Network Solution for Exascale Architectures

D5.5 Communication and Dissemination Final Report

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Release	Date	Author, Organization	Description of Changes
0.1	29/02/2024	P. Bernier-Bruna, Eviden (Bull SAS)	Initial draft
1RC1	15/03/2024	P. Bernier-Bruna, Eviden (Bull SAS)	Integration of recommendations and data obtained at the last RED-SEA F2F meeting. Draft ready for review
1.0	28/03/2024	P. Bernier-Bruna, Eviden (Bull SAS)	Integration of comments from the reviewers. Update with the latest figures and data (social media statistics, latest information on publications).

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1 Executive Summary and Introduction

This report summarizes the communication and dissemination activities carried out throughout the lifetime of the RED-SEA project, with special focus on the timeframe from October 2022 to the end of the project, as the first half of the project was already covered in *D5.3 Communication and Dissemination Intermediate Report*.

This second half of the project saw events return fully to normal after the break imposed by Covid. This provided numerous opportunities to communicate on the project, usually in conjunction with the other SEA projects.

As far as social networks are concerned, the new erratic policy of X (formerly known as Twitter) has led to a loss of interest in this network, in general but also specifically within the HPC community. From the start (and contrary to our initial expectations), LinkedIn proved to be more efficient and popular than X, and this became even truer in the last half of the project.

Concerning dissemination, the number of publications exceeds the target, and additional publications are still pending at the end of the project. Publications remain concentrated on one partner, but during the second half of the project more consortium partners contributed to publications, and we also had a number of joint publications.

As pointed out at the beginning of the project, the very limited number of public deliverables hindered the dissemination of the project's findings - due to the sheer lack of material. To remedy this, a blogging programme was set up and reinforced in the last half of the project.

Dissemination collaboration with the other SEA projects and with other EuroHPC projects was initiated very early in the project and has resulted in many joint communication/dissemination activities, especially joint events in the second half of the projects.

2 Overview of progress

2.1 Key performance indicators

The key performance indicators selected for communication and dissemination (*Table 1* below) give an overview of the progress made and demonstrate that all goals have been met or exceeded. They cover a large variety of activity types, corresponding to a variety of target groups. The corresponding targets have been set considering available funding and resources, market standards, and previous project experience.

Table 1 – Communication/dissemination Key Performance Indicators

Dissemina-tion Type	Targets	M1- M18	M19-M36	Total at M36
X	2 posts/month Average engagement rate[1] >= 1%	69 posts (average 3.8 /month) 3,92%	119 (average 6.6 /month) 5.78%	188 posts (aver-age 5.2 /month) 4.71%
LinkedIn	2 posts/month Average CTR[2] > 1,8%	54 posts (average 3/month) 4,63%	92 posts (average 5.1 /month) 4.4%	146 posts (aver-age 4 /month) 4.4%
Publications	>=10 publications over the total project duration	7	12 + 1 accepted but pending + 8 submitted + 5 planned	19 + 1 accepted but pending + 8 submitted + 5 planned
Dissemina-tion events	>=6 events over the total project duration	6	8	14

Beyond figures and KPIs, we would like to highlight that cooperation with other projects has been particularly fruitful in terms of communication and dissemination. RED-SEA has liaised with the dissemination teams of other relevant European funded projects, and particularly with the "SEA projects" DEEP-SEA and IO-SEA. Cooperation has allowed RED-SEA to achieve much more in terms of dissemination than it could have done on its own, on its limited budget, and on a difficult topic.

2.2 Follow-up on the recommendations made by reviewers at the intermediate review

Four recommendations concerned WP5. Here is an overview of the improvements we implemented. More details can be found later in this document.

R2: Update the project website to clearly show the vision and ambition of the project.
The website was updated very soon after the intermediate review:

- The motto on the **home page** was changed to "Network Interconnect for Exascale Systems" to state more explicitly the purpose of the project. Just below the motto, the section explaining the challenges addressed by RED-SEA (Network: the next big bottleneck?) was modified, and now states our ambition: *Those are the challenges that RED-SEA is tackling to design the network interconnect that will power future European Exascale systems*.

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[1] X's engagement rate is calculated as the total number of engagements a post receives (likes, clicks, retweets) versus by the total number of impressions on this Post. It is used to measure the efficiency of a Post.

[2] CTR = Click-Through Rate. It is the number of clicks on a post versus the total number of impressions of this post. It is used to measure the efficiency of a post.

- The Results webpage (https://redsea-project.eu/results/) was considerably extended to better show what the project is working on and producing. It now includes a diagram of the RED-SEA network architecture, as well as the list of relevant publications and public deliverables by topic (= by WP). This Results page was the third most consulted page on the website in the second half of the project.

R5: Better highlight collaboration with other projects and how these collaborations support the long-term strategy and serve the long-term ambition of RED-SEA partners.
We developed the block dedicated to the collaboration with the SEA projects on the RED-SEA home page. We also created a Collaborations section (https://redsea-project.eu/index.php/about#collaborations) under the About menu.

R7: At least a few joint publications within the consortium are recommended in the second reporting period. The consortium is also encouraged to produce more publications in the second phase of the project.
A few joint publications within the consortium were prepared in the second half of the project, as is shown in *Table 7 - RED-SEA publications.* The overall number of publications was also considerably higher than in the first half of the project (12 vs 7 in the first half), and **more consortium partners were involved**. It must be noted that as a large number of deliverables were due at the very end of the project, the corresponding publications were also prepared and submitted at the very end of the project, so that at the time of writing we still have 14 potential additional publications pending.

R13: RED-SEA must be more ambitious with all dissemination/communication KPIs rather than being satisfied with current achievements.
The consortium strived to be more active in communication and dissemination (see *Table 1 – Communication/dissemination Key Performance Indicators*). The frequency of posts on social media was increased by more than 50% over the second half of the project, compared to the first half. This was made possible in particular by the blog articles we published on a regular basis. They allowed the consortium to disseminate on results not (yet) included in a public deliverable. Five out of the top 10 most visited pages of the RED-SEA website in the second half of the project are blog pages, so this strategy seemed to work.
In terms of events, the project was also much more active than initially anticipated, with a participation in 8 major events in the second term of the project (14 events over the full project life, for a target of 6). This was made possible in terms of budget by the collaboration with the other SEA projects and with project ACROSS.

3 Progress and achievements

Task 5.1 Communication, dissemination, exploitation strategy definition [M1-M4] – Lead: Eviden (Bull SAS)

This task, spanning the first four months of the project, was completed on time, with the delivery of *D.5.1 Communication and Dissemination Plan*. This set the scene for RED-SEA communication and dissemination, in particular with:

- the definition of the project's key messages and target populations,
- the creation of the visual identity of the project and of matching templates,
- the selection of relevant KPIs,
- the selection/creation of relevant communication channels,
- the selection of the progress monitoring tools required for the efficient recording of dissemination/communication activities.

Task 5.2 Communication and dissemination activities [M1:M36] – Lead: Eviden (Bull SAS)

This task spanning the entire lifetime of the project covered the day-to-day communication and dissemination activities and consists in the implementation of the strategy and plan defined in *D.5.1 Communication and Dissemination Plan*.

