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DARE [777413] “Delivering Agile Research Excellence on European e-Infrastructures”



D8.6 Sustainability, Exploitation and Commercialisation Plan

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Executive Summary

The sustainability of research software is a fundamental factor for ensuring long-term progress and research excellence. Having this in mind, DARE aimed from the beginning to design a sustainability path for all its achieved outcomes and strongly link it with viable and realistic exploitation and commercialisation options.

DARE technical developments are sustainable-by-design, built on the principles of code openness, standards adoption and promotion and modular, open architectures. However, sustainability entails additional aspects related to properly approaching interested communities, obtaining insights for software and infrastructure usage from these communities, enabling coherent software usage practices, and offering training and guidance.

The report provides details on the DARE approach for covering all sustainability aspects for ensuring the DARE outcomes are effectively used by the already covered communities, are visible and accessible to any interested party, and are strongly supported by their owners for the immediate future.

The implementation of the sustainability and exploitation plan has started within the last year of the project, with a 1-year roadmap put in place at the beginning of 2020. The report also presents the progress achieved with respect to the roadmap, and the further actions to be implemented in the forthcoming years for supporting the maintenance and evolution of DARE.

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1 Introduction

1.1 Scope and Objectives of the Deliverable

The long-term success of the DARE platform, its sustainability, its ability to impact its targeted audience, and its ability to impact the evolution of e-Infrastructures, is tightly related to the degree of adoption of DARE's approach, technological solutions and services by a group of users accepting DARE's offerings and engaging with DARE's activities.

Towards this, the report outlines the DARE strategy for achieving long-term sustainability for the project's main outcomes. It identifies main targeted stakeholders and core exploitable assets, indicates main awareness and publicity venues, and highlights viable pathways for the commercialisation of DARE outcomes.

Additionally, the report presents the already carried out activities for putting this sustainability plan in motion, assesses the effectiveness of these actions and summarises further actions to realise the plan.

1.2 Structure of the Deliverable

The report is organised under three main sections. Section 2 outlines the main aspects considered for forming a comprehensive sustainability strategy. Section 3 proceeds to the presentation of the devised sustainability, exploitation and commercialisation plan. Section 4 provides details on the initiation of the plan's implementation during the last year of the project and sums up the main observations from the respective period. We conclude in section 5 with a summary of the sustainability, exploitation and commercialisation plan's main points and indicative short-term and mid-term actions to further move forward towards the plan's targets.

1.3 Relation to other activities in the project

Sustainability, exploitation and commercialisation planning builds on all DARE outcomes and activities, as it aims to properly assess their positioning and potential impact. Consequently, it is related to the technical developments in WP2, WP3, WP4 and WP5, as well as the assets developed in the context of the piloting work packages (WPs 6 and 7).

2 Core Sustainability Principles

DARE's fundamental design principles were conceived and decided early-on while in proposal preparation in order to reassure the platform's sustainability after the end of the project and to reduce the cost of sustaining the platform and increase the self-sufficiency and research agility of its users.

As discussed during the plenary meeting in Toulouse (21st to 23rd of January 2020), reflected in the internal deliverable *ID2.2-M25: DARE Architecture and Technology* internal report, and reiterated during the latest plenary meeting (23rd – 24th of June 2020, teleconference), the continuous R&D conducted by the project for both developing and using the platform carefully considered the software sustainability aspects, driven to a great extent by principles set out in the Software Sustainability Institute¹ guidelines.

The fundamental questions that will be asked about DARE platform are *what it does, what makes it better than other software* that serves a similar role, and *how it contributes to research*. In this context, potential users are being described and are able in fact to easily find a comprehensive description of the DARE platform on DARE's website where it is being provided a clear, high-level overview of it.

