



Human-centric algebraic machine learning

Report on Communication and Dissemination - M54

Deliverable D8.3

WP8 - Dissemination, Exploitation and Collaboration



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952091.

Consortium



ALGEBRAIC AI



Champalimaud
Foundation



Project

Title: ALMA: Human Centric Algebraic Machine Learning
Acronym: ALMA
Coordinator: Proyectos y Sistemas de Mantenimiento SL (eProsima)
Grant agreement: 952091
Call: H2020-EIC-FETPROACT-2019
Program: Horizon 2020
Start: 01 September 2020
Duration: 54 months
Website: <https://alma-ai.eu>
E-mail: alma@eprosima.com
Consortium: **Proyectos y Sistemas de Mantenimiento SL (eProsima) (EPROS)**, Spain
Champalimaud Foundation (CF), Portugal
ALGEBRAIC AI (ALG), Spain
German Research Center for Artificial Intelligence (DFKI), Germany
Inria (Inria), France
TU Kaiserslautern (TUK), Germany
FIWARE Foundation e.V. (FF), Germany
Technical Research Centre of Finland (VTT), Finland
Carlos III University (UC3M), Spain

Deliverable

Number: **D8.3**
Title: **Report on Communication and Dissemination - M54**
Month: 54
Work Package: WP8 - Dissemination, Exploitation and Collaboration
Work Package leader: EPROS
Deliverable leader: EPROS
Deliverable type: Report (R)
Dissemination level: Public (PU)
Date of submission: 28/02/2025
Version: v3.4
Status: Finished

Version history

Version	Date	Responsible	Author/Reviewer	Comments
v1.0	16/02/2022	EPROS	Raúl Sánchez-Mateos Lizano	D8.1 - First draft
v1.1	18/02/2022	EPROS	Juan López Fernández	D8.1 - First Review (RV1)
v1.2	22/02/2022	EPROS	Raúl Sánchez-Mateos Lizano	D8.1 - Apply changes from RV1
v1.3	22/02/2022	ALG	Nabil Abderrahaman-Elena	D8.1 - Add elevator pitch
v1.4	30/06/2022	EPROS	Javier Paris Uhryn	D8.1 - Apply PO and EU Reviewers suggestions
v1.5	01/07/2022	EPROS	Juan López Fernández	D8.1 - Second Review (RV2)
v2.0	11/09/2023	EPROS	Irene Bandera Moreno	D8.2 - First draft
v2.1	20/09/2023	EPROS	Raúl Sánchez-Mateos Lizano	D8.2 - Review
v2.2	29/09/2023	EPROS	Raúl Sánchez-Mateos Lizano	D8.2 - Update publications and events list
v3.1	20/02/2025	EPROS	Denisa Alexandru	D8.3 - First Draft
v3.2	25/02/2025	EPROS	Raúl Sánchez-Mateos	D8.3 - Review communication and dissemination plan. Update publications and events.
v3.3	25/02/2025	EPROS	Denisa Alexandru	D8.3 - Overall review and proofreading
v3.4	25/02/2025	EPROS	Raúl Sánchez-Mateos	D8.3 - Final review

Executive summary

Algebraic Machine Learning (AML) is a novel machine learning technique based on algebraic representations of data. Unlike statistical learning, AML algorithms are robust regarding the statistical properties of the data and are parameter-free. AML systems can retain what they learn, including sociocultural ethical practices for human-artificial intelligence systems. The aim of the EU-funded ALMA project is to study the mathematical properties of AML and to leverage them to develop a new generation of interactive human-centric machine learning systems. These systems are intended to minimize bias in order to facilitate trust while better enabling distributed collaborative learning.