The second half of the project saw events return to "normal" after the break imposed by Covid. RED-SEA therefore had the opportunity to take part in a high number of events, both for giving visibility to the project and for sharing project results. This was done essentially in conjunction with the other SEA projects.

Publications continued at a good pace, but unfortunately many of them were concentrated at the very end of the project, so they could not be promoted by as much as they deserved to be – and 12 publications are still not published at the time of writing.

3.1.1 Communication material

Different types of communication materials based on the RED-SEA visual identity were created to present RED-SEA to the public and to the HPC community. All communication material is available in the Resources section of the RED-SEA website: https://redsea-project.eu/resources/. The source files are available to the consortium partners in the RED-SEA private SharePoint in the WP5 folder.

Slide deck

A short presentation of the project entitled *RED-SEA in a nutshell* was prepared early in the project for consortium members who need to present RED-SEA. It was updated several times during the project's lifespan, the latest version is available here: https://redsea-project.eu/wp-content/uploads/2023/11/RED-SEA-in-a-nutshell_20231103.pdf.

Figure 1 – Slides from the RED-SEA in a nutshell PowerPoint presentation

Flyer

The RED-SEA flyer created in November 2021 was updated twice, it has been used for all in-person events. The latest version is here: https://redsea-project.eu/wp-content/uploads/2023/11/RED-SEA_Flyer_20231103.pdf.

Figure 2 - RED-SEA flyer (pages 1 and 2)

Poster

The RED-SEA poster too was updated many times, for different events(EuroHPC Summit, HiPEAC, SC…). As shown in the Figure below, we also created specific versions with "SEA projects" co-branding.

Figure 3 - RED-SEA project poster

Videos

We continued to use the short video giving an overview of the project (initially created for ISC 2022). It is also featured on the RED-SEA website. It is available both on the SEA and the RED-SEA YouTube channels: https://www.youtube.com/channel/UCjD_QOd4xj0Ieb0lOnaQFuQ.

Figure 4 - Screenshot from the RED-SEA video

A number of short videos were created specifically for social media: each of them shows RED-SEA at a specific event. These short videos, although anecdotal, are very popular on social networks. Here is an example, our impressions from SC23: https://youtu.be/xQ0xSnCQ35U?si=4_aBO3P1NUiLbjZi

Figure 5 - Screenshot from the RED-SEA SC23 impressions video

3.1.2 Website

The RED-SEA public website (https://redsea-project.eu/) is hosted in Europe (in France actually) by European provider OVHcloud.

The RED-SEA website was described in details in deliverable *D5.2 Public website*.

Website performance

Important note: Unfortunately, due to incorrect handling when the site analytics was migrated to GA4 (Google Analytics 4), site statistics were not recorded for the period from October 2022 to February 2023. Audience figures shown by Google Analytics after this update are much lower than in the first half of the project because we implemented at the same time a more restrictive cookie policy to be fully compliant with GDPR. It is therefore impossible to compare the figures issued from Google Analytics for the first term and second term.

This is why we added this time the **server-side statistics provided by our hosting service OVH**, which are very succinct but include the full traffic. Server-side data is always much higher than Google Analytics data, but it allows here at least to compare traffic in the two terms of the project, based on the same data.

Based on server-side data, traffic on the RED-SEA website increased by 344% in the second half of the project.

Table 2 - Page views and sessions, Google Analytics and server-side data

	Google Analytics M1-M18	Google Analytics M19-M36	OVH Server-side data M1-M18	OVH Server-side data M19-M36
Total page views	3572	1443	148282	508965
Total sessions	2067	747	78588	144580

Figure 6 - Google Analytics Report - Audience Overview by day (October 2022 – March 2024)

Despite its limitations, Google Analytics allows to analyse the web traffic in more details The main takeaways offered by the detailed statistics collected in Google Analytics are the following:

TOP 10 most visited pages (see Figure 7 below):

1. Home page
2. About page
3. Results page
4. Blog post VEF traces framework
5. RED-SEA blog page
6. Blog post Application-defined, high-performance packet processing with sPIN
7. Blog post Extending LinkTest for BXI interconnect
8. News and events page
9. Blog post Peek at BXI V2 performance
10. Resources

It is interesting to note that 5 out of the 10 top RED-SEA web pages are related to the blog articles, which validates our decision to publish blog articles on a regular basis. Also, the results page is in third position, certainly due to the fact that its contents were considerably extended.

Page title and screen class	Views	Users	Views per user	Average engagement time	Event count All events	Conversions All events
	1,443 100% of total	395 100% of total	3.65 Avg 0%	1m 33s Avg 0%	4,023 100% of total	0.00
1 RED-SEA project – A EuroHPC project	337	182	1.85	41s	1,047	0.00
2 About the project – RED-SEA project	179	107	1.67	53s	472	0.00
3 Results – RED-SEA project	85	53	1.60	41s	205	0.00
4 The VEF Traces framework – RED-SEA project	83	31	2.68	1m 13s	229	0.00
5 The RED-SEA blog – RED-SEA project	51	29	1.76	20s	124	0.00
6 Application-defined, high-performance packet processing with sPIN – RED-SEA project	45	16	2.81	38s	110	0.00
7 Extending LinkTest for BXI interconnects – RED-SEA project	41	14	2.93	1m 49s	105	0.00
8 News and Events – RED-SEA project	39	30	1.30	14s	93	0.00
9 A peek at BXI V2 performance – RED-SEA project	37	26	1.42	1m 20s	111	0.00
10 Resources – RED-SEA project	27	23	1.17	12s	66	0.00

Figure 7 - Google Analytics report - Pages

TOP source sites (previously called referral sites in Google Analytics)

It is a mix again of social media, community websites, and involvement of consortium partners. LinkedIn has naturally overtaken X, and the EuroHPC JU and SEA websites have played a more important role. The most interesting change is that Google, i.e. Google Search, now is the most important source by far (see Figure 9 below):

