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D5.7 Third Report on the PID Forum

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Abstract This report provides an overview of the activities of the PID Forum and the interactions with major stakeholders in the third and last year of the FREYA project.
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FREYA project summary

The FREYA project iteratively extends a robust environment for Persistent Identifiers (PIDs) into a core component of European and global research e-infrastructures. The resulting FREYA services will cover a wide range of resources in the research and innovation landscape and enhance the links between them so that they can be exploited in many disciplines and research processes. This will provide an essential building block of the European Open Science Cloud (EOSC). Moreover, the FREYA project will establish an open, sustainable, and trusted framework for collaborative self-governance of PIDs and services built on them.

The vision of FREYA is built on three key ideas: the **PID Graph**, **PID Forum** and **PID Commons**. The PID Graph connects and integrates PID systems to create an information map of relationships across PIDs that provides a basis for new services. The PID Forum is a stakeholder community, whose members collectively oversee the development and deployment of new PID types; it will be strongly linked to the Research Data Alliance (RDA). The sustainability of the PID infrastructure resulting from FREYA beyond the lifetime of the project itself is the concern of the PID Commons, defining the roles, responsibilities and structures for good self-governance based on consensual decision-making.

The FREYA project builds on the success of the preceding THOR project and involves twelve partner organisations from across the globe, representing PID infrastructure providers and developers, users of PIDs in a wide range of research fields, and publishers.

For more information, visit www.project-freya.eu or email info@project-freya.eu.

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Executive summary

This public deliverable is FREYA's third report on the PID Forum, the project's way of engaging, interacting and discussing with the PID community. The deliverable describes the engagement and outreach strategy, activities, and stakeholder reach of the PID Forum during the third and last year of the project (December 2019 to November 2020). This year was marked by the release of major PID services established by the FREYA project. Efforts were spent on receiving feedback on prototypes of the services as well as showcasing the results and promoting the use of our services in the wider PID community. FREYA continued a close collaboration with the Research Data Alliance (RDA), the EOSC community and EOSC projects like EOSC-hub, OpenAIRE-Advance, and the disciplinary cluster projects. Due to the COVID-19 pandemic, many events were forced to take place online, and FREYA organized additional webinars to reach the wider community. The online platform *pidforum.org* continued to play a major role in our communication and interaction with the global PID community. This deliverable provides a summary of key (online) events FREYA attended, as well as outlining our engagement and communication activities through *pidforum.org* and our social media channels. In addition, we provide a more detailed analysis of our engagement with the EOSC projects and the RDA, as well as outlining the achievements from our ambassador programme. The report also reviews the key performance indicators related to the PID Forum activities, which were all achieved in the last year of the project.

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1 Introduction

1.1 The PID Forum

The PID Forum forms one of the three pillars of the FREYA project, together with the PID Graph and the PID Commons. The PID Forum is the platform for engagement, interaction and discussion between FREYA and the broader PID community. It involves *pidforum.org* as an online platform, but also includes activities and events organized for the PID community and FREYA stakeholders. The goal of the PID Forum is to foster collaboration with a wide range of stakeholders to allow for co-designing of the PID services that FREYA is developing. In addition, the PID Forum is utilized to maximise uptake of services and results by the community. The work FREYA is doing is closely linked with the Research Data Alliance (RDA), the European Open Science Cloud (EOSC), and other research infrastructures who form important stakeholders for the PID Forum. The PID Forum activities in the third year of FREYA were designed to encourage stakeholders to be involved in the development of PID services. In particular, we engaged the community in the PID Graph services developed in WP2 and WP4 which were finalized in the last year of the project. We also continued our efforts to facilitate the uptake and sustainability of the FREYA outputs through the PID Commons.

1.2 Work Package goals and Key Performance Indicators

Work Package 5 is responsible for the engagement with research infrastructure communities and stakeholders external to FREYA. The goal of this WP5 is to engage with these external stakeholders to ensure that the services and policies developed by the FREYA project are known and adopted by the wider community, thereby benefiting the ecosystem as a whole.

WP5 contains the following specific goals, in which the PID Forum plays a central role:

- Develop and implement FREYA's communication plan, i.e. establish and sustain standard communication tools (via website, activity in social networks and other media) to offer continuous exchange/information/support around PIDs, and to disseminate and exploit the project outputs (Task 5.1).
- Plan and execute the PID Forum in connection with the RDA to engage infrastructure communities to discuss PID related requirements and standardization/protocols (Task 5.2). This task results in the three yearly reports on the PID Forum, including the present report.
- Coordinate with partners in the e-infrastructure realm, e.g. RDA and EOSC, to enable co-design of PID innovations (Task 5.3). This task is carried out through the PID Forum.
- Develop and refine training programs for a wide range of stakeholder groups to stimulate extensive PID uptake (Task 5.4).
- Build on the PID Ambassador Programme to raise awareness and provide training, particularly to reach end users (Task 5.5). The FREYA Ambassadors will be actively involved in the PID Forum, including strengthening community-specific engagement.

Based on these tasks, a number of Key Performance Indicators (KPIs) were established for WP5, which are used to measure the success of the engagement through the PID Forum. Table 1 shows these KPIs and provides a summary of the achievements of the last year of the project.

KPI	Target	Year 3 (November 2019 - November 2020)	
<p>Number and distribution of participants in the PID Forum.org</p>	<p>Steady increase throughout the project.</p> <p>Representation of all defined stakeholder groups.</p> <p>Active participation by FREYA partners in six RDA Working Groups/Interest Groups.</p>	<p>PIDforum.org: 506 registered users and on average 12.941 page visits per month.</p> <p>The Knowledge Hub has been fully integrated into the PID Forum.</p> <p>PID IG members: 181.</p> <p>Participation in 19 RDA groups.</p> <p>Ambassadors: 37 from 21 countries.</p> <p>Website visitors (unique): On average 661 visitors from 45 different countries each month.</p>	<p>+</p>
<p>PID Forum organization</p>	<p>Workshops and presentations at 10+ events per year, three of which are PID-related events and four service provider events per year.</p> <p>At least one session on each RDA Plenary and continuous offline activity.</p> <p>At least half of the RDA sessions will be jointly organized with other EOSC-building projects or e-infrastructures.</p>	<p>FREYA members gave presentations and workshops at 29 different events and 13 webinars.</p> <p>FREYA established the Open Science Graphs for FAIR Data IG together with OpenAIRE.</p> <p>The final event of FREYA was co-organized with EOSC-Hub and the EOSC Cluster project SSHOC.</p> <p>FREYA partners contributed to the PID IG session at the 15th RDA plenary with two presentations.</p> <p>FREYA partners participated in several sessions of the 16th RDA Plenary, including the PID IG session.</p>	<p>+</p>

Table 1 PID Forum Key Performance Indicators (KPIs) and achievements as of end of October 2020

1.3 The PID Forum in FREYA’s third year

The first year of the project focused on the assessment of relevant stakeholders and on building the Stakeholder and Communication Plan (Deliverable D5.2). Engagement activities were focused on creating awareness about the project and its goals, as well as starting to gather input from the community for the work to be conducted in FREYA. WP5 and WP3 collaborated to consult the community about user stories, and new and emerging PID types. Our PID Forum activities of year 1 are summarized in Deliverable D5.3 “First Report on the PID Forum”.¹

¹ <https://doi.org/10.5281/zenodo.2414527>

In FREYA's second year, we continued to evolve the PID Forum and established the online platform pidforum.org, which to date continues to be a valuable means of engagement and exchange. Our focus shifted from raising awareness for the project to more active collaboration and co-creation of the PID Graph services. We established deeper connections with our EOSC sister projects and the RDA, amongst others, by establishing a new RDA Interest Group on Open Science Graphs for FAIR Data. WP5 engaged with the PID Forum to gather feedback on the work conducted in FREYA on new PID types (WP3) and the PID Graph (WP2 and WP4). FREYA developed training materials and organised training events for different stakeholders from the PID community and our ambassador programme continued to grow. Our PID Forum activities of year 2 are summarized in Deliverable D5.5 "Second report on the PID Forum".²

The third year of the project largely focused on the outcomes of FREYA, promoting the services FREYA has worked on and collecting feedback for their improvement before finalizing our outputs at the end of 2020. Due to the COVID-19 pandemic, many of our engagement activities could not take place as planned. Instead of visiting conferences to demonstrate FREYA results and engage face-to-face, we organized workshops, events, and webinars online.

In the third year of the project, FREYA released three main services, the GraphQL API, the PID services registry, and the Common DOI search service. WP5 organized online events and webinars (see section 2) to showcase these services and promote their use in the PID community. In the process of developing the services, we held dedicated webinars for ambassadors and interested users to collect feedback to improve the initial products. Several surveys were administered to collect feedback from the wider community and we made use of pidforum.org to promote engagement and gather responses. Our training materials and the knowledge hub were further developed and dedicated materials to facilitate the use of the PID Graph were created and promoted by the FREYA training team.

The online platform pidforum.org continued to grow and attracted more and more users from the PID community who used it as a place for exchange (see section 3.1). We continued our work with the RDA, actively participating in the established Open Science Graphs for FAIR Data Interest Group and several PID working groups (see section 4.2). We also deepened our collaboration with our EOSC sister projects, for instance through establishing a memorandum of understanding with EOSC Hub (see section 4.1). Another important task in the last year of the project was the establishment of the FREYA sustainability plan and the PID Commons (WP6). FREYA initiated an assessment of the need for a PID Federation and the results of this assessment are summarized in a report available on Zenodo³. WP5 collaborated with WP6 to organize several meetings to facilitate the discussion around a PID federation and helped to coordinate the analysis of the community views. A more detailed description about the PID federation work will be included in Deliverable D6.5 "Final Report on PID Commons and Sustainability".

