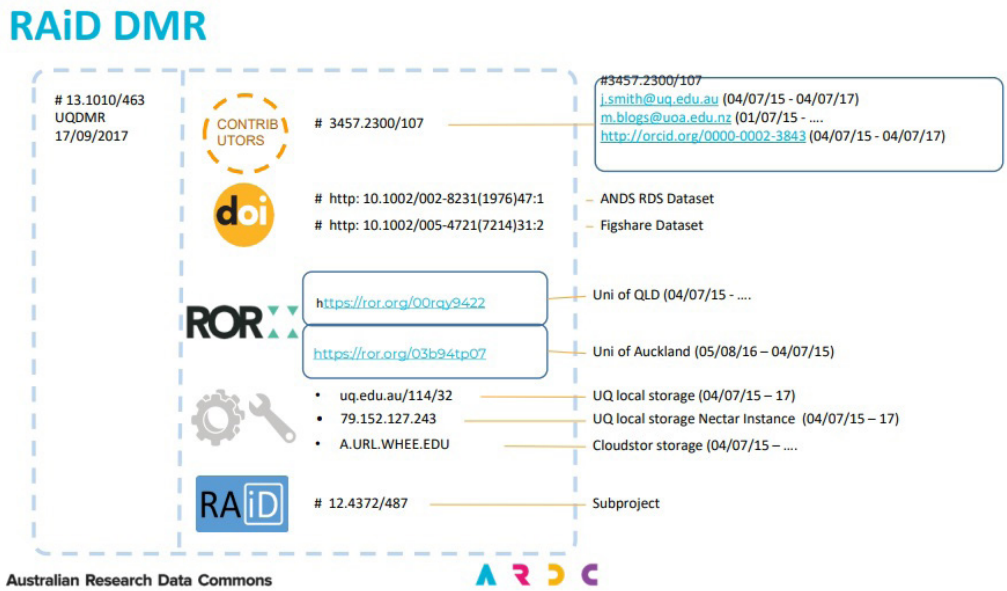
Both examples provided above for the issuing of grant IDs by the Wellcome Trust and the European Commission are following the Crossref workflow and schema. In fact, entries **13** and **15** in the references provided for this case study highlight the need for research funders to become Crossref members in order to be able to follow the procedure described above to issue grant IDs. This may pose a potential risk of lack of uptake by smaller research funders who may either be unaware of this trend or may find the workflow technically unaffordable.

The emergence of an alternative, handle-based mechanism to mint project IDs may offer an alternative way forward in these cases. This potentially alternative route is currently provided by the RAiD initiative for Research Activity identification[16]. Originally designed by the Australian Research Data Commons (ARDC), this is a free service for minting project IDs that is being considered for its implementation (beyond Australia) in Europe, the US and the UK via independent albeit connected initiatives. In Europe, the EOSC Association is to promote a 'European RAiD' under its FAIRCORE4EOSC project which kicked-off in June 2022, https://faircore4eosc.eu/.

The RAiD Metadata Manifest potentially includes additional PIDs for researchers, research outputs (publications and datasets), organisations and instruments or facilities within the same record, see an example of a RAiD record structure in **Figure 5 below**[17]. This PID initiative – which is currently undergoing registration as an official ISO standard[18] – has so far been adopted only in Australia. As per the FREYA project report dated Nov 2020[19], RAiDs were being used by seven Australian organisations at the time this was written, with an additional 24 having access to the RAiD-minting system but with no active integrations yet as of then. 5,336 RAiDs were said to have already been issued by then.

While RAiDs are to be issued by institutions and will not be able to include a DOI-based grant ID within their 'metadata envelope' unless this has previously been minted by the appropriate research funder, RAiD implementation could offer an alternative way forward for the persistent identification of projects in cases where their funders haven't been able to issue grant IDs for them. These grant IDs could be added at a later stage, and in the meantime RAiDs would include ORCIDs for the researchers involved in a project, OrgIDs for their institutions, Crossref DOIs for the publications, DataCite DOIs for the datasets and so on.

Figure 5. RAiD record structure for funded projects



3. Issues around risks and trust regarding the adoption of PIDs by research funders

Research funders are ideally placed to promote the use of PIDs by researchers they fund. In order to become key drivers for PID adoption, funders need to watch the progress around the PID landscape, avoid fragmentation and identify appropriate collaboration forums.

ORCID is the most consolidated PID among those whose implementation has been community-driven. Portugal's outlier position in **Figure 1** showing ORCID uptake (2015-2019) provides evidence of the key role that research funders may be able to play in the adoption of PIDs (widespread ORCID uptake in Portugal was a direct outcome of the emphasis made by the Portuguese Foundation for Science and Technology in requiring ORCID registration from their funded researchers). However, all other countries shown on this graph display rather limited rates of ORCID adoption and use, even when ORCID consortia have been operating for quite some time in many of these countries.

The current PID landscape is rather complex and it could be fair to expect varying degrees of adoption for different PIDs depending on the emphasis that research funders (among others) are willing to make on each of these. The NWO PID strategy for instance – perhaps the best example available at the time of writing for a coherent funder-driven approach to PID adoption – specifically focuses on ORCIDs, Crossref grant IDs and OrgIDs as the most urgent priorities for PID adoption from a funder's perspective. This section provides a broad analysis of the issues around risk and trust perceived to be relevant with regard to funder engagement in PID adoption.

3.1 Funder involvement in harmonised strategies for PID adoption

The lack of funder coordination initiatives has already been mentioned above as a significant risk that could prevent best practices to be widely shared across funders. Some examples have also been provided for the sort of collaborative initiatives that could help bridge this potential gap, especially the Crossref funder advisory group and Europe PMC network.