Regarding exploitation, it implies the utilisation of results in further research activities other than those covered within the project, or in developing, creating and marketing a product or process, or in creating and providing a service, or in standardisation activities. It entails efforts in making use of the results, recognising exploitable results and their stakeholders, concretise the value and impact of the R&I activity. DARE project partners can exploit results themselves, or facilitate exploitation by others (e.g., through making results available under open licenses). Appropriate exploitation of research results leads to leveraging innovation. Partners having technological interests (NCSR, UEDIN, ATHENA, GRNET, KNMI, CERFACS and FRAUNHOFER) will use DARE assets to further their research and development gains, by adapting them to improve robustness, efficiency, descriptiveness and the generalisability of DARE developments.

In addition, deciding to release software under an open-source licence is an important step in the lifecycle of any software project. Equally important is the selection of an appropriate licence: one that will correctly represent DARE partners rights as the software's owners, and the rights of third-party developers, if any. In this regard, partners will publish and maintain DARE asset improvements under permissive open-source licences, unless in exceptional circumstances pertaining to commercialisation of DARE products and always in accordance with said licences. This will eventually create user and developer communities that will invest and innovate using DARE tools. Partners with, or including, domain interests (NCSR, CERFACS, KNMI, KIT and INGV) will form internal and external strategic collaborations for DARE assets to be customised and used in new domains of interest, either academically or commercially.

The sustainability, exploitation and commercialisation plan below presents our analysis and decisions over the aforementioned aspects and the directions to be pursued in the immediate future for effectively capitalising on the results of the project.

¹ <https://www.software.ac.uk>

3 Sustainability, Exploitation & Commercialisation Plan

3.1 Targeted Audiences

As stated in the DARE Description of Action, we foresee three main target audiences for achieving sustainability of the core DARE outcomes:

- Domain-specific e-infrastructures that can exploit DARE in order to create new data-driven services more easily;
- Science and technology professionals that can use DARE-powered infrastructures more easily, without being concerned with technicalities, enabling them to focus on how to improve their methods, results, synergies and innovation potential;
- Research institutes, research teams, individual researchers, SMEs, etc., who, due to lack of tools, methodology or resources, are unable to make the most of even today's wealth of data, and scientific advances.

Partners with extensive outreach in commercial environments and SMEs (GRNET, UEDIN, FRAUNHOFER, NCSR-D), will promote DARE assets and their maturity to encourage commercial exploitation and uptake of DARE alongside associated relevant e-infrastructures – they will cooperate with EPOS and IS-ENES on joint activities and initiatives targeting on engaging SMEs.

3.2 DARE exploitable assets

The core exploitable outcome of DARE is the integrated **DARE Platform**, which provides all the necessary tools to research developers to develop and execute their experiments written using either the fine-grained workflow specification library dispel4py or CWL. Moreover, the DARE platform offers data provenance to the users so as to track and analyse their data. The DARE platform is cloud-ready, integrating containerized software applications running on top of Kubernetes. It comprises several distinct components that can be used independently providing their own APIs.

Detailed descriptions for each component are provided in the platform's website, with a summative list presented in the following table.

ID	Title	Core contributor(s)
A1	DARE Platform	NCSR-D, DARE Consortium
A2	dispel4py	UEDIN
A3	S-ProvFlow	KNMI
A4	dispel4py Workflow Registry	UEDIN
A5	CWL Workflow Registry	UEDIN
A6	DARE Execution API	NCSR-D
A7	Data Catalogue	UEDIN

Two additional components underwent advancements in the context of DARE and are ready to be integrated in the platform after the full semantification of the Dare Knowledge Base.

ID	Title	Core contributor(s)
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A8	SemaGrow	NCSR-D
A9	Exareme / Exaspark	ATHENA RC

Additionally, the codebases implementing the DARE use cases in the context of the DARE pilots are assets readily reusable and exploitable.

ID	Title	Core contributor(s)
A10	EPOS Rapid Assessment (RA) Pilot	INGV
A11	EPOS Moment Tensor in 3D (MT3D) Pilot	INGV
A12	EPOS Volcanology Pilot	KIT
A13	IS-ENES Climate4Impact Pilot	CERFACS
A14	IS-ENES Cyclone Tracking Pilot	CERFACS

3.3 Copyright and licensing

The cornerstone of any exploitation activity is Copyright major issues of which are discussed below with a view of including them in the exploitation course of actions.