1.4 Outline of this report

The structure of this report follows the same structure as the previous two reports on the PID Forum. It provides an overview of the activities around the PID Forum in the third and last year of the FREYA project. Following this introductory section, Section 2 outlines FREYA's engagement activities in the form of presentations, workshops, and other events, and includes descriptions of key events we would like to highlight. In Section 3, we describe our engagement through online platforms and social media, including pidforum.org, the FREYA website and Twitter. Section 4 outlines in more detail how we engaged with key stakeholder groups, in particular the EOSC projects and the RDA. We also describe our geographical and disciplinary reach, and give a brief overview of the FREYA Ambassador Programme in our third year. The last section of this report provides some general conclusions and future directions.

² <https://doi.org/10.5281/zenodo.3832069>

³ Report on the PID federation assessment: <https://doi.org/10.5281/zenodo.4059557>

2 PID Forum events

2.1 Overview and approach

Engagement and outreach in the third year of the project went differently than planned due to the worldwide COVID-19 pandemic. While the FREYA team was able to attend events in person for the first few months of 2020, the majority of the events that FREYA partners attended and organized took place online. Several key events we planned to attend (e.g. FORCE11) were cancelled or moved to the next year. This explains why the total number of events we attended in the third year of the project was lower than the previous two years. Fortunately, many events, like the RDA plenary meetings, were moved online, giving FREYA partners the possibility to engage with the community and promote and discuss FREYA outcomes. Moreover, FREYA organized additional webinars and interactive online events to show and discuss the project's progress and results. We also produced additional video demonstrations to showcase our work through our online social media channels.

In the third year of the project (December 2019 until November 2020), FREYA members presented the project, its outcomes and progress via presentations, posters, or workshops at a total of 29 different (online) events. In addition, FREYA organized 13 webinars (see section 2.4) showcasing the results of the project and providing space for feedback and comments from the community. As with our live events, we encouraged interaction with our audience in our online events, and we continued to use interactive audience participation tools such as Mentimeter⁴ to gather feedback and foster discussions.

This section follows the structure of the previous reports and highlights several (online) events we participated in for the RDA, the EOSC, and the global community. A full list of all events organised by FREYA in its third year can be found in Annex 1. In addition, Deliverable 5.9, the 'Final outreach report', provides a summary of all events and outreach and engagement activities that FREYA has conducted throughout the entire project.

2.2 RDA

RDA 15th plenary, online. April 2020

This year's spring RDA plenary meeting was planned to take place in Australia from 18 to 20 March. However, due to the global COVID-19 crisis, the physical meeting was cancelled and taken online. The RDA did an incredible job in setting up an online event that we could all join from our home offices. Instead of coming together for three days, the 15th RDA plenary spread out virtual activities over three weeks: from 18 March to 9 April.⁵ FREYA attended the PID IG session, during which representatives from ROR and DataCite gave updates about their FREYA work.

Martin Fenner (DataCite) presented the work that DataCite has conducted on the common DOI search, which answers the need to have a unique platform on where to search all scholarly DOIs, independent of the issuing agency (DataCite or CrossRef). Brian Matthews (STFC) and Rachael Kotarski (BL)—both partners on the FREYA project—presented the document drafted by the EOSC working groups on FAIR Data and Architecture, which reflects on a common PID policy for the EOSC. Despite not being a direct output of FREYA, this work was heavily influenced by the work and the expertise of the FREYA project's participants.

⁴ <https://www.mentimeter.com/>

⁵ <https://www.rd-alliance.org/rda-virtual-plenary-programme>

The recordings of this meeting are available on Zenodo.⁶ A blog post on the 15th RDA Plenary is also available on the FREYA website.⁷

RDA 16th plenary, online. November 2020

The 16th RDA plenary is taking place online at the beginning of November, the last month of the FREYA project. As before, FREYA partners will be present during the RDA and involved in the PID IG session as well as the Scholarly Link Exchange (Scholix) WG session. The plenary also offers the possibility to present posters which FREYA will use to promote the PID Forum which will continue to be a platform for PID enthusiasts beyond the FREYA project (see also section 3).

2.3 EOSC events

EOSC Symposium and project coordination workshop, Hungary. November 2019

The EOSC Symposium was held in Budapest from 26 to 28 November 2019 and was followed by a project coordination workshop from 28 to 29 November (two half days). At the Symposium there was a session on PID policies at which Simon Lambert (STFC) gave a presentation from the FREYA perspective. At the coordination workshop there were discussions of inter-project collaborations and how to engage with researchers. Simon Lambert took advantage of the opportunity to have a discussion with Tiziana Ferrari and Dale Robertson of EOSC-hub on the place of PIDs and FREYA's outputs in the EOSC Federating Core.

Workshop on training in the EOSC, The Netherlands. February 2020

This workshop, held from 26 to 28 February 2020 in The Hague, The Netherlands, was organised by DANS in coordination with EUDAT, EGI and OpenAIRE. It was held for training coordinators in EOSC projects and training service providers to offer an opportunity for them to make recommendations for inclusion in the Rules of Participation for the EOSC, which were under preparation at that time. Frances Madden (BL) attended the workshop to contribute from FREYA's perspective. The workshop also included the output of recommendations for guidance for training service providers to help them comply with these recommendations.

A report on the workshop, including the revised Rules of Participation, is available on Zenodo⁸.

EOSC-HUB week, online. May 2020

The EOSC-hub week 2020, an online event organised from 18 to 20 May and attended by over 500 people, brought together key players in the development of the EOSC.⁹ The first day of the event was the "EOSC consultation day" and covered the latest developments of the data science cloud. One of the sessions was devoted to the EOSC PID policy¹⁰ and implementation, formulated by the EOSC FAIR and EOSC Architecture Working Group and invited experts. Partners of FREYA were involved in the formulation of this PID policy. During the session, the current draft version of the PID policy was presented and discussed. The PID policy covers issues such as requirements for PID services and how they will support a functioning environment of FAIR research in the EOSC. The PID Forum is explicitly mentioned as a platform to provide feedback on the PID policy.

The second and third days of the EOSC-hub week consisted of 18 break-out sessions on a wide range of topics. For FREYA sessions on the EOSC services and the marketplace as well as onboarding processes for

⁶ <https://zenodo.org/record/3751555#.X19ALmf7TOQ>

⁷ <https://www.project-freya.eu/en/blogs/blogs/15th-rda-plenary-not-down-under-for-three-days-but-up-online-for-three-weeks>

⁸ <https://doi.org/10.5281/zenodo.3894370>

⁹ <https://www.eosc-hub.eu/events/eosc-hub-week-2020-goes-virtual>

¹⁰ <https://doi.org/10.5281/zenodo.3574202>

services developed in sister projects, like the PID Services Registry we developed in FREYA were particularly relevant.

The closing plenary session contained presentations on how EOSC services can in practice support researchers in their work on protecting ecosystems and structural biology. PIDs were mentioned as a key feature of FAIR data in both the break-out sessions and the plenaries.

Also the poster and demo session of the EOSC-hub week illustrated the relevance of persistent identifiers for the research data cloud.

Two of the 24 posters submitted to the EOSC-hub week had PIDs as their core topic. The poster “Compact Identifiers in the cloud”, submitted by FREYA partner EMBL-EBI, elaborates on “compact identifiers” (a combination of a unique prefix and a local accession number) to identify, cite, and annotate Data Objects.¹¹ Next, the FREYA poster “PIDforum.org - a global discussion platform about PIDs” introduced the PID Forum and its possibilities to the EOSC-Hub community as a community space to discuss, exchange, and engage about PID-related matters.¹² One of the demos of the EOSC-hub week covered the FREYA PID Graph. In a highly engaging four minute presentation the background and function of the PID Graph was demonstrated.¹³ The PID Graph is a graph formed by scholarly resources (such as publications, datasets and researchers) described by persistent identifiers and the connections between them.

Virtual meeting on EOSC Persistent Identifier Policy second draft, online. June 2020

The second version of the [PID Policy](#)¹⁴ has been published by representatives of the EOSC FAIR Working Group and EOSC Architecture Working group. It has been open for comments since 10 May 2020, and on 10 June 2020, the Executive Board WG hosted an online workshop¹⁵ on this document. Rachael Kotarski (BL, FREYA and PID expert in the EOSC FAIR Working Group) was among the organizers of the workshop and contributed to represent the FREYA project.

FREYA and EOSC: Persistent Identifiers in Research Disciplines Workshop, online. August 2020

FREYA organised a workshop, held on 5 August 2020, whose purpose was to bring together a number of current EOSC-related projects that are devoted to connecting their own research communities to the EOSC. The high impact FAIRsFAIR project, which is not discipline-specific but focuses on practical solutions for the use of FAIR data principles, also joined the workshop. The aim was to take stock of the uses, opportunities and challenges of PIDs across a range of research disciplines and to raise questions such as: what is there in common, where are the differences, what are the opportunities? The outcomes of the workshop have been summarized in a report published on Zenodo¹⁶, and will also be integrated into a forthcoming public FREYA deliverable D4.5 “Integration of the PID Graph with the EOSC”.