1. Google
2. LinkedIn
3. X
4. EuroHPC JU
5. Bing
6. SEA projects
7. Dashboard
8. Overleaf
9. ParTec
10. FORTH
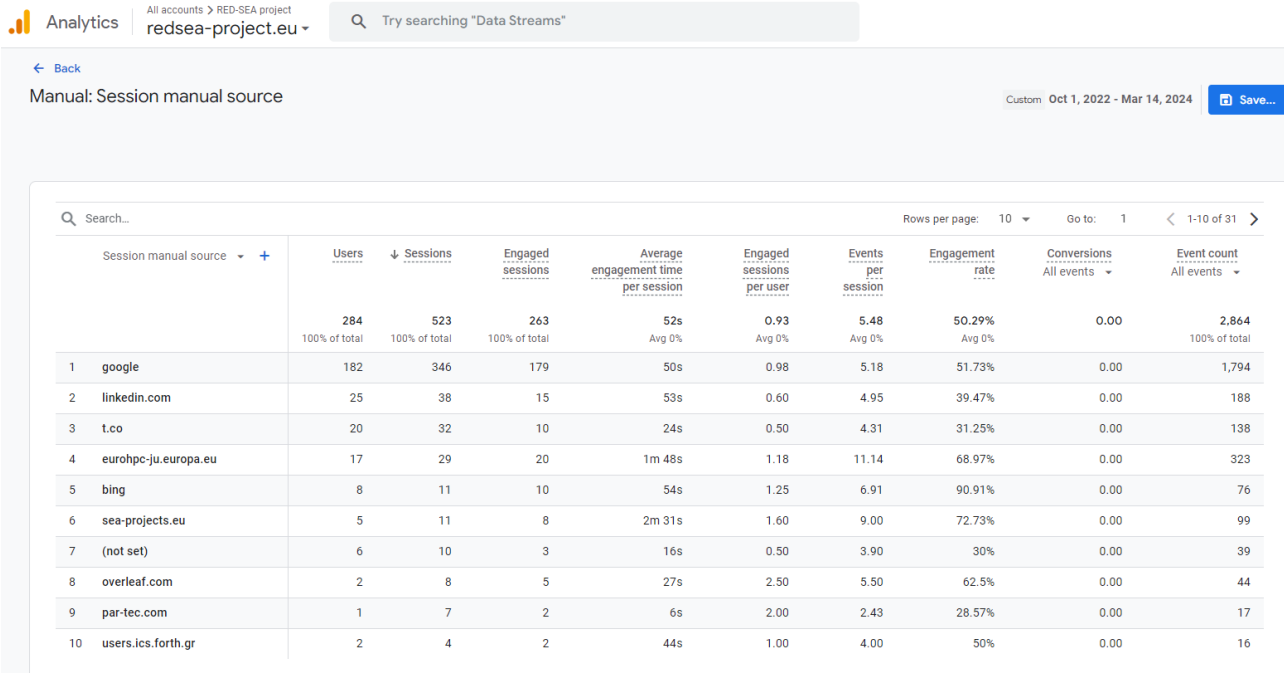
Figure 8 - Google Analytics report – Traffic source.

Blog posts

Following the success of the first two blog articles published in 2022 on a trial and voluntary basis, a dedicated blog section (https://redsea-project.eu/red-sea-blog/) was added to the RED-SEA website, and blog articles were published roughly every two months as of October 2022. We published a total of 10 blog articles over the project lifetime, involving 10 project partners (8 articles in the second half of the project). The articles were published both on the RED-SEA website and as LinkedIn articles, in order to maximize visibility. These articles have gone some way to compensating for the virtual absence of public deliverables, in particular by highlighting aspects of the project that had not (yet) been the subject of a public deliverable or publication.

A few of the blogs also include demo or tutorial videos — such as in https://redsea-project.eu/cossim-framework/ or https://redsea-project.eu/the-vef-traces-framework/.

As shown in the previous section, the blog pages were among the most popular pages of the RED-SEA website.

- 02/02/2024 Optimizations for collective communications primitives (CCP) by UPV
- 24/11/2023: Low-latency Communication in RISC-V Clusters by FORTH
- 03/11/2023: The APEnet interconnect architecture in RED-SEA by INFN
- 31/07/2023: Extending LinkTest for BXI interconnects by Jülich Supercomputing Centre
- 29/03/2023: COSSIM framework by EXAPSYS
- 23/01/2023 The VEF Traces framework by UCLM
- 02/11/2022: Extending ParaStation MPI by BXI Support by ParTec
- 03/10/2022: Development of multirail feature in MPC for BXI interconnect by CEA
- 12/05/2022: A peek at BXI V2 performance by Eviden (Bull SAS)
- 25/01/2022: Application-defined, high-performance packet processing with sPIN by ETHZ
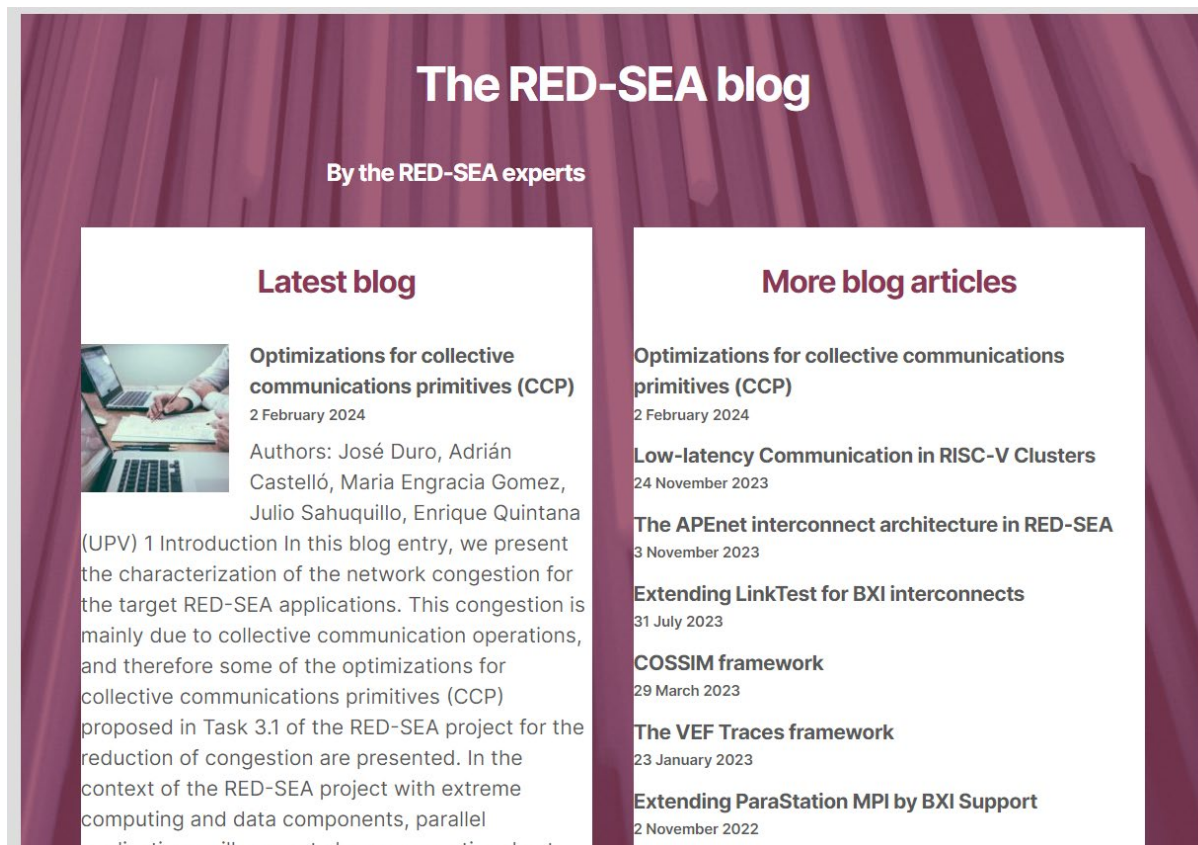
Figure 9 - Screenshot of the RED-SEA blog box displayed on the Home page

3.1.3 Social media

The RED-SEA accounts on X (formerly known as Twitter) and LinkedIn were used to drive visitors to the RED-SEA website and in particular to promote published papers, public presentations and events in which RED-SEA was involved. Publications on X and LinkedIn were programmed in advance whenever possible to ensure that both channels are used regularly and for a variety of topics. The Social Media programme was available as an Excel table in the RED-SEA private SharePoint.The performance of both accounts was analysed monthly by the Dissemination WP leader using the X and LinkedIn analytics tools when available (analytics tools in X are now only available to Premium accounts). This monitoring was available as an Excel table in the RED-SEA private SharePoint.