This report corresponds to *Deliverable D8.3 - Report on Communication and Dissemination - M54* of the ALMA project. This deliverable provides a detailed description of all the communication and dissemination tasks performed by the ALMA project partners during the first three years of the project dedicated to reach the target audience of each partner and achieve the project objectives. This deliverable begins by covering the main fundamentals of the ALMA Dissemination and Communication Plan (DACP), with special attention to those actions that increase the interest and awareness of AML as a novel ML technology and Algebraic Machine Learning - Integrating Platform (AML-IP) as the platform to integrate AML and the tools to work with this technology on end-user platforms. Among these actions are the definition of the strategy, vision and road-map of the project, as well as the promotion of the project results in order to ensure awareness of these by the target audience.

Next, the tools created for the dissemination of ALMA in the different events in which ALMA has participated are explained, as well as the internal and external tools used for the dissemination of the research results obtained, such as templates for reports, emails and contact.

Finally, the activities carried out during the three years of the project for its communication and dissemination are presented. Several ALMA partners have attended events and seminars to disseminate ALMA as well as to communicate the existence of the project and its various lines of research. Research articles have also been published in order to promote interest in the scientific community, paying special attention to mathematics and artificial intelligence researchers.

Contents

Executive Summary	4
Contents	6
Acronyms	10
1 Introduction	11
1.1 Purpose of the document	11
1.2 Communication approach	11
2 Communication and dissemination strategy	13
2.1 Communication and dissemination objectives	13
2.2 Methodology	14
2.2.1 Marketing funnel	14
2.2.2 PESO Model	16
2.3 Brand positioning	16
2.3.1 Brand messaging Framework	18
2.4 Target audiences	20
2.5 Key messages	22
2.5.1 Project launch	22
2.5.2 Second phase of the project	22
2.5.3 Third phase of the project	22
2.6 First results obtained and tools releases	23
2.7 Mid-term results obtained and tools releases	23
2.8 Long-term results	23
2.9 Elevator pitch	24
2.9.1 ALMA Elevator pitch	24
2.9.2 AML Elevator pitch	24
2.9.3 AML-IP Elevator pitch	24
2.10 Key channels	25
2.11 Roadmap	25
3 Communication and dissemination activities report	28
3.1 Phase I	28
3.2 Phase II	28
3.3 Phase III	28
3.4 Communication materials	28
3.4.1 Logo	28
3.5 Visual identity	29
3.5.1 Logo variations	29
3.5.2 Typography	31
3.6 Promotional material	31
3.7 Internal support tools	33
3.8 Meetings and events	35
3.8.1 Events summary	35
3.9 Scientific publications	38
3.10 Posts analytics	40
3.10.1 Social Media	41
3.10.2 ALMA website	43

3.10.3 eProsima News	54
3.10.4 ROS Discourse	55
A ALMA promotional material	56
References	59

List of Figures

1	ALMA marketing funnel	16
2	ALMA PESO Model	17
3	ALMA message framework	18
4	ALMA brand pillars	20
5	ALMA dissemination activities	26
6	ALMA communication activities	27
7	Original ALMA Logo	29
8	Color positive main version of the ALMA Logo	29
9	Dark blue background version of the ALMA Logo	29
11	One ink main versions of ALMA logo	30
	11a Black main version of ALMA logo	30
	11b White main version of ALMA logo	30
13	One ink secondary versions of ALMA logo	30
	13a Black secondary version of ALMA logo	30
	13b White secondary version of ALMA logo	30
10	Bright blue background version of the ALMA Logo	30
12	Color positive secondary version of the ALMA logo	30
14	Main colors for ALMA marketing materials	31
15	Secondary colors for ALMA marketing materials	31
16	ALMA promotional posters	32
	16a ALMA comprehensive poster	32
	16b ALMA wallpaper poster	32
	16c ALMA event poster	32
17	ALMA brochure	33
	17a ALMA brochure - page 1	33
	17b ALMA brochure - page 2	33
18	ALMA report template	34
	18a ALMA report template - page 1	34
	18b ALMA report template - page 2	34
19	ALMA presentation template	34
20	Twitter post examples	41
	20a ALMA presentation tweet	41
	20b ROS World 2020 promotion tweet	41
21	ALMA Website - Home Section	43
22	ALMA Home Section: About	44
23	ALMA Home Section: Latest News	44
24	ALMA Home Section: Publications	45
25	ALMA Home Section: Videos	45
26	ALMA Home Section: Events	46
27	ALMA website - About Section	46
28	ALMA website - Deliverables	47
29	ALMA Website - Work Packages	48
30	Scientific Articles	49
31	ALMA website - Videos	50
32	ALMA website - Documentation	51
33	ALMA website - Consortium	51
34	ALMA website - Events	52
35	ALMA website - Latest News	53