The participating projects were:

- DARE (www.project-dare.eu)
- ELIXIR (www.elixir-europe.eu)
- SSHOC (www.sshopencloud.eu)
- FAIRsFAIR (www.fairsfair.eu)
- DISSCO (www.dissco.eu)
- ENVRI-FAIR (<https://envri.eu/home-envri-fair/>)
- ESCAPE (www.projectescape.eu)

¹¹ <https://zenodo.org/record/3876249#.X0UOwRP7TOQ>

¹² <https://zenodo.org/record/3801816>

¹³ <https://zenodo.org/record/3817564>

¹⁴ <https://zenodo.org/record/3780423>

¹⁵ <https://www.eoscsecretariat.eu/events/virtual-meeting-eosc-pid-policy-draft-v2>

¹⁶ Report on the FREYA and EOSC workshop: <https://doi.org/10.5281/zenodo.4242881>

2.4 Other events

PIDapalooza 2020, Portugal. January 2020

This year, the fourth edition of PIDapalooza, the open festival of Persistent Identifiers, was held in Lisbon. FREYA was present and involved in several sessions. FREYA for instance hosted a session on the PID Forum to gather feedback from the community on how to continue with the Forum to help it grow further. Similar to last year, FREYA also organized a session in which our ambassador competition winner, Melroy Almeida showcased his PID Graph work. He talked about building ORCID collaboration networks and establishing connections between different identifiers. The EOSC PID policy also had a place in the PIDapalooza programme and several FREYA partners presented their work on new PID types and PID Graph systems. We published a blog post on PIDapalooza¹⁷ and all presentations are available on Zenodo.¹⁸

PID Federation meeting - at PIDapalooza 2020, Portugal. January 2020

As a side event to PIDapalooza 2020, a group of 30 representatives from persistent identifier service providers, funders, policy makers, publishers, libraries, repositories, and FREYA partners gathered to discuss the idea of creating a new organisation or community initiative, as yet unnamed, but with the working title of 'Intergalactic Federation of PID Service Providers'.

Following on from discussions within FREYA, the aim of the meeting was to assess whether such a community initiative was welcome and if now was the right time to explore this further. The potential tasks such an entity could focus on were:

- A forum for coordination across providers/communities
- Represent community interests to funders and policymakers
- Create consensus on and share best practice
- Develop and certify a seal of best practice/certification for providers
- Support emerging PID initiatives and advise on best practice
- Consider gaps in the PID landscape and find resource to close them
- Host sustainability and exit plans for PID providers
- Long-term preservation of PID metadata

A lively discussion ensued with contributions from across the room. At the end of the meeting, it was agreed that the FREYA project would undertake a landscaping and consultation exercise, to survey the current situation on the coverage of different existing organisations and consult widely with stakeholders to develop options for a potential PID Federation.

15th International Digital Curation Conference, Ireland. February 2020

'Collective Curation: the many hands that make data work' was the theme of the 15th International Digital Curation Conference held in Dublin in February 2020.

Throughout the two-day event, FREYA was well represented with a demonstrator of the PID Graph and a paper from the British Library on extending the PID Graph in their datasets collection.

Robin Dasler (DataCite) demonstrated the PID Graph and how it can illustrate relationships in the research process (with the support of the DataCite GraphQL API).

¹⁷ <https://www.project-freya.eu/en/blogs/blogs/pidapalooza-2020-in-lisbon>

¹⁸ <https://zenodo.org/communities/pidapalooza20/?page=1&size=20>

Jez Cope and Frances Madden from the British Library presented a paper looking at work done to improve the provenance information in British Library datasets by augmenting them with identifiers on the shared research repository. Both presentations are available on Zenodo¹⁹.

CW20 - Mini-workshops and demo sessions, online. April 2020

In the context of the Collaborations Workshop (CW20), and in collaboration with the Software Sustainability Institute, FREYA organized a demo session to introduce the GraphQL query language and to demonstrate how it can be used for exploring connections between scholarly resources, including software. The recording of the demo session is available online²⁰.

1st Workshop on Scientific Knowledge Graphs, online. August 2020

Martin Fenner from FREYA partner DataCite contributed to the paper *Open Science Graphs Must Interoperate!* that was presented at the Scientific Knowledge Graph (SKG) workshop in August. The authors include the co-chairs of the RDA Open Science Graphs for FAIR Data IG Amir Aryani, Paolo Manghi and Martin Fenner, and the presentation focussed on the need of the various open science graph initiatives to cooperate and interoperate.

FREYA final event: Realising the European Open Science Cloud: Towards a FAIR research data landscape for the social sciences, humanities and beyond, online. November 2020

To showcase the results of the FREYA project and to place our work into the context of the EOSC and our common efforts of building and extending the European infrastructure for FAIR data, we are organizing a four day conference together with EOSC-Hub and the SSHOC EOSC Cluster Project. This conference will take place online and consist of interactive sessions, expert panels, live demonstrations, and discussions around four topics: Data policy and governance, Technology and infrastructure, Training and community building, and Sustainability management.

FREYA is well represented at this event, showcasing the work we have done in the project in seven different sessions. We have common sessions with the other projects to discuss the role of PIDs in the EOSC and to reflect on our training and community building activities. We will have dedicated sessions to share our insights on developing the PID Graph, as well as the PID Commons and sustainability. FREYA will also demonstrate the PID Graph services, the PID Forum, and the Knowledge Hub in the “Marketplace of tools” sessions at this event. More information is available on the FREYA website²¹

2.5 FREYA webinars

In FREYA’s third year, FREYA increased the number of webinars that we organized to communicate our project results, as well as to gather feedback from the community on service prototypes. Organizing webinars allowed us to engage with the PID community despite being unable to physically visit events during the COVID-19 pandemic. An overview of all webinars held in the third year of FREYA is given in Table 2 below.

Several of our webinars were dedicated to discussing our PID services. We organized a webinar on the GraphQL and Common DOI search, collecting feedback for the final release of the latter service. In another webinar, we demonstrated the set of computational notebooks²² that were developed by FREYA to query

¹⁹Harnessing the Power of the PID Graph: <https://doi.org/10.5281/zenodo.3875046> ; Building the Picture behind a Dataset: <https://doi.org/10.5281/zenodo.3674733>

²⁰ Link to the recording: <https://www.youtube.com/watch?v=DKWH0hEKiXY&feature>

²¹ <https://www.project-freya.eu/en/events/joint-eosc-hub-freya-sshoc-event>

²² The computational notebooks are available on: <https://pidnotebooks.org/>

the PID Graph. Following the tradition of the previous years, several webinars were organized specifically for our ambassadors (see also section 4.4).

Name of the webinar	Description
DataCite Winter Webinar (23-01-2020)	FREYA participated in a DataCite Winter webinar for the UK consortium, giving a brief overview of the FREYA project with a particular focus on the PID Graph.
Invited webinar from RDC on the potential of the PID Graph (27/02/2020)	This webinar was held on invitation of RDC (Research Data Canada) and introduced the PID Graph and its potential to connect and understand the relationship between different entities involved in the research process.
FREYA Ambassador webinar on PIDs for facilities (25-03-2020)	This webinar included presentations on the following subjects: Melroy Almeida of the Australian Access Federation and ambassador competition winner presented Building ORCID Collaboration Networks following his presentation at PIDapalooza. Simon Lambert presented on PIDs for facilities and Manuel Bernal Llinares presented on Identifiers.org and JSON-LD metadata.
FREYA webinar on the NARCIS PID Graph (09/04/2020)	This webinar presented one of the applications of the PID Graph on NARCIS, the national Dutch portal with information about Dutch researchers.
FREYA PID services: Graph QL and Common DOI Search (26-05-2020)	This webinar provided an overview of the DataCite GraphQL API and its capabilities and offered attendees the opportunity to feed into the requirement gathering for the Common DOI Search service.
British Library webinar on Project FREYA: How PIDs can connect research together (28-05-2020)	This webinar, organized by the British Library, gives an overview of the FREYA project and about the potential of PIDs.
FREYA webinar on the PID Services Registry (08/07/2020)	This webinar gave an introductory overview to a new FREYA service, the PID Services Registry, developed by DataCite and input into planning for its future as a service. As a result of the

	webinar, a new service was added to the registry.
FREYA webinar on the PID Graph in practice- Jupyter notebook demonstration (27-08-2020)	In this webinar several use cases of the PID graph were presented. Furthermore, Jupyter Notebooks were introduced, with a focus on how they can be used to query the DataCite GraphQL service and gather information through the PID Graph.
FREYA guest webinar on the CoronaWhy Knowledge Graph (01-09-2020)	In this webinar, FREYA invited the CoronaWhy initiative to talk about their community, and how collaborative intelligence and Linked Data are used to build integration layers between datasets produced by human experts and existing machine learning algorithms.
Webinar: DataCite Commons – Discovering PIDs and the PID Graph (30-09-2020)	This webinar introduced the DataCite Commons service which was launched as a minimum viable product in August 2020. Attendees were given the opportunity to provide feedback on the service, the most valuable characteristics of it, and how useful they found it.
Webinar: A PID Federation – what it could be and what could it do? (14-10-2020)	This webinar investigates the idea of creating an organization to help the PID community sustain itself: the PID Federation idea has been developed by Josh Brown (BL) following interviews, focus groups and surveys with experts in the field.
Final ambassador webinar (05-11-2020)	The last webinar for our ambassadors was used to thank the ambassadors for their contribution to the project, to communicate and respond to the ambassador survey results and to give them the final information on the project.
PIDs for Instrument RDA webinar ²³ (13-11-2020)	Webinar organized by Persistent Identification of Instruments WG in which FREYA partners were involved.

Table 2 Overview of the webinars we have organized or participated in in the third year of the project. Webinars were recorded and are available on the FREYA YouTube channel²⁴

²³ The report was prepared before the link to the webinar recording was available but we aim to make all recordings available on the FREYA YouTube channel.

²⁴ https://www.youtube.com/channel/UCQ5Jp19cvtVLPxUB2WVO5CA?view_as=subscriber

3 PID Forum online

3.1 pidforum.org

In order to facilitate discussions and exchange of the PID community beyond and in-between events, we established an online PID Forum (*pidforum.org*) at the beginning of 2019 (Figure 1 shows a screenshot of the front page). This ensures an ongoing exchange with the community, allowing the project to showcase results and services and ask for community feedback. During the third year of the project, we continued to use *pidforum.org* to interact with the community. The team of moderators from different FREYA partners and PID providers helped to moderate the categories and create content that was shared with the community. *Pidforum.org* was for instance used to showcase the different PID Graph use cases for which FREYA developed Jupyter notebook examples.²⁵ We also used *pidforum.org* to gather feedback on our services. Surveys that we conducted, for instance on the Common DOI search, were promoted through the forum, giving us the possibility to reach a wider audience to collect feedback and ideas.²⁶ Based on feedback we gathered during PIDapalooza and other events, we started creating content for the forum in different languages. With the help of our ambassadors, key items of the Knowledge Hub were translated and separate channels for German and Spanish speakers were established. “The Knowledge Hub”, where our training materials are collected, is a central part of the PID Forum and allows us to make our PID training materials (described in Deliverable D5.6) available to a wider audience.