Copyright owners are clearly stated in DARE software and documentation: A clear statement of copyright for the DARE platform and its documentation provides a clear message to anyone using the software, as to who created, and owns, the software and documentation. As such, anyone visiting DARE website or reading related documentation will know exactly who to contact if they have a question about using, modifying or redistributing the software and documentation. In addition, it is also essential for users and developers to know the copyright of any third-party software bundled in a release for the same reasons.

Each source code files includes a copyright statement: To cover the eventuality of distributing source code files separately from any copyright statement, and in order to remove any ambiguity about ownership, it's a good practice to include a copyright statement with each of the source code files, as a comment, or, if the language permits it, as a string constant.

Using open-source license for DARE platform and its components: The selection of an appropriate open-source license needs further hindsight as it is important as the type of licence adopted may determine whether or not a potential user decides to use, or further develop DARE. Open-source software can give users confidence that even if DARE project has ended, they at least have the means to be able to access, fix, improve or extend your software themselves. It also gives them the potential to make such changes when they need them, rather than having to wait for you to do it on their behalf. All components included in the DARE Platform are licensed under the Apache 2.0 License, with independent / pre-existing assets carrying similar open-sourced licenses. Code assets related to the pilots are also publicly available.

Website and documentation clearly state the license of DARE components: Users need to know the licensing conditions of your software, and also any third-party software bundled with it, since this may impose constraints and obligations on how they can use or redistribute it, while developers need to know the conditions under which they can change or extend DARE software and any restrictions on their modifications and extensions and the redistribution of these. It is also essential for users and

developers to know the licensing of any third-party software bundled in a release for the same reasons. In this regard, users will be able view the license for DARE software modules on DARE's website, without having to downloading the various components.

3.4 Availability, access and support

3.4.1 Distribution

The central distribution channel for the DARE assets is the dedicated GitLab micro-site², where both high-level and technical information on the DARE platform and its distinct components can be found. The micro-site provides installation instructions for different environments, links to the code repositories of all individual components, and detailed API documentation, as analysed in the following section.

3.4.2 Platform documentation

The objective is to make DARE services documented and available through high-impact, wide-reach channels. The core DARE platform (software v3.6) is now published and documented in the Journal of Open-Source Software³.

DARE documentation is clearly available on DARE's website and within DARE platform allowing users getting to grips with the various components and anticipating their expectation to find documentation packaged with the software itself and/or on DARE's website. Care is taken to describe how to use the software as opposed to what it does or how and labelling the documentation with the version of the software it should be used along with a release history (e.g., release data, version numbers, key features of each release etc.) to allow users to see how the software has evolved.

A documentation "quick start" guide is included, which provides a short overview of how to use DARE software components with some basic examples of use. This way the bare minimum information needed to deploy software and try out some of its basic features is guaranteed and the users will be able to check out the software developed without investing a significant amount of their time or effort. This, in turn, can lead to more users.

DARE also provides more extensive documentation with clear, step-by-step instructions on how to deploy and use DARE platform assuring it is not structured from the development team point of view and not overlooking the basic steps that new users need to know. Effort is put to keep documentation unstated assumptions to a bare minimum to avoid alienating the novice user and deter them from using it. The documentation includes a comprehensive guide to all software's commands, functions and options along with troubleshooting information documentation list, all third-party dependencies such as languages, libraries, packages, scripts, models, or tools along with web address, and licenses.

The DARE software can be used as a library, package or service by other software; therefore, a comprehensive API documentation has also been included to cover functions, data types, or classes offered by a library or a collection of REST endpoints or web services.

