



# D1.13 – Final Dissemination Report

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## ABSTRACT

This document summarizes the communication and dissemination activities carried out following the plan described in D1.9 (M18) and designed to achieve the goals described in the BIG-MAP Grant Agreement, i.e., to present actions to maximize the visibility and impact of the project and project results, and the steps to ensure alignment with the BATTERY 2030+ Communication Strategy.

The main actions are described and categorized, specifying the target audiences and the communication and dissemination channels.

The results generated have been disseminated within the battery R&D community via (so far) 92 peer-reviewed papers in scientific journals and presentations at scientific conferences and workshops (201 oral + 63 posters), with high- channels being preferred. Besides the website and social media accounts, the activities within BIG-MAP have received comprehensive coverage in popular science and mass media, so a large generic audience has been targeted (specific *ad hoc* video developed).

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## 1. Introduction

The BIG-MAP Dissemination and Communication Plan (D1.9, M18) was designed to fulfill the dissemination and communication obligation applying for any H2020 project, following the strategy described in the Description of Action (DOA), part B, and targeting the quantitative measures settled there.

The global aim of the dissemination and communication effort throughout the project has been to create maximum awareness about the BIG-MAP vision, the related outcome, and the impact on the European efforts to develop the next generations of high-performance, sustainable batteries, and the role of these batteries in the European transition to a net-zero energy supply in 2050. A very relevant distinctive feature is that the plan is aligned with the BATTERY 2030+ Communication Strategy.

In this regard, and for better compliance with the overall goal of maximizing the visibility and impact of the projects within the BATTERY 2030+ umbrella, an application as a Project Group was put together for the Horizon Results Booster service “Portfolio Dissemination & Exploitation Strategy”.

## 2. Dissemination and communication activities

The BIG-MAP dissemination and communication effort targeted the groups specified in the DoA, Part B, Table 2.3 and followed the strategy described in Table 2.5 of the same document, with the main relevant addition being the joint participation in the Horizon Results Booster program in the framework of a Project Group application led by BATTERY2030+. First Module A (“Identifying and creating the portfolio of R&I project results” was granted, and a portfolio of Dissemination and Exploitation Strategy (PDES) was put together in July 2022 for joint dissemination, including also a mapping of the relevant stakeholders/target audience. Once Module A was completed, a new application was submitted and further granted for Module B to assist in complementing the visual identity. A [short video](#) describing the main results achieved within the projects was completed in May 2023. In addition, capacity-building courses on communication and dissemination were made available to all project participants.

Specific concrete actions explicitly taken in the framework of BIG-MAP to implement the strategy to reach the defined quantitative goals are reported below. Subsection 2.1 describes the dissemination actions, i.e., the actions targeting the transfer of knowledge, results, data, and tools to users interested in exploiting these, while subsection 2.2 is about communication or, more precisely, about reaching out with information about the impact of BIG-MAP to the broad public. Tables 1 and 2 give the quantitative targets' status at the project's end.

### 2.1 Dissemination actions

Below are described the prioritized actions, which can primarily be categorized into: dissemination via publication of the generated results, tools, and knowledge, and dissemination via the organization of events bringing general focus on the overall BIG-MAP effort, with special emphasis on selected Stakeholders.

**Publication of papers in scientific journals**

The generated results have been disseminated within the battery R&D community via 92 peer-reviewed papers (per 28/2-2024) in scientific journals (Table 1).