The number of registered users has continued to steadily grow since *pidforum.org* was launched and has now passed 500 (Figure 2). Figure 2 shows the development of the number of users and the number of pageviews per month in the third year of FREYA.

The future of *pidforum.org*

Pidforum.org has been growing steadily since its launch and has proven to be a valuable platform for online exchange with the wider community. FREYA was able to gather feedback on PID services we developed and the forum was also used as a place to collect reactions on the EOSC PID policy drafts. Other PID enthusiasts have also started using the forum to promote events and share ideas or ask for help with specific questions. Moreover, the forum has been used by the organizers of PIDapalooza and by DataCite for communicating in private channels. In the last year of the project, FREYA has advocated for sustaining *pidforum.org* beyond the project’s lifetime and we launched a survey to assess the community’s willingness to contribute to hosting the forum after the FREYA project ends.²⁷ Six organisations expressed their interest in taking on the financial and managerial efforts needed to sustain the PID Forum. Most of the organisations expressed their desire for the forum to remain an active platform and stressed the value of the forum for the wider community. The moderators (excluding moderators of organizations who applied to take over the Forum) evaluated the different proposals and together decided that NISO (US National Information Standards Organization)²⁸ was the best candidate organisation to take over *pidforum.org* after the end of FREYA. NISO has agreed to take on this role thereby sustaining *pidforum.org* as a place for exchange and discussion beyond the lifetime of FREYA.

²⁵ Use case example posted on the PID Forum: <https://www.pidforum.org/t/pid-graph-graphql-example-research-organization/929>

²⁶ The survey on the Common DOI search was posted on the PID Forum: <https://www.pidforum.org/t/common-doi-search-let-us-know-what-you-think/988>

²⁷ Post requesting organisations to express interest in hosting the PID Forum: <https://www.pidforum.org/t/are-you-interested-in-hosting-the-pid-forum/1066>

²⁸ <https://www.niso.org/>

all categories ▾ **Categories** Latest Top + New Topic







Category	Topics	Latest
General Topics that don't need a category, or don't fit into any other existing category.	17	 We would love your feedback on the FREYA notebooks! ■ PID Graph
PID Best Practices A category to bring together information (papers, guidelines etc) and ideas on PID best practices for different communities and disciplines.	13	 Jupyter Notebooks from NLS ■ FREYA general
PID News & Blogs Share interesting PID news & blogs here	30	 Webinar: Celebrate Peer Review Week with ORCID ■ PID-related events ■ orcid
PID Graph Persistent identifiers and associated metadata describe resources such as datasets, software, publications, people, research organizations, funders, and grants. An important part of this metadata is the description of connections between these resources. Together these resources and their connection...	29	 Realising the European Open Science Cloud: Towards a FAIR research data landscape for the social sciences, humanities and beyond ■ PID-related events
PID Services Post anything related to PID Services here.	4	 Interconectando datos con la API de ORCID ■ PIDs canal en español ■ orcid
PID-related events Category to share any PID-related events that might be of interest to the community e.g. conferences, webinars, workshops and more!	35	 2. Online-Seminar: ORCID an der eigenen Einrichtung implementieren am 07. Oktober 2020 ■ PIDs-Kanal auf Deutsch ■ pid-basics, datacite, orcid

Figure 1 Front page of pidforum.org

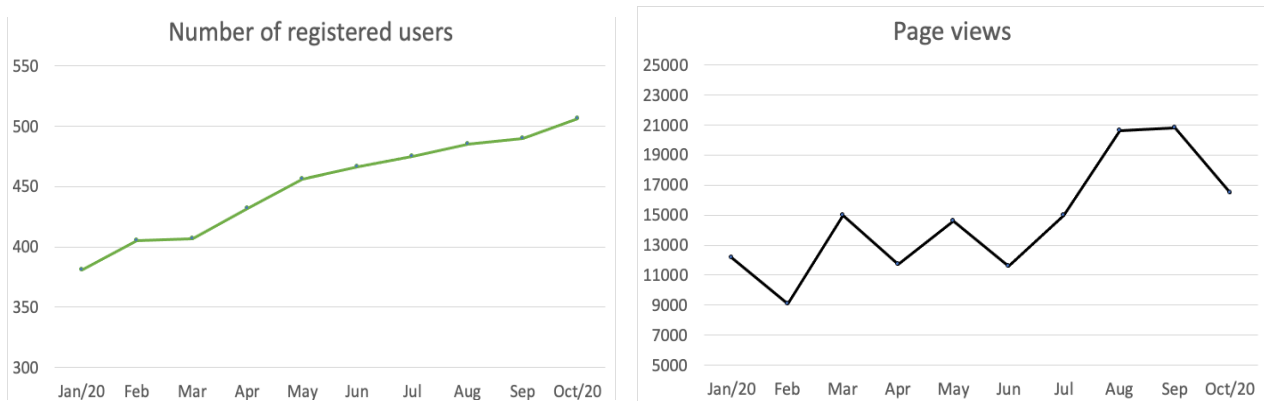


Figure 2 Number of registered users of the PID Forum (left) and number of page views of pidforum.org (right), both per month in 2020

3.2 Website and social media

Next to *pidforum.org*, FREYA has used several virtual channels to reach our different stakeholders, including the project website, twitter and YouTube. An overview of our social media achievements is shown in Table 3.

Activity	Target FREYA	FREYA Year 1 (Dec 2017 - Oct 2018)	FREYA Year 2 (Nov 2018 - Oct 2019)	FREYA Year 3 (Nov 2019 - Oct 2020)	Total
Blog Posts	70 [23 per year]	13	32	27	72
Twitter Followers	1000 [in total]	944	1322	1586	1586
Tweets	500 [167 per year]	110	328	232	670
YouTube videos	10 [3-4 per year]	3	4	10	17

Table 3 Overview of planned social media communication activities and achievements

Website

The FREYA Website²⁹ is the main window to showcase what the project is developing and offers to the PID community and beyond. It provides information on the project and its partners, upcoming and past events, the Ambassador Programme, the project's results and outputs, and includes a news and blog section.

During the third year of the project, the website has been both enriched with regular updates and adapted to accommodate newly released outputs from the FREYA project.

- The tab “Resources” has been reconceptualized and now has three main sub-headings: Knowledge Hub, Project Outputs and Key Events. While the first subheading (Knowledge Hub³⁰) remained unchanged, the second (Outputs³¹) has been updated with new webinars, publications and public deliverables. In addition, this section has been enriched with the ten Jupyter Notebooks that can be re-used as examples to query the PID Graph. The third section (Key events³²) summarizes all the live and online events organized by the FREYA project and categorizes them according to their main stakeholders: PID community (in general), the RDA community or the EOSC community, similar to the sections described in this report.
- The “PID services” tab has also been updated to reflect the recent developments related to the PID graph and PID services, including information about the launched *PID Services Registry*, the

²⁹ <https://www.project-freya.eu/en>

³⁰ Knowledge Hub: <https://www.project-freya.eu/en/resources/knowledge-hub>

³¹ Outputs: <https://www.project-freya.eu/en/resources/project-output>

³² Key events: <https://www.project-freya.eu/en/resources/key-events>

DataCite Commons, Provenance services, Research Organization services and the Prototypes of new PIDs services.

- In the last year of the project, 27 blog posts have been published, reaching the target of 70 blog posts for the project. These include blogs in the “Meet the FREYA ambassadors” series, blogs on developments around the PID Graph and other FREYA results, reposts from partner blogs, and guest blogs, e.g. from our ambassadors.
- On average, the FREYA website attracted more than 650 unique visitors a month in its third year and, compared to the second year of the project, the number of visitors has been increasing (see Figure 3).



Figure 3 Number of unique visitors of the FREYA website per month

Twitter

Twitter is an important communication channel that the FREYA project uses to interact with the broad research community and disseminate the project’s results. The FREYA Twitter³³ account has more than 1550 followers (see Figure 4 below), ranging from individual researchers and scholars interested in Open Science, to research infrastructures - such as CESSDA, DARIAH or ELIXIR - as well as other (European) projects - including FAIRsFAIR, EOSC-Hub and OpenAIRE-Advance.

Tweets mainly disseminate news and information about the project, announce events and request feedback on the project’s results. Twitter has been crucial in the dissemination of online events during the Covid-19 pandemic in 2020. Moreover, Twitter is also used to stay updated about the developments in other projects and initiatives related to PIDs and the European and global research infrastructure. We also actively retweet relevant posts from our project partners and sister projects, EOSC-Hub, OpenAIRE-Advance, FAIRsFAIR and RDA Europe, to promote their work within the broader PID community.

The impact of our tweets varies (see Figure 5 for two example tweets), but the amount of followers has been increasing steadily and in October 2020 FREYA counts more than 1500 followers. To further estimate

³³ FREYA twitter: https://twitter.com/freya_eu

the impact of our Twitter communications, we collect information about the number of followers, profile visits, retweets and likes each month (see Table 4).