3.4.3 User Support

DARE is an open-source software and the level of support a user can expect to receive is response on a best effort basis. A user will be able to consult DARE's documentation when looking to solve a problem where it is described how they can get help, how to submit their support request, e.g., via e-mail, telephone, issue tracker, forum or other means, and any related resources e.g., web pages with

² <https://project-dare.gitlab.io/dare-platform/>

³ <https://joss.theoj.org/papers/10.21105/joss.02664>

frequently asked questions or e-mail archives. These resources will remain available for the anticipated lifetime of the software, at least.

Tests and testing environments are an important aspect of maintainable software and can be run after DARE platform software is being deployed to show whether the deployment has been successful. To this end, the respective repositories provide testing examples, while a toy example set is available via the platform's microsite.

To further improve support in the future, a lightweight, automated subscription process that will allow users to receive notifications to changes to DARE's source code repository is considered. Keeping information as open as possible thus presenting the fact that DARE project is open and inclusive, may have users benefit from bug fixes made since last release.

Last but not least, timely announcements will be made regarding the deprecation of components, APIs, etc. Should a feature be due to be superseded by a newer, better feature or component, including both for a suitable period within the software will allow DARE users to transition comfortably from the older version to the new version.

3.5 Community Engagement

The cornerstone of denoting DARE platform capabilities are the case studies in Climate Science and Volcanology that have been conducted and have allowed potential users to learn about it. They did act indeed as a great advert for the DARE platform showing satisfied users that have benefited from it thus paving the way to gain more users.

Starting from these communities, the first goal is thus to ensure continuous and impactful usage of DARE services from the communities represented in the project; towards this, DARE use case partners will operate and maintain institutional deployments of the DARE platform for at least 2 years after the end of the project. Technical partners are in turn committed to provide technical support for the same timeframe. Updates on the platform or its components will be communicated to the responsible personnel of CERFACS, KIT and INGV, who will decide whether the updates are applicable for their purposes and collaborate with the relevant technical partner to incorporate the update.

At the same time, DARE partners will aim to expand support to additional communities by reaching out to relevant stakeholders; the consortium will undertake awareness and dissemination activities targeting different scientific communities, as detailed in the next section.

3.6 Awareness and Publicity

Engaging an audience usually involves a clear communication and effective dissemination strategy, aiming to increase the awareness of outcomes and the expected benefits from the adoption of these outcomes, for each stakeholder. Through a dedicated dissemination strategy and associated capacity building activities, DARE will increase the number of institutions/ organisations/communities that will become aware of DARE offerings and be actively involved as users.

The main awareness and publicity venues to be used for DARE will continue to be the project's website, the platform micro-site, and the social media accounts maintained in Twitter, LinkedIn and ResearchGate.

3.7 Commercialisation Pathways

Appropriate measures and supportive environment on all levels must be considered to foster the effective uptake of new technologies by all relevant economic stakeholders and having the DARE platform and DARE components as services addressing the industry. Here are some highlights:

- a. **Education skills and competences:** Support universities and research institutions in exploiting agile computing in their teaching and research activities and offer training services. Organize competence building and training activities for SME-employees, tailored to SMEs needs (local language, online courses).
- b. **Usability, trust and security:** Comfortable and SME-friendly usability of DARE platform infrastructure/ technology to facilitate and modernize access to resources: provide access to DARE infrastructure, support secure application workflows between SME premise and the DARE platform. Perform/support research activities in purpose of making DARE platform technology more SME-friendly.
- c. **Business models:** Affordable DARE platform services, transparent costs for SMEs, understandable SLAs and contracts. These are turn points towards creating transparent accounting and charging market-oriented prices for offered services. The “License barrier” can be lowered by promoting the fact that DARE is an open-source software. Open up new opportunities to long-term contracts in order to guarantee stable and SME-oriented environments.
- d. **Financing:** Use of targeted funding opportunities dedicated to DARE platform usage by a broader range of stakeholders. Support and take an active role in the development of strategic funding programs on different levels - from governmental to private associations. Make SMEs aware of these funding opportunities and support them to make proper use of them.