**Table 1.** List of the journals and number of papers per journal

Journal	No.	Journal	No.
ACS Appl. Mater. Interfaces	1	J. Chem. Educ.	1
ACS Energy Letters	1	J. Chem. Inf. Model.	1
ACS Materials Letters	1	J. Chem. Phys.	5
Advanced Energy Materials	10	J. Chem. Theory Comput.	2
Advanced Functional Materials	1	J. Electrochem. Soc.	5
Advanced Intelligent Systems	1	J. Energy Storage	1
Advanced Materials Interfaces	2	J. Mater. Chem. A	4
Applied Energy Materials	1	J. Phys. Energy	3
Chemical Reviews	2	J. Power Sources	4
Chemistry Methods	2	Machine Learning: Science and Technology	2
ChemSusChem	1	Materials Advances	1
Computer Physics Communications	1	Materials Today Communications	1
Digital discovery	4	Matter	2
Electrochemical Science Advances	1	Nature Communications	2
Electrochimica Acta	2	npj Computational Materials	3
Energies	1	Phys. Chem. Chem. Phys.	2
Energy & Environmental Science	1	Phys. Rev. B	1
Energy Storage Materials	3	Scientific Data	3
Environmental Science & Technology	1	Scientific Reports	1
IEEE Sensors Journal	1	Small Structures	1
		Surface and interface analysis	1

All journal papers are open access via a 'gold' or a 'green' model (depending on the journal policy and the potential impact of the publication on the scientific community), and funding is duly recognised following the EU standard acknowledgement. The number of publications in tier 1 journals like Chemical Reviews (2), Joule (2), Energy & Environmental Science (1), Matter (2), and Adv. Energy Mater. (9) deserves to be highlighted.

**Publication of software, code, and scripts**

The [BIG-MAP GitHub Organisation](#) contains 65 code [repositories](#), 38 are public, e. g., the [BattINFO Ontology](#) and the [Robotic Platform controller](#), covering various aspects of the digital battery research. The [BIG-MAP App Store](#) currently contains 30 apps. The apps, for example [AiiDALab App](#) for simulation, [FullProfAPP](#) for data analysis as well as [Datalab](#) and [Onterface](#) for data management cover the full research data life cycle. To be published, apps need to be open source (source code provided for the public, e. g., in the BIG-MAP GitHub Organisation) and provide proper documentation including video tutorials how to install and to use them. A demonstration video explaining the features of the application has been added to each app in the App Store.



### Publication of data

In order to facilitate the immediate sharing of data within BIG-MAP, we have deployed (since Dec 2022) the BIG-MAP Archive server. It is a private server, where access is given with secure credentials only to BIG-MAP users, and that allows researchers of BIG-MAP to publish their data as soon as possible, to make it accessible to the whole consortium even before publication of the respective scientific article.

The server is available at <https://archive.big-map.eu>. All BIG-MAP members have received an account to the archive. Multiple training events have been put in place in 2022 and 2023 (online or as part of the various BIG-MAP conferences, workshops and project meetings) to inform and train project members to their use; a demo instance used for training is also deployed and available at <https://big-map-archive-demo-public.materialscloud.org> (so that test data uploaded during training does not mix and pollute the “production” BIG-MAP data space).

Thanks to the server, data can be immediately shared within the consortium; researchers in BIG-MAP have been trained and strongly encouraged to publish the data there as soon as possible. The BIG-MAP Archive also provides a programmatic API to facilitate data upload and download from scripts rather than from a web interface. This allows in particular the automated upload of data from autonomous platforms as soon as measurements are performed, e.g., via the FINALES platform (see, e.g., discussions in deliverables D9.6 and D10.4).

The platform can be extended to support the needs of all BATTERY 2030+ projects, with each project having their own private space, as well as a shared BATTERY 2030+ dataspace where data can be shared with any other BATTERY 2030+ project. This was presented at the BIG-MAP EUnified Battery Data Space Workshop, taking place in Grindelwald (Switzerland) on 29-31 January 2024 together with activities within several WP (WP7, WP9, WP10) to facilitate and automate semantic annotation of data (e.g., with links to ontologies).

Once data has been curated in the BIG-MAP Archive, it’s already in the correct format (with appropriate open file formats, readme files, standardized metadata, semantic annotations) to be shared with the public, once the corresponding paper is published. This can happen on several open trusted data repositories, such as Zenodo (<https://zenodo-rdm.web.cern.ch>) or Materials Cloud Archive (<https://archive.materialscloud.org>). These repositories make data findable by providing a DOI, accessible by anyone on the web, and ensure long-term preservation of the same data. Several of the BIG-MAP datasets are being downloaded frequently, e.g., the [MultiXC](#) (>1800 times) and [Transition1x](#) (>600 times). We recommend using appropriate keywords when publishing data on those repositories, such as the “BIG-MAP” keyword on the Materials Cloud Archive. Performing a search on the platform with this keyword will therefore show all entries associated with BIG-MAP.