Recommendation number 5 in the NWO PID strategy suggests [NWO] "to collaborate with other funders in the international PID landscape, for instance by participating in such a coordination effort within the context of Science Europe". Issues remain nevertheless in areas like the following ones:

- Not all funders have the required technical expertise that would allow them to engage in PID-issuing initiatives;
- Most cross-funder collaborative networks are designed to deal with policy-making issues rather than to address technical ones;
- Funders, especially small ones, may not be willing (or even have the workflows in place) to pay a membership fee to an organisation for the purpose of minting their own PIDs;
- Big national-level funders like the DFG, the NWO and the UKRI and Wellcome have successfully advocated for ORCID adoption by their funded researchers, but it may be harder for them to promote more complex PIDs whose benefits may not be so evident yet;

- The collaborative workflows and endeavours between funders and institutions are often there in many countries, but are largely missing in many other ones.

The Knowledge Exchange partnership encompasses six member countries where the situation around these issues is generally an advanced one. Not only do some funders in KE countries already have PID strategies, but the collaborative networks within the wider scholarly communications community are well established. A recommendation is then for KE to consider the possibility of acting as a frontrunner in the area of funder involvement in PID adoption, with the appropriate international coordination mechanisms in place that would complement – and overlap with – the efforts that other key stakeholders in this area are already conducting such as Crossref, DataCite, ORCID[iv] or the Research Data Alliance (RDA)[v].

3.2 Potential divergences in the technical workflows for PID adoption

Partially as a result of the lack of coordination across national-level research funders, there is a risk for their adopting different technical solutions when promoting PID adoption in their countries. Some examples of these could be the (current) ROR vs Ringgold dichotomy as a technical basis to mint OrgIDs, or using Crossref grant IDs vs allowing institutions to start implementing RAiDs as project identifiers. Transparent communication practices by research funders in terms of disseminating their support for and their progress around implementing various PIDs could tackle this risk, but some forum for this sort of exchange to take place should be available. The discontinuation of the PIDapalooza series of events may pose an issue in this regard, but other venues could rise up to the challenge.

The EU-funded FREYA project managed to bring together all relevant stakeholders in the PID landscape for a joint initiative aimed at "iteratively extending a robust environment for PIDs into a core component of European and global research e-infrastructures". In a similar way, EOSC-funded projects such as those stemming from the HORIZON-INFRA-2021-EOSC-01 call to enable an operational, open and FAIR EOSC ecosystem (2021) could also play a key role in terms of the international PID community management both from a technical and a social perspective.

3.3 Funders ideally placed to gain researchers' trust

A distinction between 'technical' and 'admin-oriented' PIDs has been made in another case study in this series devoted to PIDs for instruments and facilities. 'Technical PIDs',are those identifiers, such PIDs for geo samples or for research instruments and facilities, whose implementation has so far mainly been driven by researchers with little involvement from other stakeholders like institutions or research libraries (or indeed research funders). This is in contrast to the more 'admin-oriented PIDs' (such as ORCID, OrgIDs, grantIDs and RAiDs) whose use cases much more clearly serve the objectives of the wider scholarly communications community. Awareness of these admin-oriented PIDs among researchers is typically much lower. These are not clear-cut categories, but from the perspective of the risks associated to PID implementation this is a useful classification to bear in mind.

[iv] ORCID operates its own Funder Working Group, which only partially overlaps with other associations of research funders mentioned above, https://info.orcid.org/funder-working-group/. While the presence of European and specifically KE member country funders in the group is relatively small, this forum has a strong representation from relevant areas like Oceania and Latin America.

[v] The RDA National PID Strategies Working Group brings together various national agencies and initiatives with the purpose of mapping common activities and reporting on the specific PIDs adopted in the context of national PID strategies, https://www.rd-alliance.org/groups/national-pid-strategies-wg. Several core KE agencies (Jisc, SURF and CSC) currently represent their respective countries (and their key funders) in the group.

While research institutions may well be able to deal with the latter group of 'admin-oriented' PIDs on their own, the research funders' involvement is seen as critical for ensuring a widespread adoption of the more technical PIDs such as identifiers for instruments or geo samples. This is because these technical PIDs are likely to see a bottom-up implementation in which researchers take the lead.

Research funders are ideally placed to identify researchers' best practices with regard to these technical PIDs and to further promote them in specific disciplines. This role would also involve discussing such best practices with institutions, which may often not be aware of them. The NWO PID strategy proposes the creation of a very timely Dutch PID advisory board in which the national research funder's involvement is strongly recommended. This would ensure a solid coordination across key stakeholders in the country and beyond. This is in fact a recommendation that other countries – and specifically Knowledge Exchange member countries – could also bear in mind.

4. Authorship

This case study has mainly been written by Pablo de Castro (University of Strathclyde and euroCRIS, ORCID https://orcid.org/0000-0001-6300-1033) within a team of consultants including Ulrich Herb (Saarland University, ORCID https://orcid.org/0000-0002-3500-3119), Laura Rothfritz (Humboldt University Berlin, ORCID https://orcid.org/0000-0001-7525-0635) and Joachim Schöpfel (University of Lille and euroCRIS, ORCID https://orcid.org/0000-0002-4000-807X) under the umbrella of scidecode science consulting (ROR https://ror.org/02c0bjd31). The work has been overseen by the Knowledge Exchange Task & Finish Group whose composition is listed at https://www.knowledge-exchange.info/event/pids-risk-and-trust.

5. Literature

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