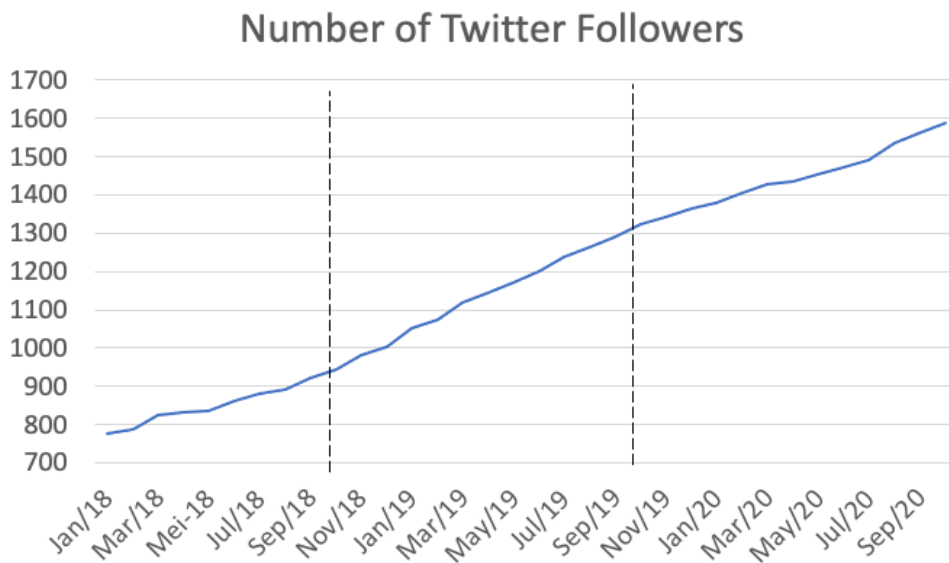


Figure 4 Number of Twitter followers throughout the FREYA project

Top Tweet earned 3,168 impressions

It's official! dates are fixed for the joint [@freya_eu](#) [#SSHOC](#) [@EOSC_eu](#) event from the 16 to 19 November! More info available here: bit.ly/2ZYgSx2
[#OpenScience](#) [#researchdata](#)
[#datamanagement](#)
pic.twitter.com/hrdrwD1yjC



13 11

Top Tweet earned 4,675 impressions

We are preparing for the next [@freya_eu](#) webinar on 27th August dedicated to the [#PID](#) [#graph](#), included a demonstration with [#Jupyter](#) [#notebooks](#) on how to gather information. We can't wait!
[@datacite](#) [@freya_eu](#) Registration is now open: bit.ly/3fHNn7v

2 17 23

Figure 5 Selection of two tweets that received many impressions in September and August 2020. "Impressions" indicate the number of times a particular tweet was seen

	Number of new followers	Number of profile visits	Number of retweets	Number of likes
Average	23	145	39	48
Range	6 - 42	63 - 222	12 - 82	23 - 85

Table 4 Overview of the key metrics from the FREYA twitter account measured each month for the third year of the project (November 2019 - October 2020)

YouTube

The main goal of the FREYA YouTube channel³⁴ is to make the recordings of the FREYA webinars available online. These videos have been assigned a DOI and are available on Zenodo.org.³⁵ As of the end of October 2020 our YouTube channel has 78 subscribers.

In addition to the recordings of webinars and other online events organized in the last year, our YouTube channel hosts the introductory video of the FREYA project, entitled "FREYA. The Power of PIDs"³⁶ (see Figure 6 for a screenshot). This video has been created by a creative agency and aims at explaining, to a broad audience, why the use of PIDs is important for Open Science and how FREYA is tackling this objective. As of October 2020, the video received almost 600 views on YouTube.

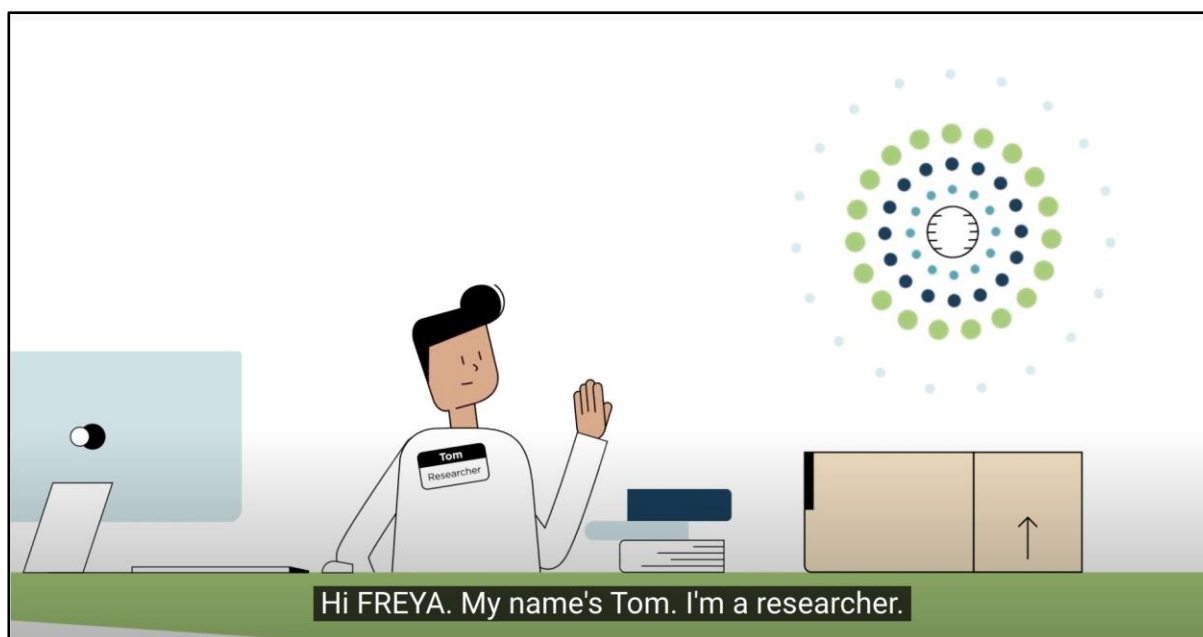


Figure 6 Screenshot of the video "FREYA. The Power of PIDs"

³⁴ <https://www.youtube.com/channel/UCQ5Jp19cvtVLPxUB2WVO5CA>

³⁵ <https://zenodo.org/search?page=1&size=20&q=freya>

³⁶ <https://www.youtube.com/watch?v=9G4EMJCwCw4>

4 Stakeholder engagement and outreach

FREYA had initially determined its key stakeholders in the Communication and Stakeholder Plan (D5.2, internal document) and refined them throughout the project. We have specified the following five stakeholder groups: service providers, research stakeholders, users, structural stakeholders, and commercial stakeholders. For our engagement activities, service providers and research stakeholders are particularly relevant, as we wanted to involve them in the co-creation of our services and project outputs. Within these two stakeholder groups, the EOSC-related projects and Working Groups, as well as the RDA, play a central role and have been a large focus of our activities. The EOSC governance and executive board are also important (structural) stakeholders that FREYA has increasingly engaged with in the last year of the project. In our last year of activities, a larger role was given towards assessing how FREYA results can be sustained and exploited after the end of the project (which is outlined in more detail in Deliverable 5.10). This was addressed with several stakeholders, including PID service providers, who were involved in discussion around the PID Commons and the assessment of possibilities for establishing a PID federation.

Below, we outline our engagement activities of the third year with the EOSC, the RDA, and other stakeholders. A more elaborate evaluation of our stakeholders and our engagement and outreach activities for each of the defined stakeholder groups across the entire lifespan of the project is described in D5.9, our final outreach and engagement report.

4.1 EOSC

The FREYA project is built on the recognition that persistent identifiers must form a core component of European and global research e-infrastructures and provide an essential building block of the European Open Science Cloud (EOSC). EOSC is not a centralized entity with which one can engage directly, as with, for example, projects, institutes or corporations. Rather, the EOSC is an interlocking complex of initiatives and activities of different kinds, motivated by a common goal of attaining the vision of the EOSC.

In the final year of FREYA, the EOSC has been in a period of active transition. Although the EOSC was formally launched in November 2018 at an event in Vienna, its transition from the initial vision, to a fully functional and accessible infrastructure network, has recently gained more momentum. As a major step in this process, the EOSC Association was established in July 2020 as a private law body with a public service mission under Belgian law. A co-programmed partnership between this association and the European Commission will develop the next implementation steps of EOSC

The EOSC Portal and Marketplace are now fully functioning, but the first round of EOSC-building projects (including FREYA itself) are nearing their end, and new projects will soon be taking their place to expand the offering and consolidate and scale up access. Concerning the sustainability of EOSC, intensive effort has been made by the EOSC Sustainability Working Group, leading to a succession of reports for wider consultation, labelled “strawman”, “tinman” and the final “iron lady”, soon to be published. It is clear that these and other crucial issues for EOSC are driving substantial progress that will continue to further shape the EOSC beyond the end of the FREYA project.

FREYA’s final year of engagement with EOSC was focused on positioning FREYA’s legacy within this dynamic landscape, to ensure a sustained benefit of FREYA services and outputs to the EOSC beyond the project’s lifetime. To this end, the exploitation of FREYA results is fully explored in D5.10 which will be submitted to the EC at the same time as this deliverable. FREYA also focused its engagement with EOSC on making the project results known, reinforcing the vision, and ensuring that connections are in place to take the FREYA contributions forward. It needs to be acknowledged that the COVID-19 pandemic decimated our efforts to organize and attend face-to-face meetings, workshops and conferences, which impacted our engagement and opportunities for frequent contact and fruitful informal discussions.

EOSC-hub

EOSC-hub is a large project bringing together major European research e-infrastructures (including the EGI Federation, EUDAT CDI and INDIGO-DataCloud) to deliver a common catalogue of research data, services, and software and make it available through the EOSC Portal. EOSC-hub is now entering its last phase and has produced nine Key Exploitable Results including the Portal and Marketplace, Rules of Participation, training materials and many others, highlighted on the project's web pages³⁷.