### Presentations at scientific conferences, workshops, and networking events

BIG-MAP has been very active presenting results at relevant events. The strategy has been to present the scientific results in targeted conferences and workshops and promote the developed standards, protocols, and tools in networking events targeting potential users, including the broader scientific community and platforms with activity related to BIG-MAP goals.



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The most relevant elements that have been promoted are, e.g., the developed data standards and battery testing protocols, the BattINFO ontology (<https://doi.org/10.5281/zenodo.6304783>), the BIG-MAP online laboratory notebook, and online tutorials and webinars.

To date, BIG-MAP accounts for 264 presentations at conferences and workshops (201 of them oral), plus an additional number at seminars and networking events.

BIG-MAP arranged stakeholder events targeting industry, professional/business organizations, policy makers etc. On the 16th of March 2021 from 4:30 pm until 6 pm, BIG-MAP organised the first online Stakeholder Event with the aim to create awareness of the BIG MAP project and find collaborators for the different BIG-MAP open calls. It gathered 165 participants that discovered the BIG-MAP project ambition, its challenges and the motivations and expectations from partners of different industries involved in the project. More importantly, participants were also given a chance to bring their contribution by applying to open calls for stakeholder initiatives.

The second Stakeholder Event was organised on the 17<sup>th</sup> of December, 2021 from 2 until 4 pm CET. A total of 218 registrations were received and more than 130 participants finally attended the online event. During the webinar, we showcased the BIG-MAP first achievements in some of the main dimensions that BIG-MAP is investigating: AI and *in silico* design, data management and infrastructure, and experimental characterization and testing. This event was also taken as an opportunity to present synergies with other projects BATTERY 2030+ projects. At the same time, the 2<sup>nd</sup> call for “BIG-MAP Stakeholder Initiatives” was launched to fund a number of smaller collaborative projects between BIG-MAP partners and stakeholders.

94% of the attendees were European (including Switzerland and UK), the rest being from either North- or South- America, Japan or the Middle East. Academia or governmental research organizations accounted for 70% of the attendees and 28% were from the private sector. Besides being a forum for the exchange of information between the BIG-MAP consortium and potential users of BIG-MAP output, the events served to disseminate *Stakeholder Initiatives*. These are open calls for proposals for small (< 100.000 € in total) collaborative projects between one or more external stakeholders and one or more BIG-MAP partners targeting the integration of the BIG-MAP infrastructure in the European value chain for battery discovery and development. The initiative was a success with 23 proposals being received in total, amongst which seven were funded after assessment according to (i) the value to BATTERY 2030+ and the European battery community (30%), novelty and impact (30%), feasibility (20%) and PI track record (20%).

### Others

Due to the size of the BIG-MAP project, there is a need for constant stimulation of activities to maintain effective dissemination across the BIG-MAP partners, the work packages, and the researchers. The non-senior researchers were given particular focus in this context, because they do not have a seat in any of the boards and groups handling the day-to-day coordination of the scientific work.

Essential means for stimulating the cross-project disseminations have been:

- The 12 Key Demonstrators drawing on competences in more work packages.
- The biannual project meetings designed to give the BIG-MAP PhD students and postdocs insight into the wealth of scientific tasks and disciplines included in the project and



stimulate collaboration across the non-senior team members. Three PhD students and three postdoc awards were given at the last project meeting being held in Brussels October 24<sup>th</sup> -25<sup>th</sup> 2023.

- The BIG-MAP travel fund set aside in the budget for stimulating collaboration between work packages and partners, has resulted in 18 exchanges between partners (typically 1 to 3 months duration).