36	ALMA comprehensive poster	56
37	ALMA wallpaper poster	57
38	ALMA event poster	58

List of Tables

2	ALMA target communities and partners responsible for raising awareness	21
3	Events summary	38
4	Scientific publications	40
5	Social Media partners' actions dashboard	43
6	Posts on ALMA news website	54
7	Posts on eProsima news website	55
8	Posts on ROS Discourse	55

Acronyms

AI	Artificial Intelligence.
AML	Algebraic Machine Learning.
AML-IP	Algebraic Machine Learning - Integrating Platform.
DACP	Dissemination and Communication Plan.
HCI	Human-Computer Interaction.
HW	Hardware.
ML	Machine Learning.
PESO	Paid, Earned, Shared, Owned.
ROS	Robot Operating System.
SEO	Search Engine Optimization.
SME	Small and Medium-sized Enterprises.
TSC	Technical Steering Committee.

1 Introduction

1.1 Purpose of the document

This report describes the main activities of communication and dissemination of the results of the different research areas within the ALMA project.

Communication activities encompass all those activities aimed at bringing the research results to the attention of multiple audiences in a manner understandable for all targeted groups. The ultimate goal is to inform stakeholders about the benefits of the novel machine learning techniques being developed under the ALMA project such as AML, as well as the tools and research surrounding this Machine Learning (ML) technology. This is done according to the guidelines of the public policy perspective of EU research and innovation funding, considering aspects such as the contribution to competitiveness and the resolution of social and ethical challenges.

Furthermore, dissemination consists of those activities focused on publicly sharing the results of research and innovation with the target audience of each of the research fields that comprise the ALMA project. This target audience is AML end-users, mathematicians, Artificial Intelligence (AI) researchers, industry, ROS 2¹ and FIWARE communities, industry players and policymakers.

It is crucial to generate interest in the target audience by communicating and disseminating solid and robust results that can be contrasted and evaluated by the scientific and industry community. That is why the main purpose of this document is to establish the dissemination and communication strategy of the ALMA project, rather than to focus on the description of all the activities carried out so far.

It is important to highlight that ALMA has primarily focused on research, contributing to foundational advancements rather than immediate industrial deployment. While AML has demonstrated significant theoretical potential, its adoption in real-world applications—particularly within the ROS 2 community—has faced challenges. The increasing dominance of Large Language Models (LLMs) has shifted the landscape of AI research and applications, making it more difficult to position AML as a preferred alternative. Additionally, AML's complexity and the specialized knowledge required to leverage its full capabilities have further limited its widespread adoption. Despite these challenges, its unique approach to structured embeddings and interpretable machine learning continues to provide valuable insights for future developments in AI and robotics. Additionally, several tools, such as AML-IP, DDS Router, and Fast DDS Monitor, have been widely adopted in production and deployment scenarios within the ROS community, even though they are not directly tied to AML.

1.2 Communication approach

AML is the disruptive machine learning technology that lays the foundation for the development of subsequent research and implementations that exploit the novel features of this machine learning paradigm. That is why the communication approach is based on the explanation of the benefits that AML could bring in the future compared to traditional ML algorithms. Therefore, the aim is to attract the attention of the target audience interested in AI and thus promote knowledge and interest in other research and development fields such as *a)* the use of AI tools developed and compatible with ROS 2, *b)* new paradigms of Human-Computer Interaction (HCI), *c)* AML based world models, *d)* the learning of ethics and culture with AML, and *e)* new hardware architectures for AML computation.