Interaction with the other SEA projects has been strong on social media: each project takes special care to retweet / share / like / mention the others as much as possible, and this makes a real difference on social media performance.

The new erratic policy of X has led to a loss of interest in this network, in general but also specifically within the HPC community. Several European HPC players actually stopped using X in 2023 (such as ISC or project EUMaster4HPC). From the start (and contrary to our initial expectations), LinkedIn proved to be more efficient and popular than X, and this became even truer in the last half of the project.

The frequency and success of the posts are well above the targeted KPIs. **The frequency of the posts was increased in the second half of the project, both on X and LinkedIn** (the data in Table 2 below is also included in the cumulative Table 1, reproduced here for readability purposes).

Table 3 - Social media KPIs

Dissemination Type	Targets	M1- M18	M19-M36	Total at M36
X	2 posts/month	69 posts (average 3.8/month)	119 (average 6.6 /month)	188 posts (average 5.2 /month)
	Average engagement rate[3] >= 1%	3,92%	5.78%	4.71%
LinkedIn	2 posts/month	54 posts (average 3/month)	92 posts (average 5.1 /month)	146 posts (average 4 /month)
	Average CTR[4] > 1,8%	4,63%	4.4%	4.4%

X/Twitter: 263 followers

The number of followers has progressed in the second half of the project (175 at M18) but not as much as initially expected. This is not specific to RED-SEA, we observe the same slowdown in other X project accounts. It is disappointing, even though our numbers compare well with similar projects started at the same time. However our small X community is very dedicated, which allows us to reach high engagement rates.

For future projects, we would recommend stopping to use X. Mastodon would be an appropriate alternative for the HPC community, or Bluesky, now that it is open to all. However, it would be a good idea for EuroHPC to issue a recommendation to all funded projects, so that they can migrate *en masse* to the same application for maximum effectiveness.

LinkedIn: 514 followers

This is well above our initial expectations, and the number of LinkedIn followers more than doubled in the second half of the project (221 at M18). It is a trend we are seeing in other projects too: LinkedIn has become a powerful social media for European funded projects. Its reputation as a "professional" tool allows to involve project participants that usually have no presence on social media.
The average Click-Through Rate is stable despite the strong growth of our community (usually, the CTR decreases as the number of followers grows).

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[3] X's engagement rate is calculated as the total number of engagements a post receives (likes, clicks, retweets) versus by the total number of impressions on this Post. It is used to measure the efficiency of a Post.

[4] CTR = Click-Through Rate. It is the number of clicks on a post versus the total number of impressions of this post. It is used to measure the efficiency of a post.

The figure below is based on our monthly social media statistics. It contrasts the overall performance of X and LinkedIn. The dotted Trend lines clearly show progress for LinkedIn and decrease for X. **Attention: the two graphs do not use the same scale.**
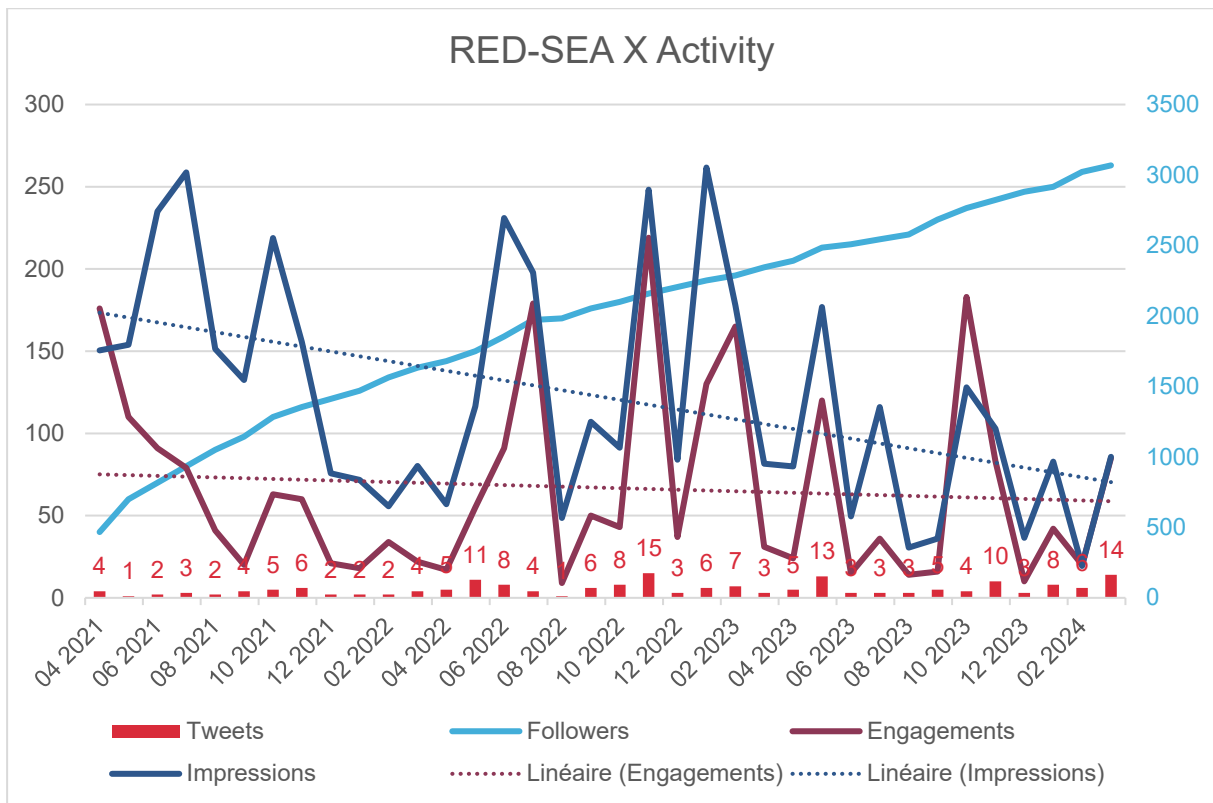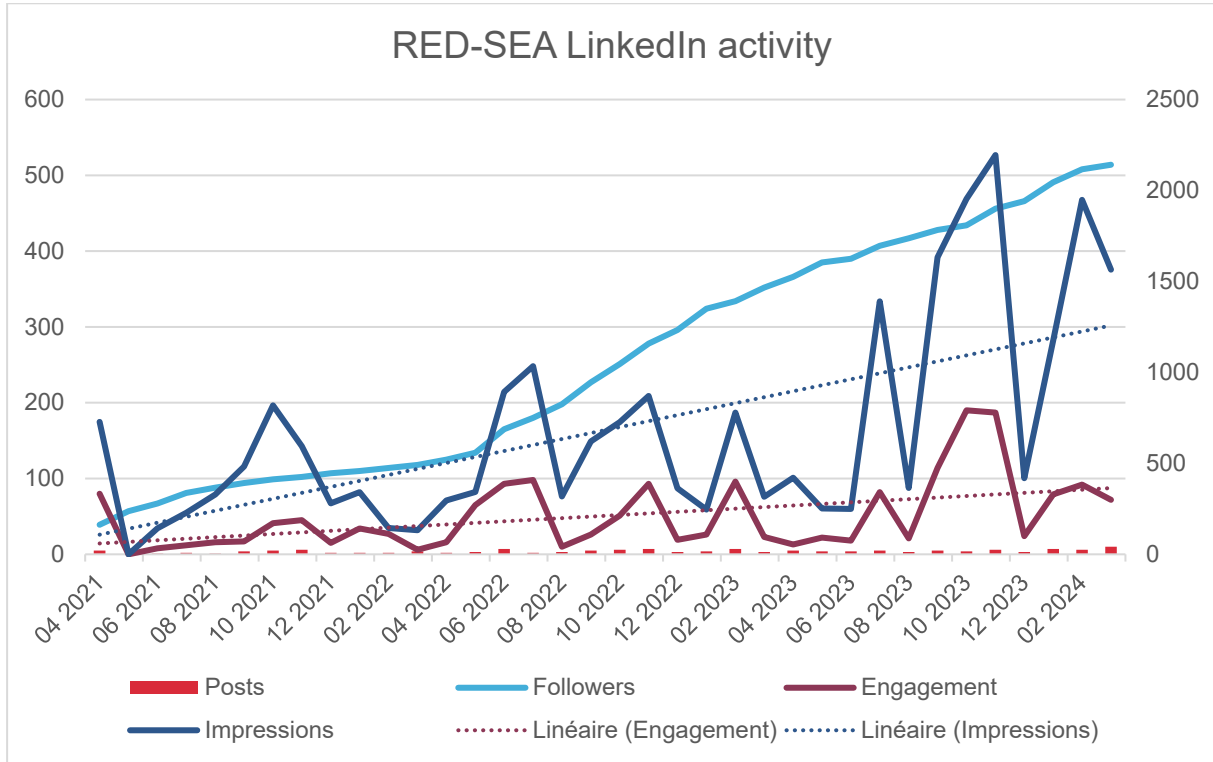
Figure 10- A comparison of the performance of RED-SEA's X and LinkedIn Accounts