**Table 2.** Status of dissemination actions. Bold text marks actions and targets described in the Grant Agreement.

Dissemination channel	What	Project target	Status at the end of the project
Scientific publications	<b>Journal papers</b>	<b>60-80 peer-reviewed papers</b>	92 papers already published
	Apps in App Store		30 apps
	Software, code, scripts in GitHub registry		65 objects
	Data in open repositories		206 as of February 2024 (pending final uploads), plus many currently in the private big-map archive.
Presentations in scientific conferences and workshops	<b>Oral and poster presentations</b>	<b>100-150 presentations</b>	264
Presentations in networking events	<b>Promotion of BIG-MAP data standards, testing protocols, online tools, etc.</b>	<b>25 presentations</b>	72
	BIG-MAP <b>stakeholder meetings</b> and training events, as well as online tutorials and webinars	<b>30-50 participants</b>	2 webinars with a total of 230 participants

## 2.2 Communication actions

The prioritized communication actions have been axed around BIG-MAP website ([www.big-map.eu](http://www.big-map.eu)), active and broad outreach via social media (Twitter @BIGMAP\_EU, [www.linkedin.com/company/big-map/](https://www.linkedin.com/company/big-map/)) and targeted interaction via mass media. Table 3 gives an overview of the actions with reference to the plan described in the DoA, Part B, and status on the quantitative targets at the end of the project.

**Table 3.** Status of communication actions. Bold text marks actions and targets described in the Grant Agreement.

Communication channel	Type of information	Target	Status per Feb. 2022
<b>Project website</b>	General information: project objective and partners	<b>&gt;500 unique stakeholder registrations<sup>1</sup></b>	~17000 unique visitors (the need for registration was
	Announcements:		

<sup>1</sup> Refers to the abandoned system for registrations, i.e., the target is no longer relevant.



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	publications, events, and open positions	<b>&gt; 1000 downloads<sup>2</sup></b>	abandoned to simplify)
	Access to BIG-MAP tools: App Store, GitHub registry, and online Laboratory Notebook		
<b>Social media</b> (LinkedIn, Twitter, YouTube)	Information about breakthroughs publications, project events, and project updates	<b>&gt;1000 unique followers</b>	Twitter: 1302 followers, 489 tweets LinkedIn: 1093 followers
<b>Mass media</b>	Press releases about key results targeting media		21 press releases
	Interview and popular science articles targeting the general audience	<b>2-3 articles per year</b>	>43 newspaper & magazine articles, some of them includes interviews > 2 videos 2 TV broadcasts 1 podcast

### Project website

The project website, [www.big-map.eu](http://www.big-map.eu), designed for servicing a broad audience with easy-to-access online general information about BIG-MAP (deliverable D1.1). The website served also as a one-point-of-access to the BIG-MAP App Store, the BIG-MAP GitHub registry, and the BIG-MAP online laboratory notebook.

Due to changed provider of webpage statistics in October 2021, the exact number of unique visitors is unfortunately not available. However, statistics from the two monitoring providers covering two different periods shows:

- 7092 unique visitors in the period December 2020 – October 2021
- 10117 unique visitors in the period November 2021 – February 2024

This sums up to >17000, but some visitors might have been counted twice. Yet, a more conservative estimate would be 10000 unique visitors.

Detailed statistics for the period up to October 2021 show most visits to the front page, followed by the following sub-pages: BIG-MAP giving general information about the project, PARTNERS presenting the partners, and DISSEMINATION listing dissemination actions. Most visitors access the webpage directly, and only a few accesses via links on the [BATTERY 2030+](http://BATTERY2030+) website (3 %), LinkedIn (1%), and Twitter (1 %).

Geographically, the website has visitors from all over the world, with peaks in Western Europe (12% Germany, 10% France, 9 % Denmark), USA (6%), and China (3%).

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<sup>2</sup> Refers to downloads and uploads from BIG-MAP tools as the AppStore, the GitHub, the BIG-MAP environments at open repositories.



The number of visitors confirm that the webpage in its present format serves the purpose of being an easy-to-access channel for information relating to BIG-MAP. It has been continuously updated with new information on a running basis, typically under the sub-pages DISSEMINATION, NEWS, and POSITIONS and the recent series of Key Demonstrators, which are short articles describing the main results from BIG-MAP. It was presented with an appetizer on the front page and a link to a more descriptions (example in Figure 1).