It is intended to give the key message that AML is a paradigm that will be further developed in the

¹<https://www.ros.org/>

future. One of the main problems involving potential stakeholders, who are looking for stable, efficient and long-term projects, is the belief that the progress and results of the ALMA project will no longer be supported once the project comes to an end. Several tools to facilitate the use of AML will be developed to ensure that this will not happen, thus eliminating the uncertainty of the initial investment in ALMA. It is intended to give the message that ALMA is only the project that provides the necessary funding to promote AML research.

Of primary importance it is to emphasize the market orientation and global dimensions of AML and the tools for the development and exploitation of this technology (AML-IP). Thus, a differentiation is made between research activities and results, placing them in the context of market exploitation and research.

Since the research results will be publicly available, and the AML node communication tools such as AML-IP are open source products, the collaboration of third parties in the development and improvement of the products resulting from the project is encouraged. All these aspects and actions considered, together with the publication of reports, articles and conferences, will make the ALMA project more transparent to the stakeholders.

Finally, it is important to mention that the development of open-source products makes the number of collaborations to the project increase significantly, making the interaction of third parties with these products more open, agile, and flexible. Moreover, this favours the acceptance of AML-IP by the ROS 2 community, an open-source robotics operating system largely supported by the developer community.

2 Communication and dissemination strategy

This section describes the communication and dissemination strategy to be adopted by the ALMA project within the framework of the Dissemination and Communication Plan (DACP).

First, the communication and dissemination objectives are introduced, followed by the methodology to be used in order to achieve these objectives. Next, the brand positioning strategy based on the key points of purpose, perception, personality, positioning and promotion of ALMA is introduced.

Target audiences are analyzed for each of the different lines of research. Due to the heterogeneity of the research carried out within the ALMA project, which ranges from the mathematical research for the development of AML, the investigation of human-machine interaction, the definition of ethical and cultural models of the world using AML, and its application in robotics by eProxima, the target audiences differ for each work package. The key messages and the channels used to deliver these messages to the already-defined target audience are defined.

This section ends with the roadmap of the dissemination and communication plan from the project start to the end date.

2.1 Communication and dissemination objectives

The main objective of the communication effort hitherto undertaken has been that of maximizing the impact and benefits of the ALMA project by bringing it closer to the target audiences of each of the lines of research. This is accomplished in an orchestrated manner by inquiring about the stage of the project at each moment of its past and future lifetime since the target audience varies depending on the status of the research. That is, the interested audience changes depending on whether the project is in a research phase and supported by scientific publications, or whether it has products accessible to end users that can be corroborated, tested and used in the industry.

Therefore, clear and measurable objectives are set to check the acceptance status of the project among the different target groups to provide adequate information and promotion of the project concept and its direction in a timely manner.

Communication materials are designed in order to have a clear branding and market positioning. Special attention will be paid to the results obtained in the previous year (2024) for the purpose of maximizing the exploitation of these results in 2025. This communication and dissemination plan aims to define the most effective communication channels, tools and mechanisms for each target audience in order to maximize the impact in each phase of the project. In addition, the impact of the communication is monitored so as to take corrective and preventive measures if necessary to maximize the visibility of the ALMA project.

The following are the main objectives of the communication strategy:

- CO1: to give a clear message of the mission, objectives and results of the ALMA project by formulating key messages tailored for the different target audiences.
- CO2: to support and promote collaboration with other relevant projects, the industry, communities and global initiatives that increase awareness of the ALMA project and facilitate outreach to potential customers or end-users.
- CO3: to make the results of the project understandable to the community so that AML is human-centred and comprehensible as it claims to be.
- CO4: to attract new researchers to create a community around the ALMA project and specifically AML.

- CO5: to attract early adopters to test the implementations resulting from the project and create an AML-IP community in order to introduce our developments to the pre-existing Robot Operating System (ROS) community.
- CO6: to support targeted communication of the project results in order to prepare the basis for future exploitation.