YouTube

RED-SEA has a YouTube channel (https://www.youtube.com/channel/UCjD_QOd4xj0Ieb0lOnaQFuQ) but this is purely used as an easy way to store and share videos. Instead we are promoting the SEA YouTube channel https://www.youtube.com/channel/UCRIN8VDHwMNc_uCKVGFI-MA.

3.1.4   Events, presentations and workshops

Communication/dissemination activities were initially limited by the pandemic. As RED-SEA's communication budget is limited, we decided not to participate in purely virtual tradeshows during the first year of the project, and to save our budget for face-to-face events, which started again as of May 2022. This allowed us to take part actively to many events in the second half of the project.

For all communication and dissemination activities, we have favoured joint activities with other projects, both for budgetary reasons and to have maximum visibility.

A list of all planned/done dissemination activities was shared with all consortium partners in the RED-SEA private SharePoint (the data in Table 3 below is also included in the cumulative Table 1, reproduced here for readability purposes).

Table 4 - Events KPI

Dissemination Type	Targets	M1- M18	M19-M36	Total at M36
Dissemination events	>=6 events **over the total project duration**	6	8	14

In the second half of the project, RED-SEA participated in a total of 8 major events, which brings our total number of major dissemination events to 14 for the whole duration of the project. We were also involved in other events, but with a less prominent participation – for example a RED-SEA poster at the EuroHPC Summit. Here is an overview of the type of events we were involved in during the second half of the project, and the full list of events (for the whole project duration) is below in Table 5.

- 6 booths,
- 7 technical presentations in workshops/BoFs,
- 2 generic project presentations,
- 3 posters,
- 1 full-day RED-SEA workshop.

Table 5 - RED-SEA events and workshops
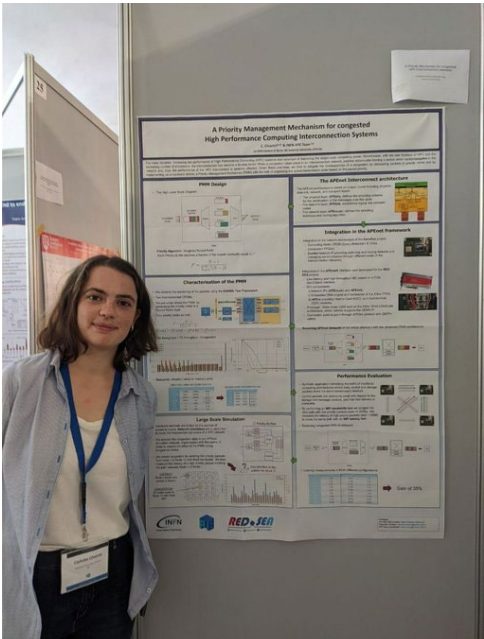
Date	Event	Activity	Partners involved
15-18/11/2021	**SC21** (Online)	RED-SEA flyer on the DEEP-SEA project corner of FZJ's virtual booth (no cost)	FZJ, Eviden
28/03/2022	**MAELSTROM dissemination workshop** (Online)	Presentation: The Red-Sea Project: Advanced EU-based Interconnect Technologies RED-SEA speaker: Nikos Xrysos (FORTH) https://events.ecmwf.int/event/294/	FORTH
25/05/2022	**Workshop sul Calcolo nell'I.N.F.N.** (Paestum, Italy)	Presentation: RED-SEA: network solution for ExaScaleArchitectures RED-SEA speaker: Andrea Biagioni (INFN) https://agenda.infn.it/event/30202/page/6177-overview	INFN
29/05-02/06/2022	**ISC 2022** (Hamburg, Germany)	Joint SEA booth (on site and online)	All

Date	Event	Activity	Partners involved
29/05-02/06/2022	**ISC2022** (Hamburg, Germany)	SEA BoF "Smart resource management beyond compute nodes" RED-SEA speaker: Grégoire Pichon (Eviden) https://app.swapcard.com/widget/event/isc-high-performance-2022/planning/UGxhbm5pbmd-fODYxMTgw	FZJ, CEA, Eviden
14-15/06/2022	**Teratec Forum** (Palaiseau, France)	RED-SEA booth in Europa Village	Eviden, CEA

Date	Event	Activity	Partners in-volved
20-22/06/2022	**HiPEAC 2022** (Budapest, Hungary)	Presentations (1 general, 1 technical) in workshop "HeLP-DC: Heterogeneous and Low-Power Data Center technologies in the EuroHPC Projects Context" RED-SEA speakers: Andrea Biagioni (INFN) and Pierre-Axel Lagadec (Eviden).	Eviden, INFN
13-18/11/2022	**SC22** (Dallas, USA)	• Joint SEA booth (managed by RED-SEA) with project ACROSS • SEA BoF: Disaggregated Heterogeneous Architectures RED-SEA speaker: Pierre-Axel Lagadec (Eviden) • RED-SEA research paper in the HPC Network Architecture session: "Building Blocks for Network-Accelerated Distributed File Systems" by ETHZ. This paper was produced in collaboration with DEEP-SEA and was a BEST PAPER FINALIST!	Eviden, FZJ, CEA