4 Plan Implementation

4.1 Sustainability and Awareness Roadmap design

Based on the presented sustainability principles and sustainability analysis, an initial roadmap for enacting the sustainability plan was developed at M25. The roadmap foresaw the actions presented in the following subsection to be implemented during the project and act as initiators for the overall sustainability plan. An assessment of the achieved progress with respect to the foreseen actions follows in section 4.2.

4.1.1 Sustainability roadmap

- **Integration in IS-ENES:** The goal is for the DARE Platform to be incorporated in the set of services provided by the IS-ENES e-infrastructure. Towards this, we pursued the organisation of a demo showcasing the effectiveness of the DARE approach in the prototyped Climate use cases in the context of the IS-ENES 3 General Assembly, March 2020, Toulouse.
- **Volcanology DARE-driven use case:** in the context of the DARE use cases, KIT has now designed and implemented an additional pilot use-case. It is currently being tested on the DARE platform deployment of Fraunhofer SCAI and will be used for educational purposes during a summer school organised by KIT late July 2020. This is an example developing application community self-sufficiency which will reveal issues to be dealt with before the end of DARE. Such self-sufficiency is a crucial element of exploitation. The success with this will stimulate take up in similar research and educational contexts among solid-Earth researchers.
- **Awareness and training events targeting additional communities:** We will organize and run open webinars showcasing the capabilities of the DARE platform and addressing a general audience, such as the IS-ENES mentioned above. Communities we intend to reach in the future include Eurofusion, Nanomaterials, Atmospheric sciences, Earth Observation etc. In addition, for the second year running, DARE co-organises the session “Digital Transformation of Earth Science Cloud: Data-Oriented and Self-Optimizing Architectures and Workflows (IN Session ID# 104374)” to take place at the American Geophysical Union Fall Meeting, in December 2020. Similar efforts will be pursued in the future as well.
- **Collaboration with EINFRA-21 projects:** Since early in the project, DARE has been working towards collaborations on the technical and sustainability fronts, with its EINFRA-21 sister projects. In a clustering event in July 2019 in Athens, concrete synergies were decided to be explored.
- **NCSR-D Digital Innovation Hub testbed:** NCSR-D will deploy, operate and maintain a DARE Platform instance and make it available to (a) researchers at or working with the research centre and (b) relevant industry stakeholders seeking consultation and/or testing facilities from NCSR-D’s Digital Innovation Hub.
- **Collaboration and integration with EOSC:** Investigating ways to apply for a DARE service to EOSC-hub, and to that end we are in communication with - also DARE-partners - GRNET, and others.

4.1.2 Dissemination and awareness roadmap

- **Project Website:** Various aspects of the website have already been updated (publications, deliverables, DARE platform release, additional news items, the media kit) in the past few weeks. In the coming months the website will undergo a redesign and a consolidation process to reflect more accurately the technical work within the project, emphasize technical achievements and report in more detail dissemination and awareness actions.

Furthermore, to address the expectations of a more technical audience, we have designed and published a micro-site dedicated to the DARE Platform itself². The micro-site targets CS researchers and developers, as well as research developers who want to test platform features and communicate its potential to their IT departments for personal/institutional use.