The main objectives of dissemination are aligned with the communication objectives in order to ensure that the project has a medium and long-term impact through the publication of research results. The dissemination objectives are listed below:

- DO1: dissemination of the project results and the technical, technological and scientific developments resulting from the ALMA project throughout its execution, as well as the benefits, use cases and exploitation scenarios derived from the use of such results.
- DO2: to create partnerships with other global projects to publish and make use of our results in order to promote an indirect dissemination of the ALMA project.
- DO3: facilitate the exploitation of the results by the community of developers who assess and provide feedback on the use of the tools created during the course of the project.
- DO4: facilitate access to the research results so that the scientific community is able to validate, contrast and corroborate the publications made.
- DO5: publication of the project results in web pages and forums of the different target communities in order to gain visibility among these communities.
- DO6: perform a market segmentation analysis with the purpose of focusing each of the research areas on their potential users/customers in order to enhance the exploitation strategy.

2.2 Methodology

The methodology followed in ALMA to meet the communication and dissemination objectives is based on the adoption by the consortium of the use of elements that guarantee the communication of a common message. This is done through a combination of traditional marketing elements such as scientific publications and participation in events, and online tools that help to easily understand ALMA's vision, mission and proposal.

During the initial two years, the main dissemination efforts were mainly focused on event participation and promotion of the different research tracks involved in ALMA, with AML as the central element that unifies all research and development processes.

In the current year, our focus has shifted towards the seamless integration of AML across diverse partner networks to achieve a unified architectural framework.

Specific actions are taken in the communication strategy in order to gain early adopters of the developed tools that would help disseminate AML to the target developer community, by encouraging their peers to use these tools.

2.2.1 Marketing funnel

This section introduces and describes the main stages of the marketing funnel of the ALMA project in order to reach the target communities.

Awareness The main objective of the awareness activities is to make the target audience cognizant of the ALMA brand and the AML technology. Through these, ALMA's digital presence is strengthened,

promoting familiarity with the project and building a reputation through media adoption. The following are described the aforementioned awareness activities:

- Generate product awareness through social media and digital media activities.
- Management of sponsored events with high digital media presence.
- Presentation of ALMA and AML in target communities in order to gain brand awareness and technical benefits.
- Search Engine Optimization (SEO):
 - Keyword research to position ALMA and AML, thus making the content relevant to the searcher's queries.
 - SEO on Page: optimization of web pages in order to improve ALMA's ranking in search engine results by including keywords in titles and content.
- Use of social media in order to engage potential customers, improve community relations and increase awareness. The social media strategy is built with organic content but could include paid ads such as banners or pay-per-click (on Twitter or LinkedIn) to reach the target audience if needed.
- Partners attendance to relevant national and international events to raise awareness of ALMA.

Interest The objective of the interest activities is to increase the number of searches related to the ALMA project, which results in an increase of website traffic. This is a good indicator of growing interest in the project by the target audience. These activities are:

- Generation of branded content and banners for specialized communities, focusing on the exploitation of relationships.
- Generation of digital content marketing material, due to the significant reduction of in-person events, such as infographics, videos, interviews and testimonials.
- Online technical and business events focused on engaging policymakers, researchers and users.

Consideration Consideration activities are aimed at creating a community around the ALMA project through the following media:

- Technical blog posts.
- Workshops and online presentations.
- Educational material to facilitate incorporation into the AML ecosystem.

Conversion Conversion is ensured by providing the first results of the project to the ALMA community established in the previous phase. This is accomplished by promoting fluid communication with the community and by encouraging and motivating early adopters and community members to actively participate in events organized by the project partners. This phase is reinforced with:

- Periodic newsletter covering the main achievements in the project.
- Emails summarizing the main events and uses of AML by the community.
- Use of success stories to convert and engage those members of the community who are less actively involved.
- Webinars, Q&A sessions, online demo use cases, tutorials and training.

- Referrals to encourage our advocates to become brand ambassadors. Introduce brand advocates by promoting their participation in sponsored content and webinars to present their implementation and research outcomes so they may as well gain referrals.

The above points are summarized in the ALMA marketing funnel diagram shown in Figure 1.