Date	Event	Activity	Partners involved
16-19/01/2023	**HiPEAC 2023** (Toulouse, France)	• Joint SEA-projects booth (managed by RED-SEA) • Presentation in workshop "CONCERTO" RED-SEA speaker: Andrea Biagioni (INFN) • Presentation in a workshop with the 10 Euro-HPC projects in our call "EuroHPC projects shaping Europe's HPC landscape" RED-SEA speaker: Andrea Biagioni (INFN) • Presentation in the Industrial Session RED-SEA speaker: Jean-Robert Bacou (Eviden) 	Eviden, FZJ, INFN and all
26/02/2023	**SIAM Conference on Computational Science and Engineering (CSE23)** (Amsterdam, Netherlands)	Joint SEA minisymposium RED-SEA speaker: Gilles Moreau (CEA) 	CEA, FZJ

Date	Event	Activity	Partners involved
20-23/03/2023	**EuroHPC Summit Week** (Gothenburg, Sweden)	Project poster RED-SEA speaker: Gilles Moreau (CEA) 	Eviden, CEA
21-25/05/2023	**ISC 2023** (Hamburg, Germany)	• SEA mini-booth on the EuroHPC JU booth • Project presentation on the EuroHPC "theatre" RED-SEA speaker: Pascale Bernier-Bruna (Eviden) 	All

Date	Event	Activity	Partners involved
31/05-01/06/2023	**Teratec Forum** (Paris, France)	SEA booth in Europa village	Eviden, CEA
09-15/07/2023	**ACACES 2023** Fiuggi (Italy)	Research poster "A priority management mechanism for congested HPC interconnection systems" presented by Ph.D student Carlotta Chiarini from INFN's APELab	INFN

Date	Event	Activity	Partners in-volved
12-17/11/2023	**SC23** (Denver, CO, USA)	• Joint SEA booth with ACROSS project (managed by RED-SEA) • Joint BoF (SEA and other projects): Power Consumption and Exascale Computing: Toward a "Short Production Circuit" Model RED-SEA speaker: Antoine Capra (Eviden) 	Eviden, CEA, FZJ
16/01/2024	**Final SEA workshop** Munich (Germany)	A Flexible, Integrated Software Stack for HPC Systems Independent event before the HiPEAC Conference RED-SEA speakers: Jesús Escudero-Sahuquillo and Pedro J. García (UCLM) 	FZJ, UCLM, Eviden

Date	Event	Activity	Partners involved
17-19/01/2024	**HiPEAC 2024** Munich (Germany)	• Joint SEA booth • Full-day RED-SEA workshop to share the outcomes of our research "RED-SEA: Next-generation European interconnect network for Exascale". • Presentation in workshop "EuroHPC Projects Shaping Europe's HPC Landscape" RED-SEA speaker: Jesús Escudero-Sahuquillo (UCLM) 	Eviden, UCLM, FORTH, CEA
18-21/03/2024	**EuroHPC Summit** Antwerp (Belgium)	• Project poster • RED-SEA was presented in the session Co-Designing the Future of European HPC: Eco-friendly Technologies, Systems and Software 	Eviden, ParTec

3.1.5 Press

On 5 August 2022, the SEA projects were featured in an HPCwire article entitled "SEA Changes: How EuroHPC Is Preparing for Exascale" (https://www.hpcwire.com/2022/08/05/sea-changes-how-euro-hpc-is-preparing-for-exascale/). The article details the contributions of DEEP-SEA, IO-SEA and RED-SEA for the imminent arrival of European exascale computing. This was the outcome of the "Project spotlight" on the SEA projects published by the EuroHPC JU a few days earlier.

The SEA projects issued **a joint press release** on 14 March 2024 to mark the end of the three projects: https://sea-projects.eu/sea-projects-preparing-europe-for-the-future-of-supercomputer/.
The press release was focused on how the technologies developed by the projects were put to use – in Jupiter and EUPEX. This press release was promoted by all three projects on social media.

This press release was published in HPCwire (https://www.hpcwire.com/off-the-wire/the-sea-projects-are-preparing-europe-for-the-future-of-supercomputing/) and generated a nice article in golem.de (https://www.golem.de/news/supercomputing-europa-setzt-auf-neue-generation-von-exascale-super-computern-2403-183240.html)

3.1.6 Publications

The number of publications exceeds the target. During the second half of the project, the number of publications was considerably higher than in the first half of the project (12 vs 7). More consortium partners contributed to publications – though ETH Zürich remains the leader by far – and there were a number of joint publications involving two consortium partners.

It must be noted that as a large number of deliverables were scheduled for the very end of the project, the corresponding publications were also prepared and submitted at the end of the project. Therefore, at the time of writing, we are still waiting for the results of some submissions, and work is still on-going to submit more publications after the project end. **14 additional publications could potentially be released after the end of the project**: 1 is accepted but not yet published, 8 were submitted before the end of the project, 5 will be submitted in the coming months. The full list of submitted and planned publications is included at the end of *Table 7 - RED-SEA publication*s.

All RED-SEA publications are available in Open Access. Whenever the publisher did not give the option to publish in open access, we made sure a pre-print was available in open access. Publications are listed:

- in the About section of the RED-SEA website (https://redsea-project.eu/about/#publications);
- to facilitate access, they are also listed in the Results section of the RED-SEA website, under the relevant topic (https://redsea-project.eu/results/),
- and finally they have been uploaded to the RED-SEA community in the open-access repository Zenodo, so as to reach a larger audience (**833 downloads at the time of writing**).

A list of all planned/done dissemination activities including publications was shared in the private RED-SEA SharePoint, so that all members of the RED-SEA consortium could follow the progress.

Table 6 - Publications KPI

Dissemination Type	Targets	M1- M18	M19-M36	Total at M36
Publications	>=10 publications over the total project duration	7	12 + 1 accepted but pending + 8 submitted + 5 planned	19 + 1 accepted but pending + 8 submitted + 5 planned

Table 7 - RED-SEA publications

Date	Event or Journal	Title	Partners involved
16/06/2021	**ISCA 2021** (Online)	S. Di Girolamo et al., "*A RISC-V in-network accelerator for flexible high-performance low-power packet processing*," 2021 ACM/IEEE 48th Annual International Symposium on Computer Architecture (ISCA), Valencia, Spain, 2021, pp. 958-971, doi: 10.1109/ISCA52012.2021.00079. https://ieeexplore.ieee.org/document/9499874 Open Access version: https://arxiv.org/pdf/2010.03536.pdf	ETHZ