- Finally, to measure website visits, a Google Analytics tool has been put in place so much so for the main DARE project website as well as for the DARE platform micro-site.
- **Social Media presence:** Taking into account recommendations from the first periodic project review, the project will intensify its efforts on having a strong presence in the selected social channels (i.e. Twitter, LinkedIn and ResearchGate). A more streamlined process for communicating DARE presence in events has been put into place and will be followed up by attending partners. Furthermore, a person representing the technical development team of the project has been appointed as responsible for communicating the technical advancements of the project. The assigned person will report on new releases, major component updates and other major and minor relevant milestones. Finally, a bi-weekly schedule has been put in place so as to share DARE publications on social media and thus make scientific progress of the project more evident to the wider public and to the scientific community.
 - **Dissemination to the wider public and to policy makers:** To further communicate project progress and results to the wider public, as well as policy makers, the partnership is preparing a dedicated article which will highlight the importance of the project and how it fits in with EC policy in the domain. The article will be made available via the project website, via EC portal CORDIS and will be translated by partners and disseminated in their respective countries in the form of a news item.
 - **Partner communication for WP8 matters:** To help partners engage more on all dissemination matters, the coordinating partner will put in place monthly telcos dedicated to the work conducted within WP8. All partners will assign a person to attend these meetings and report on latest activities (events, publications, demonstrations) which are then to be followed up by the dissemination team.
 - **Newsletter creation and dissemination:** The coordinating partner will oversee the creation and dissemination of an electronic newsletter which will be produced on M36 of the project. This newsletter will stand as a cumulative report of the project's objectives, scientific and technical accomplishments, major dissemination activities and successes during the three years. The newsletter will be disseminated to all registered interested parties (feature already available via the DARE website) and to a communication list which will have been compiled by the partnership.
 - **Event Organisation and Attendance:** DARE will participate with various capacities in multiple events relevant to its technical positioning and its sustainability targets. A tentative list follows.

Event Title	Date and Location
EuroDARE Platform summit week	23 - 27/3/2020 Porto, Portugal
EOSC-Hub week 2020	18 - 20/5/2020 Karlsruhe, Germany
Volcanology Summer School	Summer 2020
eScience 2020 Conference	8 - 11/9/2020 Osaka, Japan
Workshop in the context of eScience 2020	8 - 11/9/2020 Osaka, Japan
Joint E-INFRA 21 events	TBA
ICRI 2020: 14 th International Conference on Research and Innovation	16 - 17/9/2020 Lisbon, Portugal

Digital Transformation of Earth Science Cloud: Data-Oriented and Self-Optimizing Architectures and Workflows	7-11 December 2020
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- **Scientific communication:** The project will continue its academic presence via the production of conference and journal papers. Tentative targets, apart from the aforementioned eScience 2020 conference, are:

Event Title	Date and Location
Open ENVRI community meeting	3-7 February 2020
The Platform for Advanced Scientific Computing (PASC20) Conference	29/6 – 1/7/200, Geneva, Switzerland

4.2 Roadmap assessment

4.2.1 Sustainability-centred actions

- **Integration in IS-ENES:** Unfortunately, the IS-ENES 3 General Assembly event was cancelled due to COVID-19, however a webinar and demo targeting the IS-ENES community took place in October 16, 2020. The webinar introduced the DARE platform to the wider ENES community focusing on a Cyclone Tracking use case. It included deployment instructions and a short hands-on session. A number of test accounts on an operational DARE installation were provided for limited time and use, based on availability along with a DARE Webinar Evaluation Form.
- **Volcanology DARE-driven use case:** the VC use case was designed and developed successfully and reported in detail in deliverable D6.4. Its usage in the context of a Summer School took place in July 2020, as detailed in the same deliverable.
- **Awareness and training events targeting additional communities:** In accordance with reviewer comments, we intensified our focus on the already covered communities. To this end, the aforementioned webinar addressing the IS-ENES community and the Volcanology Test Session in the relevant Summer School was organised. Additionally, an EPOS hands-on webinar presenting the platform and its usage was organised, with the details presented in deliverable D8.5.
- **Collaboration with EINFRA-21 projects:** A number of potential synergies have indeed been explored, especially with DEEP and XDC, however it appeared the projects had a fundamentally different approach to that of DARE, so any rushed integration between them would have been counterproductive. DARE is still pursuing collaboration avenues with FREYA and is still committed to wider-scale communication with all sister projects. To that end, DARE explores the following integration paths:
 - o reusing provenance technology found in DARE in the DEEP project,
 - o potential usefulness of DEEP-as-a-Service for high-level services offered in DARE
 - o making use of PIDS within DARE, as well as Provenance identifiers to complement PID graphs in FREYA
 - o using the notification system within DARE in XDC
 - o assessment of EUXDAT data connectors for potential re-use by DARE
- **NCSR-D Digital Innovation Hub testbed:** The relevant instance has been deployed and is available as part of the Hub's service portfolio. A preliminary test case using the platform for the Materials Science domain was conducted in collaboration with an SME residing at the Lefkippos Technological Park. The DARE platform is also one of the assets foreseen for the new SmartAttica and SmartHealth DIH initiatives, successfully submitted at the National EDIH call and qualified for evaluation at the EC level.