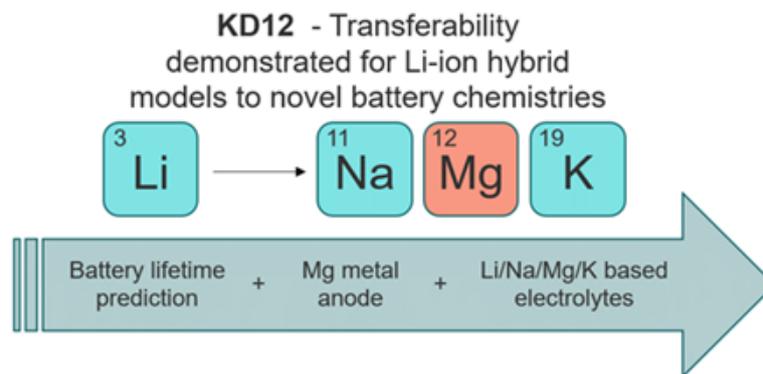
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## BIG-MAP Key Demonstrator

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### Transferability demonstrated for Li-ion hybrid models to novel battery chemistries

The changing battery landscape requires advanced models that go beyond lithium-ion technology to continue the progress and investigation. The BIG-MAP project has devised innovative methodologies succeed on the adaptation of models from lithium-ion to emerging systems like sodium or magnesium-based batteries, overcoming lithium-ion limitations and promoting sustainable energy storage solutions. It includes machine learning models for predicting battery lifespan and customized experimental methods to test their applicability across different systems.



[Read more here](#)

**Figure 1.** Example of a Key demonstrator appetizer.

Regarding downloads (283), the most popular contents relate to Ontology (24%) with the rest being very diverse.

### Social media

Posts on social media have been the preferred channel for broad notification about results, publications, breakthroughs, events, key dates, open positions, etc. The sought format of such posts is a short statement describing the news paired with a link to where further information can be found and accounts have been created on Twitter and LinkedIn. The BIG-MAP Dissemination and Exploitation Manager, Rosa Palacin, has been responsible for posting BIG-MAP news on these media. She handles the posting of news relating to the project seen as a whole, whereas the individual members of the BIG-MAP consortium post news relating to their specific tasks.



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The BIG-MAP Twitter account, [@BIGMAP-EU](#), was launched in June 2020. The numbers of associated Tweets and followers are respectively 489 and 1302. 112 other channels are followed. Following other channels is important both for crediting fellow researchers and optimizing the impact of our tweets. A [BIG-MAP LinkedIn](#) account was launched in February 2021 and has currently 1093 followers. LinkedIn offers information on the profiles of the ones following BIG-MAP. This is valuable information that can target our communication and dissemination to specific interest groups.

BIG-MAP has not seen the need for opening a channel on YouTube for videos, because Twitter and LinkedIn support the video format, and more BIG-MAP videos have been posted here, and also in the BATTERY 2030+ YouTube channel.

### Others

An exhibition at the Danish Science Museum [Experimentarium](#) has given BIG-MAP a unique opportunity for exposure to the public society. BIG-MAP contributed to the design of the battery part of the exhibition and provided a professionally made animation video illustrating the working principles in BIG-MAP. The video is available on [YouTube](#) and via link on project website (under dissemination). The video voice is English, but the BIG-MAP partners can add subtitles in any language and thereby adapt the video to their specific need.

All BIG-MAP team members have been active in promoting BIG-MAP in local science festivals, university open days, and similar events, with no centralized coordination of such initiatives.

## 3. Conclusion

The overall dissemination effort has resulted in very relevant outcomes. The number of journal papers to date (92) and conferences/presentations at scientific meetings are larger than initially foreseen. The BIG-MAP GitHub registry is well-populated (65 objects), with currently 30 apps the App Store.

The communication efforts were enhanced throughout the project and aside the webpage and social media accounts, the interaction with mass media have resulted in newspaper and magazine articles, interviews, TV broadcasts among others.