Date	Event or Journal	Title	Partners involved
19/11/2021	**SC21** (St Louis, USA and online)	Daniele De Sensi, Salvatore Di Girolamo, Saleh Ashkboos, Shigang Li, and Torsten Hoefler. 2021. *Flare: flexible in-network allreduce*. In Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC '21). Association for Computing Machinery, New York, NY, USA, Article 35, 1–16. https://doi.org/10.1145/3458817.3476178 https://dl.acm.org/doi/10.1145/3458817.3476178 Open Access version: https://arxiv.org/abs/2106.15565 https://spcl.inf.ethz.ch/Publications/.pdf/desensi-flare.pdf	ETHZ
16/03/2022	**DATE 22** (Antwerp, Belgium and online)	A. Cossettini, K. Taranov, C. Vogt, M. Magno, T. Hoefler and L. Benini, "*A RDMA Interface for Ultra-Fast Ultrasound Data-Streaming over an Optical Link*," 2022 Design, Automation & Test in Europe Conference & Exhibition (DATE), Antwerp, Belgium, 2022, pp. 80-83, doi: 10.23919/DATE54114.2022.9774599. https://ieeexplore.ieee.org/document/9774599 Open Access version: https://spcl.inf.ethz.ch/Publications/index.php?pub=437	ETHZ
20/05/2022	**IEEE Transactions on Parallel & Distributed Systems**	A. Psistakis *et al.*, "*Optimized Page Fault Handling During RDMA*," in *IEEE Transactions on Parallel and Distributed Systems*, vol. 33, no. 12, pp. 3990-4005, 1 Dec. 2022, doi: 10.1109/TPDS.2022.3175666. https://ieeexplore.ieee.org/document/9779430	FORTH
30/05-03/06/2022	**IPDPS 2022** (Lyon, France)	A. Strausz, F. Vella, S. Di Girolamo, M. Besta and T. Hoefler, "*Asynchronous Distributed-Memory Triangle Counting and LCC with RMA Caching*," 2022 IEEE International Parallel and Distributed Processing Symposium (IPDPS), Lyon, France, 2022, pp. 291-301, doi: 10.1109/IPDPS53621.2022.00036. https://ieeexplore.ieee.org/document/9820724 Open Access version: https://arxiv.org/abs/2202.13976	ETHZ
12-17/06/2022	**SIGMOD'22** (Philadelphia, PA, USA)	Konstantin Taranov, Steve Byan, Virendra Marathe, and Torsten Hoefler. 2022. *KafkaDirect: Zero-copy Data Access for Apache Kafka over RDMA Networks*. In Proceedings of the 2022 International Conference on Management of Data (SIGMOD '22). Association for Computing Machinery, New York, NY, USA, 2191–2204. https://doi.org/10.1145/3514221.3526056 https://2022.sigmod.org/sigmod_industrial_list.shtml Open Access version: http://spcl.inf.ethz.ch/Publications/index.php?pub=440	ETHZ
28/06/2022	**ICS'22** (online)	Alexandru Calotoiu, Tal Ben-Nun, Grzegorz Kwasniewski, Johannes de Fine Licht, Timo Schneider, Philipp Schaad, and Torsten Hoefler. 2022. *Lifting C semantics for dataflow optimization*. In Proceedings of the 36th ACM International Conference on Supercomputing (ICS '22). Association for Computing Machinery, New York, NY, USA, Article 17, 1–13. https://doi.org/10.1145/3524059.3532389 https://dl.acm.org/doi/10.1145/3524059.3532389	ETHZ

Date	Event or Journal	Title	Partners involved
31/08-02/09/2022	**Euromicro DSD 2022** (Gran Canaria, Spain)	A. Biagioni et al., "***RED-SEA: Network Solution for Exascale Architectures***," 2022 25th Euromicro Conference on Digital System Design (DSD), Maspalomas, Spain, 2022, pp. 712-719, doi: 10.1109/DSD57027.2022.00100. https://ieeexplore.ieee.org/document/9996916 Open Access version: https://zenodo.org/records/10718578	All (coordinated by INFN)
7-11/11/2022	**ACM CCS** (Los Angeles, CA, USA)	Konstantin Taranov, Benjamin Rothenberger, Daniele De Sensi, Adrian Perrig, and Torsten Hoefler. 2022. ***NeVerMore: Exploiting RDMA Mistakes in NVMe-oF Storage Applications***. In Proceedings of the 2022 ACM SIGSAC Conference on Computer and Communications Security (CCS '22). Association for Computing Machinery, New York, NY, USA, 2765–2778. https://doi.org/10.1145/3548606.3560568 Open Access version: https://arxiv.org/abs/2202.08080	ETHZ
14-18/11/2022	**SC22** (Dallas, TX, USA)	Salvatore Di Girolamo, Daniele De Sensi, Konstantin Taranov, Milos Malesevic, Maciej Besta, Timo Schneider, Severin Kistler, and Torsten Hoefler. 2022. ***Building blocks for network-accelerated distributed file systems.*** In Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis (SC '22). IEEE Press, Article 10, 1–14. https://dl.acm.org/doi/abs/10.5555/3571885.3571898 Open Access version: https://arxiv.org/abs/2206.10007	ETHZ in collaboration with DEEP-SEA
8/12/2022	**Proceedings of the ACM on Measurement and Analysis of Computing Systems**	Daniele De Sensi, Tiziano De Matteis, Konstantin Taranov, Salvatore Di Girolamo, Tobias Rahn, and Torsten Hoefler. 2022. ***Noise in the Clouds: Influence of Network Performance Variability on Application Scalability.*** Proc. ACM Meas. Anal. Comput. Syst. 6, 3, Article 49 (December 2022), 27 pages. https://doi.org/10.1145/3570609	ETHZ
8-12/05/2023	CHEP 23 Norfolk, VA, USA	***Outlines in hardware and software for new generations of exascale interconnects*** Paper accepted and presented, **publication through EPJ Web of Conferences planned in Spring 2024** Conference webpage: https://www.jlab.org/conference/CHEP2023 Presentation slides: https://indico.jlab.org/event/459/contributions/11806/attachments/9260/13429/chep2023_REDSEA_Martinelli.pdf	INFN
15-19/05/2023	**IPDPS 2023** (Saint Petersburg, FL, USA)	M. Copik, K. Taranov, A. Calotoiu and T. Hoefler, "***rFaaS: Enabling High Performance Serverless with RDMA and Leases***," in 2023 IEEE International Parallel and Distributed Processing Symposium (IPDPS), St. Petersburg, FL, USA, 2023 pp. 897-907. doi: 10.1109/IPDPS54959.2023.00094 https://www.computer.org/csdl/proceedings-article/ipdps/2023/376600a897/1OSIc8YaNQQ Open Access version: http://arxiv.org/abs/2106.13859	ETHZ
16/05/2024	**Arxiv**	Copik, M., Calotoiu, A., Taranov, K., and Hoefler, T., "***FaaSKeeper: Learning from Building Serverless Services with ZooKeeper as an Example***", *arXiv e-prints*, 2022. doi:10.48550/arXiv.2203.14859. https://arxiv.org/abs/2203.14859v2	ETHZ