In the third year of FREYA, FREYA and EOSC-hub have signed a Memorandum of Understanding (MoU) to promote their respective objectives by providing for appropriate collaborations and interconnections among their members. While we were already cooperating closely with EOSC-Hub, it was nevertheless considered appropriate to formalise a MoU in regards to several areas that had emerged during the course of the work. Specifically, four areas of cooperation are identified in the MoU:

1. Develop a joint position on the place of PIDs in the EOSC Federating Core (and EOSC services more generally), based on the emerging EOSC Architecture WG proposal.
2. Collaboratively work on integration of the PID Services Registry with the EOSC Portal.
3. EOSC-hub will advertise training events organised by FREYA on PIDs and will store FREYA training material from the knowledge hub in its training registry.
4. Organise a joint FREYA/EOSC-hub event in November 2020 to advertise the results of the joint activities and the achievements of both projects.

In the frame of the MoU, there has been continued work on the place of FREYA outputs and services in EOSC, with a discussion held in Budapest at the EOSC symposium and project coordination workshop the end of 2019 (see also section 2.3) and a final push to reach an agreed position on the place of PIDs in the EOSC Federating Core. In addition, FREYA and EOSC-HUB are collaborating in the organisation of a joint final event in November 2020 (see also section 2.4).

OpenAIRE

OpenAIRE is concerned with pushing towards openness in scholarly communication. It has evolved through a long-running series of projects funded by the European Commission and is now a highly developed infrastructure offering a wide range of services, including interlinking of research outcomes. Aligning and interfacing the OpenAIRE graph and the FREYA PID Graph is key to an EOSC integration of services, and has therefore been the focus of engagement with OpenAIRE in the framework of the RDA Interest Group Open Science Graphs for FAIR Data. This RDA Interest Group (see also section 4.2) is led by co-chairs Martin Fenner (DataCite and FREYA) and Paolo Manghi (Technical Director of OpenAIRE). Furthermore, FREYA and OpenAIRE have together been involved in the publication of a paper entitled 'Open Science Graphs Must Interoperate!' that was published in the Proceedings of the Scientific Knowledge Graphs Workshop which was co-located with TPD 2020³⁸.

EOSC Working Groups

As noted earlier in this report and described in more detail in the second annual report on the PID Forum³⁹, representatives from the EOSC FAIR and EOSC Architecture Working Groups have been collaborating to produce a document outlining a PID policy for EOSC. Members of the FREYA team from STFC and the British Library chaired the groups, which launched the initial Persistent Identifier Policy for the EOSC in December 2019⁴⁰. A second version of the policy is now available⁴¹ and is presented at the FREYA final event in

³⁷ EOSC-Hub Key exploitable results: <https://www.eosc-hub.eu/eosc-hub-key-exploitable-results>

³⁸ Paper Open Science Graphs must Interoperate: https://skg.kmi.open.ac.uk/SKG2020/papers/ARYANI_et_al_SKG_2020.pdf

³⁹ Deliverable 5.5 <https://doi.org/10.5281/zenodo.3832069>

⁴⁰ Launch of the EOSC PID policy: <https://www.eoscsecretariat.eu/news-opinion/launch-persistent-identifier-policy-eosc>

⁴¹ PID policy second version: <https://doi.org/10.5281/zenodo.3574202>

November 2020. It is worth noting that the EOSC Strategic Research and Innovation Agenda⁴², which was the subject of an open consultation in mid-2020, includes a section on PIDs. The SRIA defines three main Strategic Objectives and fourteen Action Areas and persistent identifiers are singled out as a priority in Action Area 1 “P1: Implement the EOSC Persistent Identifier (PID) Policy and develop additional infrastructure required to support the publication, curation and tracking of research outputs.” Within this, the PID Graph is specifically mentioned.

Other EOSC projects

FREYA partners developing PID Graph pilot applications (STFC, BL, CERN, EMBL, UniHB/PANGAEA, KNAW-DANS) operate in particular domains of research and have close relationships with the ESFRI/EOSC cluster projects in those domains. The cluster projects aim to act as bridges between established research communities and their infrastructures and EOSC. FREYA organised a workshop for EOSC cluster projects in August 2020 (see section 2.3), which is reported in and provides input to the deliverable D4.5 “Integration of the PID Graph with the EOSC”. The aim of the workshop was to take stock of the uses, opportunities and challenges of PIDs across a range of research disciplines and to raise questions such as: what is there in common, where are the differences, what are the opportunities? The engagement with these projects permitted a broad view of the opportunities and future prospects for the PID Graph vision, building on FREYA’s own achievements.

4.2 RDA

The Research Data Alliance (RDA) community is also a key stakeholder group for FREYA, as many professionals working with PIDs from various disciplines from around the globe come together in RDA Working (WGs) and Interest Groups (IGs), and during the biannual RDA plenaries. FREYA interacts with the RDA in multiple ways to ensure exchange and uptake of the project’s work with ongoing RDA initiatives. Table 5 provides an overview of RDA WGs and RDA IGs for which PIDs are relevant. The table also contains the names of FREYA partners that are active in the groups. Some of the most relevant WGs and IGs are described below.

RDA Groups	FREYA representation
Data Discovery Paradigms IG	BL, CERN, DANS, DataCite, PANGAEA
Data Fabric IG	DANS
Metadata IG	ARDC, BL, CERN, STFC
Open Science Graphs for FAIR Data IG	ARDC, DataCite, PANGAEA

⁴² News item on the EOSC Strategic Research and Innovation Agenda: <https://www.eoscsecretariat.eu/news-opinion/eosc-strategic-research-and-innovation-agenda-version-08>

PID IG	ARDC, BL, CERN, DANS, DataCite, EBI-EMBL, ORCID, PANGAEA, STFC
Research data needs of the Photon/Neutron Science IG	STFC
Research Data Provenance IG	[no FREYA representative]
Software Source Code IG	BL, ORCID
Vocabulary Services IG	ARDC
Data Description Registry Interoperability (DDRI) WG	DataCite, CERN, DANS
Data Usage Metrics WG	BL, CERN, DANS, DataCite, Hindawi
Data Versioning WG	[no FREYA representative]
Metadata Standards Catalogue WG	BL, DataCite
Persistent Identification of Instruments WG	DataCite, ORCID, PANGAEA, STFC
PID Kernel Information WG	DANS
RDA/FORCE11 Software Source Code Identification WG	DataCite, STFC
RDA/WDS Scholarly Link Exchange WG	ARDC, Crossref, DataCite, EMBL-EBI, PANGAEA
Research Data Repository Interoperability WG	CERN, DANS
Physical Samples and Collections in the Research Data Ecosystem IG	PANGAEA

Table 5 Overview of the PID relevant RDA Groups and FREYA representatives

Persistent Identifier Interest Group

FREYA is well-represented in the Persistent Identifier Interest Group⁴³ (PID IG), with co-chairs from ORCID and ARDC, and member representation by multiple other FREYA partners. The purpose of the PID IG, which has 181 members as of November 2020, is to synchronise identifier-related efforts, address important and emerging PID-related topics, and coordinate activities, including appropriate RDA Working Groups, to practically solve PID-related issues from the engaged communities. FREYA contributed to the PID IG meetings during the RDA plenaries and uses the PID IG online discussion list for engagement with group members.

Persistent Identification for Instruments WG

The Persistent Identification for Instruments WG⁴⁴ (PIDINST) has been relevant for the work in FREYA WP3 and contributions to WP4. This WG explored a community-driven global solution for the unique identification of measuring instruments used in the sciences. The WG collected use cases for persistent identification of instruments (see Figure 7), aligned the collected metadata, and developed a metadata schema to register DOIs for instruments. The schema is available on GitHub⁴⁵ and its maturation was supported, among others, by FREYA partners STFC and PANGAEA. The working group built its work on use cases provided by both its members and external contributors, to ensure that the devised schema could solve as many of these use cases as possible and benefit the diverse community of instrument users. The working group recently published a research paper on persistent identification of instruments⁴⁶, which is a formally endorsed RDA output and has further produced a white paper, soon to be published. The working group has attracted international interest and participation, actively pursuing implementation of its output in Europe and abroad.

Use Case Distribution

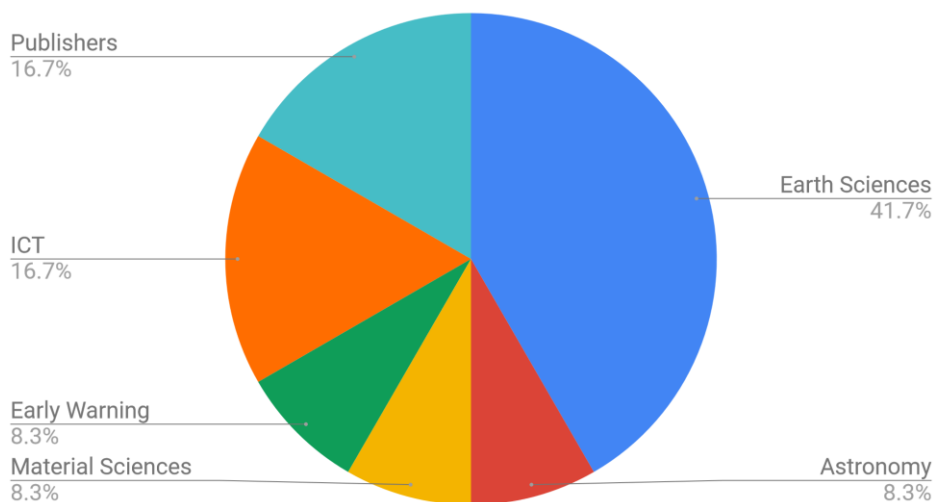


Figure 7 Percentile contribution of use cases to the RDA PIDINST working group by research community or infrastructure focus

⁴³ www.rd-alliance.org/groups/pid-interest-group.html

⁴⁴ www.rd-alliance.org/groups/persistent-identification-instruments-wg

⁴⁵ <https://github.com/rdawg-pidinst/schema>

⁴⁶ Stocker, M., Darroch, L., Krahl, R., Habermann, T., Devaraju, A., Schwarzmann, U., D'Onofrio, C. and Haggström, I., 2020. Persistent Identification of Instruments. *Data Science Journal*, 19(1), p.18. DOI: <http://doi.org/10.5334/dsj-2020-018>

Open Science Graphs for FAIR data IG

FREYA played a key role in the establishment of the Open Science Graphs for FAIR data interest group. After a birds of feather session at the 13th RDA at the beginning of 2019, this group was established to bring together RDA members with an interest in PID and knowledge graphs. This IG is led by co-chairs Martin Fenner (DataCite and FREYA) and Paolo Manghi (Technical Director of OpenAIRE). Due to the COVID-19 pandemic, group activities were forced to continue remotely as the RDA plenaries had to move online.