- **Collaboration and integration with EOSC:** The following potential levels of integration are under consideration:
 - o Permanently deployed service in the form of a set of RESTful endpoints and of a Jupyter notebook for interactive use. This case will have the drawback that it will require DARE to manage accounting of resources for its users. It will also require DARE to have LSAs with relevant cloud providers. On the other hand, it has the advantage that end-users (developers and researchers) could immediately start using DARE services, submit workflows for execution, interrogate its catalogues, etc.
This case can also include potential service offerings on commercial clouds, given their services are often more mature. However, all drawbacks hold, in addition to further integration which would burden DARE.
 - o Offer DARE as software readily deployable on user-acquired cloud resources. This has the disadvantage that non-technical researchers will not be able to use the service immediately. On the other hand, it has the advantage that it does not require DARE to do accounting, resource acquisition nor have an actual business model in place.
Given that DARE's core users are research developers, a first inclination would be that the second option would be preferable.

4.2.2 Awareness-centred actions

Following a more structured approach for WP8 internal communication, and establishing a regular reporting and alignment schedule, dissemination and communication activities intensified during the last year, largely achieving the targets set by the roadmap. In more detail, the following actions were carried out under each item foreseen in the roadmap.

- **Project Website:** The project's website and the microsite dedicated to the DARE platform were regularly updated with new information as it emerged. Details on the visibility and content updates are provided in the relevant D8.3 deliverable.
- **Social Media presence:** in accordance with the targets of the roadmap, DARE intensified its presence in the social media channels covered by the project, with particular emphasis on the promotion of technical developments not only within the project but also on the broader e-infrastructure communities and the targeted scientific domains. All technical and scientific achievements were reported on Twitter and LinkedIn, with event organisation and participation also promoted accordingly.
- **Dissemination to the wider public and to policy makers:** A comprehensive article based on internal deliverable D2.2 and addressing both scientific and broader audiences was prepared and made publicly available via Zenodo.
- **Newsletter creation and dissemination:** A summative newsletter has been produced and made available at the end of the project, summarizing all major developments, achievements and milestones of DARE. Further details are provided in deliverable D8.3.
- **Event Organisation and Attendance:** DARE achieved the tentative targets set by the roadmap, with the exception of events cancelled due to the COVID-19 outbreak. The full list of events attended and organised is included in deliverable D8.3.
- **Scientific communication:** During the last year of the project, four (4) additional scientific publications were produced in domain-oriented and computer science-related workshops and conferences, as detailed in deliverable D8.3. Furthermore, DARE representatives attended the Open ENVRI community meeting, however the eScience 2020 and PASC20 conferences were cancelled due to COVID-19.

5 Conclusions and Next Steps

Through its usage in multiple representative piloting use cases, DARE has showcased its potential to act as a new paradigm for scientific workflow design and enactment and infrastructure abstraction mechanism. The presented sustainability plan outlines the main courses of action to ensure that DARE outcomes retain their momentum, are visible, understandable and usable by the already represented and additional communities.

The continuation of usage and advancement of research in DARE platform and its components is already ensured for the forthcoming years, through its usage in the IS-ENES project (for two more years) and its inclusion in the new AI4Copernicus project coordinated by NCSR-D, addressing the needs of the Earth Observation community.

We believe that the constant evolution of the platform and the maximisation of its reach via the implementation of the analysed sustainability and exploitation plan will further strengthen its impact and the establishment of the main paradigms and solutions developed in the project.