Date	Event or Journal	Title	Partners involved
21-23/06/2023	**ICS'23** (Orlando, FL, USA)	Marcin Copik, Roman Böhringer, Alexandru Calotoiu, and Torsten Hoefler. 2023. *FMI: Fast and Cheap Message Passing for Serverless Functions*. In Proceedings of the 37th International Conference on Supercomputing (ICS '23). Association for Computing Machinery, New York, NY, USA, 373–385. https://doi.org/10.1145/3577193.3593718 Open Access version: https://arxiv.org/abs/2305.08763	ETHZ
20-22/09/2023	**XXXIII Jornadas de Paralelismo** (Ciudad Real, Spain)	Duro, J., Castello, A., Gomez, M. E., Sahuquillo, J., Quintana, E., Gomez, G., Sanchez, M., Escudero-Sahuquillo, J., Garcia, P. J., Alfaro, F. J., Sanchez, J. L., & Quiles, F. J, « *Proyecto RED-SEA: Resultados Intermedios* », presented at XXXIII Jornadas de Paralelismo (JP23), Ciudad Real, Spain, sept. 2023. doi: 10.5281/zenodo.10688152. https://doi.org/10.5281/zenodo.10688152	UPV, UCLM
29/10/2023	**Future Generation of Computer Systems**	Daniele De Sensi, Edgar Costa Molero, Salvatore Di Girolamo, Laurent Vanbever, Torsten Hoefler, **Canary: Congestion-aware in-network allreduce using dynamic trees**, Future Generation Computer Systems, Volume 152, 2024, Pages 70-82, ISSN 0167-739X, https://doi.org/10.1016/j.future.2023.10.010.	ETHZ
11/11/2023	SC23 (Denver, CO, USA)	Marcin Chrapek, Mikhail Khalilov, and Torsten Hoefler. 2023. *HEAR: Homomorphically Encrypted Allreduce*. In Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC '23). Association for Computing Machinery, New York, NY, USA, Article 36, 1–17. https://doi.org/10.1145/3581784.3607099	ETH
15/12/2023	**IEEE Big Data 2023** (Sorrento, Italy)	W. Qiu, M. Copik, Y. Wang, A. Calotoiu and T. Hoefler, "*User-guided Page Merging for Memory Deduplication in Serverless Systems*," 2023 IEEE International Conference on Big Data (BigData), Sorrento, Italy, 2023, pp. 159-169, doi: 10.1109/BigData59044.2023.10386487. https://doi.org/10.1109/BigData59044.2023.10386487 Open Access version: https://arxiv.org/abs/2311.13588	ETHZ
19/01/2024	**Arxiv**	Möller, L., Copik, M., Calotoiu, A., and Hoefler, T., "*Cppless: Productive and Performant Serverless Programming in C++*", *arXiv e-prints*, 2024. doi:10.48550/arXiv.2401.10834. https://arxiv.org/abs/2401.10834	ETHZ
Submitted	**MicPro**	Follow-up paper on results for EPDSD (follow up of 10.1109/DSD57027.2022.00100)	UPV and ALL
Submitted	**Euro-Par 2024** (26-30/08, Madrid, Spain)	Design and Evaluation of a Hybrid Congestion Control Mechanism for Interconnection Networks using BXIv3 technology	UCLM, Eviden
Submitted	**Euro-Par 2024** (26-30/08, Madrid, Spain)	Quality-of-Service Provision for High-Performance Ethernet-based Interconnection Networks	UCLM, Eviden

Date	Event or Journal	Title	Partners involved
Submitted	**Euro-Par 2024** (26-30/08, Madrid, Spain)	Efficient adaptive routing solutions for BXI-based Dragonfly+ networks	UCLM
Submitted	**Euro-Par 2024** (26-30/08, Madrid, Spain)	Efficient adaptive routing solutions for the next generations of BXI-based interconnection networks	UCLM
Submitted	**Euro-Par 2024** (26-30/08, Madrid, Spain)	One-to-Many Communication Primitives in DragonFly Networks with Scientific Workloads	UPV
Submitted	**CEDI 2024** (17-21/06, A Coruña, Spain)	Análisis de Interferencias en la Red de Interconexión entre Aplicaciones Exascale	UPV
Submitted	**CEDI 2024** (17-21/06, A Coruña, Spain)	Análisis de prestaciones de primitivas colectiva de uno a varios en redes DragonFly con cargas de trabajo de exaescala	UPV
Planned	**IEEE CAL journal**	Communication and Congestion Characterization in High-Performance Interconnection Networks	UCLM, UPV
Planned	**DS-RT 2024** (7-9/10, Urbino, Italy)	Accurate and Distributed Simulation of ARM and RISC-V HPC Systems running MPI applications	EXAPSYS, UCLM
Planned	**Open Research Europe**	Summary research paper based on D1.4 and presenting the global outcomes of the project	FORTH and ALL
Planned	**TBD**	Advanced Accurate Congestion Control in Hardware Platform	FORTH
Planned	**TBD**	The caRVnet Lean Network Interface Card	FORTH

Collaboration with the SEA projects

Specific SEA dissemination meetings were held monthly involving the dissemination stakeholders of the three SEA projects. They formed a small, close-knit group who regularly supported each other to give maximum visibility to each of the 3 projects, both on social networks and at face-to-face events. The success of this collaboration for dissemination is clearly visible throughout the activities listed in *3.2.4 Events, presentations and workshops*.

Together, the three SEA projects have:

* created and then extended a joint website https://sea-projects.eu/ and a joint YouTube channel;
* submitted and then organised a SEA workshop at ISC 2022;
* set up a joint SEA booth at ISC 2022, and prepared a joint video, joint goodies, joint raffle for this booth;
* set up a joint SEA booth at SC22, and organised a joint SEA BoF ;

- set up a joint booth at HiPEAC 2023;
- organised a joint mini symposium at CSE23;
- set up a joint booth at Teratec Forum 2023;
- shared a mini-booth on the EuroHPC booth at ISC 2023;
- set up a joint SEA booth at SC23, and organised a joint BoF;
- organised a full-day SEA workshop just before HiPEAC 2024;
- set up a joint SEA booth at HiPEAC 2024;
- released a joint final Press Release.

A **joint publication with DEEP-SEA** was issued:

Salvatore Di Girolamo, Daniele De Sensi, Konstantin Taranov, Milos Malesevic, Maciej Besta, Timo Schneider, Severin Kistler, and Torsten Hoefler. 2022. *Building blocks for network-accelerated distributed file systems.* In Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis (SC '22). IEEE Press, Article 10, 1–14. https://dl.acm.org/doi/abs/10.5555/3571885.3571898
Open Access version: https://arxiv.org/abs/2206.10007

We have created a public repository to store all the **traces obtained from the collaboration with DEEP-SEA**, together with the offline analysis reports. This repository can be found here: https://gitraap.i3a.info/jesus.escudero/vef-traces-repository.

The **collaboration with IO-SEA** concluded with an article published on our website: https://redsea-project.eu/collaborations-between-the-io-sea-and-red-sea-projects/

3.2   Other collaborations

Some communication / dissemination actions were also achieved with other EuroHPC projects:

- SC22: the SEA booth was also shared with project ACROSS;
- HiPEAC 2023: presentation in workshop "EuroHPC projects shaping Europe's HPC landscape" organised by the 10 projects in our call, and in CONCERTO, a workshop on projeCts crOss-synergy iN advanCing Exascale platfoRms and quanTum cOmputing, organised by project ACROSS;
- SC23: the SEA booth was also shared with project ACROSS;
- HiPEAC 2024, participation in workshop "EuroHPC projects shaping Europe's HPC landscape" organised by the 10 projects in our call.

Appendix A - Acronyms

Acronym	Definition
ASIC	Application-Specific Integrated Circuit
BoF	Bird of a Feather
BXI	BullSequana eXascale Interconnect
CPU	Central Processing Unit
CTR	Click-Through Rate
FPGA	Field Programmable Gate Array
GDPR	General Data Protection Regulation
GPU	Graphics Processing Unit
KPI	Key Performance Indicator
MSA	Modular Supercomputing Architecture
RISC-V	Reduced Instruction Set Computer 5
SIMD	Single-Instruction Multiple-Data
WP	Work Package

Table 8 - Table of acronyms used in this document