RDA national nodes: Netherlands and United Kingdom

RDA Europe, the European plug-in to RDA, is mandated to ensure that European political, research, industrial, and digital infrastructure stakeholders are aware of, engaged with, and actively involved in the global RDA activities. One of the objectives of the RDA Europe 4.0 project is to consolidate a European network of National Nodes, in order to foster adoption of RDA outputs at a regional level. There are currently national RDA nodes for 23 European countries.⁴⁷ FREYA collaborated with the national nodes of the UK and the Netherlands by co-organising workshops^{48 49} on the use of PIDs in these countries (see appendix 1 for an overview of all FREYA events).

4.3 Other stakeholders

Next to the EOSC-related projects and the RDA, FREYA interacted with other service providers and research, data and infrastructure communities to disseminate results, ask for feedback, and seek interaction. We were active at several (online) events (see Section 2 and Annex 1) in order to reach these communities.

As in previous years, PIDaploozza 2020 formed an important point of contact between FREYA and the global PID community. FREYA used this opportunity to initiate discussions about a global PID federation which was further investigated by an elaborate assessment of the community's needs and ideas. The report summarizing the results is available on Zenodo⁵⁰ and was discussed with the community in a dedicated webinar⁵¹. The assessment of the possibilities for establishing a PID federation is described in more detail in Deliverable D6.5.

As with the RDA and EOSC, interaction with our other stakeholders happened primarily online. We used PIDForum.org to ask for feedback and communicate our services and project outcomes. As mentioned above, we also held dedicated webinars for the broader community about our services, including a webinar on the GraphQL API⁵², our Jupyter notebooks examples to query the PID Graph⁵³, as well as giving demos on the PID Graph⁵⁴ as an introduction to new audiences.

FREYA continued to engage with disciplinary stakeholders via online events like the FREYA and EOSC workshop, which was held with the cluster projects representing different disciplines⁵⁵ (see section 2.3.) and through the FREYA final event⁵⁶ (see section 2.4), which is co-organized with the SSHOC project,

⁴⁷ <https://www.rd-alliance.org/groups/rda-europe-national-nodes>

⁴⁸ RDA UK: <https://www.project-freya.eu/en/events/research-data-alliance-rda-uk-and-freya-workshop>

⁴⁹ RDA NL: <https://www.project-freya.eu/en/events/pid-nl-a-workshop-on-the-use-of-persistent-identifiers-in-the-netherlands>

⁵⁰ PID federation report <https://doi.org/10.5281/zenodo.4059557>

⁵¹ Webinar description of the PID federation webinar: <https://www.project-freya.eu/en/events/webinar-a-pid-federation-2013-what-it-could-be-and-what-could-it-do>

⁵² Webinar on GraphQL: <http://doi.org/10.5281/zenodo.3859925>

⁵³ Webinar on the Jupyter notebooks: <https://doi.org/10.5281/zenodo.4004426>

⁵⁴ PID Graph demo: <https://doi.org/10.5281/zenodo.3817564>

⁵⁵ FREYA and EOSC: PIDs in research disciplines workshop: <https://www.project-freya.eu/en/events/freya-and-eosc-persistent-identifiers-in-research-disciplines-workshop>

⁵⁶ FREYA Final event, co-organized with EOSC-Hub and SSHOC: <https://www.project-freya.eu/en/events/joint-eosc-hub-freya-sshoc-event>

focussing on the Social Sciences and Humanities within the EOSC. As before, a close connection to research disciplines was in addition established through our disciplinary partners (e.g. EBI-EMBL for life sciences, CERN for particle physics, British Library for humanities), as well as using the ambassador programme described in the next section.

4.4 FREYA ambassadors

FREYA's Ambassador Programme provides a mechanism to engage with PID enthusiasts from a broad range of subject areas. An extensive report on the Ambassador programme is available in our deliverable D5.8 Report on the Ambassador programme. The Ambassador programme was designed to amplify the project results across disciplines. In the final year of the project we added five new ambassadors, reaching a total of 37 ambassadors and thereby also achieved the KPI described in the project's description of work. We decided to close the call for ambassadors in March 2020 as it was felt any new ambassadors after that point would be unable to contribute effectively to the project.

Following the first two years, we continued our engagement with the ambassadors throughout the year, including holding several webinars dedicated to ambassadors (see Section 2.5). These webinars have been well attended with 10 and 20 ambassadors, who have provided useful feedback.

We use a mailing list specifically for the ambassadors, which has been used for discussions such as input for research proposals in preparation and follow up communication on webinars. The mailing list is used for regular communication between the FREYA project and the ambassadors, with emails being circulated at least monthly if not more frequently. The ambassadors have also provided input for requirements and feedback for new PID services, including DataCite Commons and the PID Services Registry, at webinars and via a survey. We have also asked ambassadors to provide feedback on the Jupyter notebooks developed for FREYA and to evaluate the ambassador programme as a whole. They have also provided translations for pages on the Knowledge Hub and subtitles for the Power of PIDs video.

In 2020, we also launched a "Meet the FREYA Ambassadors" blog series which resulted in several blog posts. While the success of this series was somewhat limited, it gave the ambassadors a relatively easy opportunity to demonstrate their participation in the ambassador programme and outline their experiences with PIDs.

We continued to hold the annual FREYA ambassador competition to fund a place at PIDapalooza in 2020. This time, Melroy Almeida, from the Australian Access Federation, was the winner. He attended the conference and gave a presentation about his work building a tool to visualise and understand ORCID collaboration networks, a useful demonstration of FREYA's PID Graph concept. We have also held a competition for an opportunity to present at the FREYA final event and decided to award a prize to two entrants based on the quality of the submissions received. The winners of that competition were Claudia Alen Amaro of Instruct ERIC and Luc Boruta of Thunken. Claudia will present on the topic of using the PID Graph to track research provenance and Luc will present on the integration of the DataCite GraphQL API into the Cobaltmetrics API.

4.5 Disciplinary and geographical reach

FREYA's work is important for the global scientific community from various scientific backgrounds. We aimed to reach the global community by participating in a variety of national and international (online) events, as well as through our funded and unfunded partners, and via the FREYA ambassador programme. In order to make our work more accessible to the global community, FREYA has recorded its webinars and

made them available through the FREYA Youtube channel⁵⁷ and our Zenodo community page⁵⁸. We engaged with local experts to help us translate key training materials, as well as providing subtitles for our video explaining the power of PIDs⁵⁹

Global PID Community

As in the previous two years of the project, FREYA continues to work in close contact with the RDA, actively participating in different RDA groups and during the online RDA plenaries (see 2.2 and 4.2). Many of our events took place online, allowing a global audience to participate. While time differences might make it difficult for people from other time zones to join particular events, our video recordings allow people from all over the globe to learn about FREYA and PID in general. The ambassador programme has grown further in the last year of the project, reaching 37 ambassadors from 21 different countries midway 2020 (Figure 8).

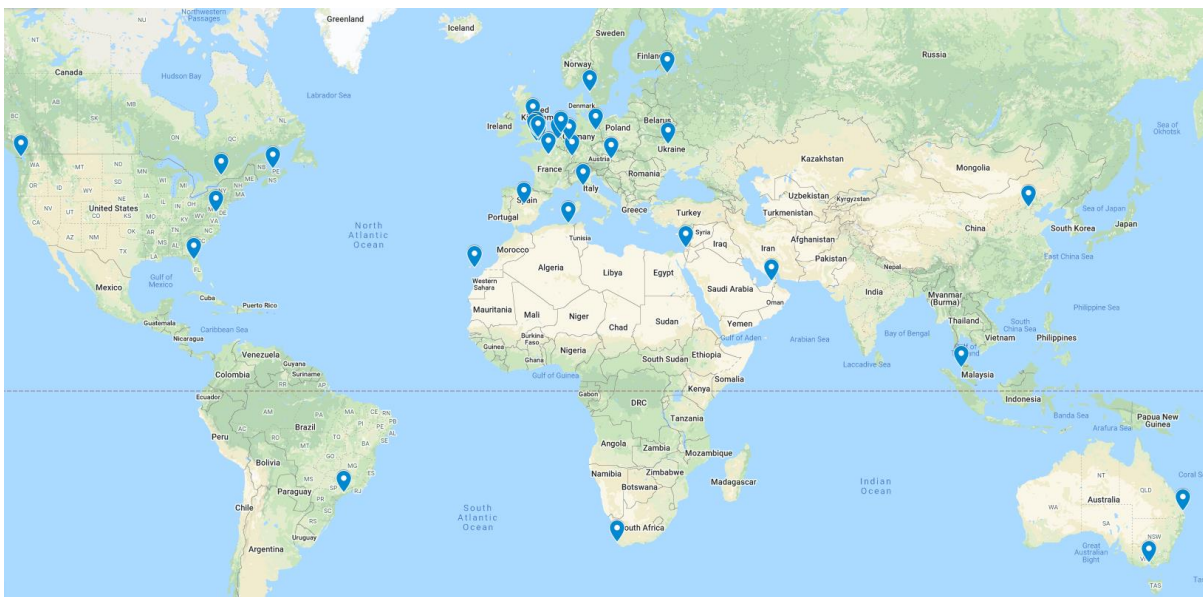


Figure 8 Map displaying the home countries of the 37 FREYA Ambassadors

FREYA also continues to use social media, in particular Twitter and the project website, to reach the global community. The project's twitter account is followed by more than 1,500 people from a range of geographical locations and scientific disciplines. The FREYA website, on average, attracted more than 600 unique visitors from 45 distinct countries each month. Figure 9 below gives an indication of the geographical spread of the FREYA website visitors.

⁵⁷ FREYA YouTube channel: https://www.youtube.com/channel/UCQ5Jp19cvtVLPxUB2WVO5CA?view_as=subscriber

⁵⁸ FREYA Zenodo community: <https://zenodo.org/communities/freyaproject/>

⁵⁹ Power of PIDs video, with subtitles in different languages: <https://www.youtube.com/watch?v=9G4EMJCwCw4&t=13s>

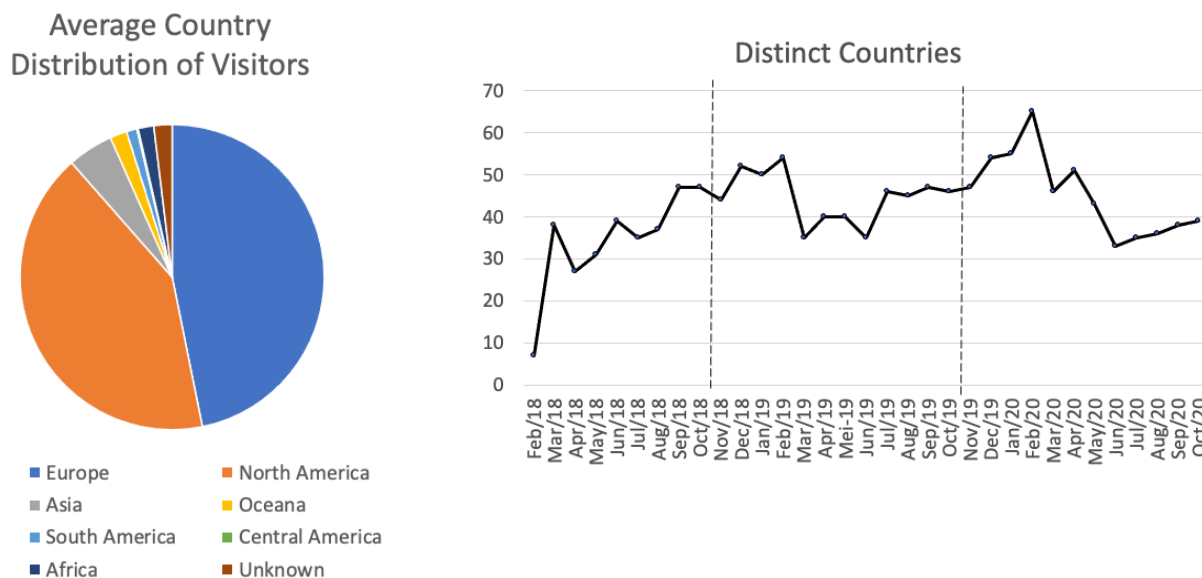


Figure 9 Overview of the monthly-average geographical distribution of FREYA website visitors (left) as well as the number of distinct countries (right) that visited the FREYA website during the project

Cross-Disciplinary PID Community

The FREYA disciplinary partners (i.e., DANS and the British Library for the social sciences and humanities, CERN for high-energy physics, EMBL-EBI for life sciences, PANGAEA for earth and environmental sciences,) continue to provide a direct connection to specific disciplines. As mentioned above, the FREYA ambassadors also play an important role in reaching specific disciplines that may not be represented in the FREYA consortium. We encourage our ambassadors to share their experiences through our webinars⁶⁰ as well as by taking part in our ambassador competition⁶¹. Lastly, PIDforum.org is used to reach a broad audience of scientists and scholars, and PID-related discipline-specific information can be discussed and shared there.

⁶⁰ All ambassador webinars are listed on the FREYA website: <https://www.project-freya.eu/en/resources/project-output>

⁶¹ News item about the ambassador competition winners in 2020: <https://www.project-freya.eu/en/news/newsitems/freya-ambassador-competition-winners>

5 Conclusion

FREYA has utilized the PID Forum, both through events, pidforum.org and social media, to engage with the wider community in the third and final year of the project. This year was marked by the release of several PID services which we developed together with the community engaging through online events, dedicated webinars, as well as through surveys and discussions held on *pidforum.org*. While the COVID-19 crisis did not allow us to present the project's progression and results at physical meetings, we have attended and organized various online events connecting with the RDA, the EOSC, and other stakeholders in multiple ways. We have managed to achieve all key performance indicators related to the PID Forum, attending a variety of national and international events, engaging with different stakeholders and disciplines, as well as building a solid basis of social media followers, FREYA ambassadors and pidforum.org members.

While the FREYA project is ending, our work will live on through the FREYA partners who are sustaining many of the developed services (see also deliverable D5.10 elaborating on FREYA's exploitable results and D6.5 on the sustainability planning). Importantly, the online PID Forum community FREYA has established will continue to exist. NISO, the National Information Standards Organization, has agreed to take over the coordination of *pidforum.org* after the end of the FREYA project. As such, it will remain a global platform bringing together the wider PID community and continuing the work of FREYA, improving the PID infrastructure and promoting the use of PIDs across the scientific landscape. Since its establishment, the PID Forum has played a central role in the engagement and exchange on PID-related matters with the wider community, including EOSC-related developments like the EOSC PID policy. Being sustained after the end of the project, pidforum.org can remain this central online space for PID-related discussions in the EOSC and beyond.

Annex A: Overview of FREYA events in year 3

Overview of all events in which FREYA participated in the third year (November 2019 - November 2020)

Date	Meeting	Location
06-11-2019	ETD2019	Portugal
20-11-2019	Challenges in the Scholarly Publishing Cycle 2019	UK
20-11-2019	FREYA - RDA-NL Workshop	The Netherlands
26-11-2019	EOSC Symposium 2019 and Coordination Day	Hungary
04-12-2019	(Effectively) communicating your research online	UK
04-12-2019	Software Graph Hackathon	UK
11-12-2019	DESIR Winter School - Data and Software Citation	Portugal
28-01-2020	ROR community meeting	Portugal
29-01-2020	PIDapalooza (multiple contributions)	Portugal
06-02-2020	NWO Social Science and Humanities Synergy meeting	The Netherlands
17-02-2020	IDCC	Ireland
26-02-2020	EOSC Training Workshop	Netherlands
18-03-2020	15th RDA Plenary (multiple contributions)	Online
31-03-2020	SSI Collaborations Workshop	Online
27-04-2020	EOSC Validation Workshop	Online
04-05-2020	SwePub user Forum 2020	Online
18-05-2020	EOSC Hub Week (multiple contributions)	Online
10-06-2020	EOSC PID Policy online consultation	Online
25-08-2020	1st Workshop on Scientific Knowledge Graphs -SKG2020	Online
10-09-2020	Reproducibility-Replicability-and-Trust-in-Science-2020	Online

10-09-2020	Dutch National Workshop on research information	Online
23-09-2020	OASPA	Online
06-10-2020	2nd ESFRI RIs-EOSC Workshop - "RIs shaping EOSC"	Online
19-10-2020	EOSC Symposium 2020	Online
22-10-2020	Celebrate Open Access Week with a PIDs Quiz	Online
28-10-2020	Japan Science & Technology (JST) Seminar	Online
09-11-2020	16th RDA Plenary	Online
25-11-2020	ORCID Tech Workshop	Online
26-11-2020	FREYA Final Event (multiple contributions)	Online

Annex B: FREYA Ambassadors

FREYA Ambassadors Names, Affiliations and Country

Melroy Almeida	Australia	Australian Access Federation (Australian ORCID Consortium Lead)
Valerie Brasse	The Netherlands	EuroCRIS
Janet Anderson (formerly Delve)	UK	University of Brighton
Antonella Fresa	Italy	Promoter
Stephen Grace	UK	London South Bank University
Jord Hanus	Belgium	University of Antwerp
Reyna Jenkyns	Canada	Ocean Networks Canada
Julio A. Martínez Morilla	Spain	University of Las Palmas de Gran Canaria
Eva Mendez	Spain	Universidad Carlos III de Madrid
Fiona Murphy	UK	Consultant
Irina Radchenko	Russia	ITMO University
John Salter	UK	White Rose Libraries; University of Leeds
Brigitte Hausstein	Germany	GESIS
Birger Jerlehag	Sweden	Swedish National Data Service
Mark Leggott	Canada	Research Data Canada
Rolf Krahl	Germany	Helmholtz-Zentrum Berlin für Materialien und Energie (HZB)
Suzanne Dumouchel	France	CNRS
Suresh Pannerselvam	USA	University of Florida
Muriel Swijghuisen Reigersberg	UK	Open University
Nicole Kearney	Australia	Biodiversity Heritage Library Australia (Museums Victoria)

Niklas Zimmer	South Africa	University of Cape Town
Mohammed Kaabar	Malaysia	Universiti Sains Malaysia
Clifford Tatum	The Netherlands	SURF Market
Claudia Alen Amaro	UK	Instruct-ERIC
Guo Xiaofeng	China	Chinese DOI Center
Alojz Androvic	Slovakia	Slovak Centre of Scientific and Technical Information
George Duimovich	Canada	Carleton University
Paloma Marín Arraiza	Brazil	TU Wien
Luc Boruta	USA	Thunken (Cobaltmetrics)
Maria de Montserrat Rodriguez-Marquez	UK	University of Surrey
Leonardo Jose Mataruna-Dos-Santos	UAE	American University in the Emirates
Elton Barker	UK	Open University
Victoria Dominguez Del Angel	France	CNRS, ELIXIR and Institut Francais de Bioinformatique
Bachir Chaib	Algeria	University 20 aout 1955, Skikda
Dror Berger	Israel	IUCC, Tel-Aviv University
Serhii Nazarovets	Ukraine	State Scientific and Technical Library of Ukraine
Mircea Zloteanu	UK	Kingston University