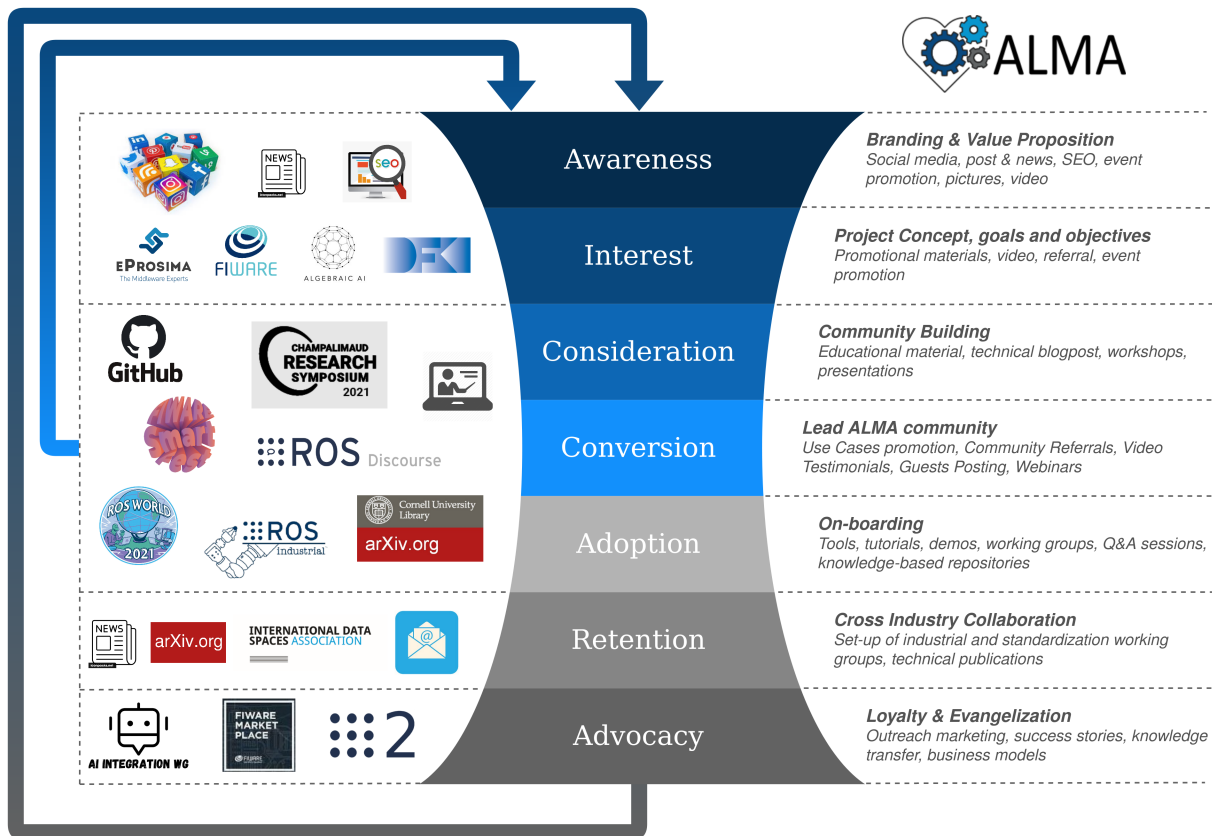


Figure 1: ALMA marketing funnel

2.2.2 PESO Model

The ideas outlined above result in a 360° marketing strategy that can be visualized in the PESO Model of the ALMA project shown in Figure 2.

2.3 Brand positioning

ALMA's brand positioning and identity have developed during the initial three years of the project and will continue to expand and improve over the next few years of the project realization. This development is guided by the following aspects:

- **Purpose:** identifies the rationale for the project and the contribution to the ALMA end users as well as the knowledge contributed to the AI research community.
- **Perception:** how AML is described and recognized by the community.
- **Personality:** defines the tone of the messages to be disseminated according to the target audience, as well as the nature and content of those.

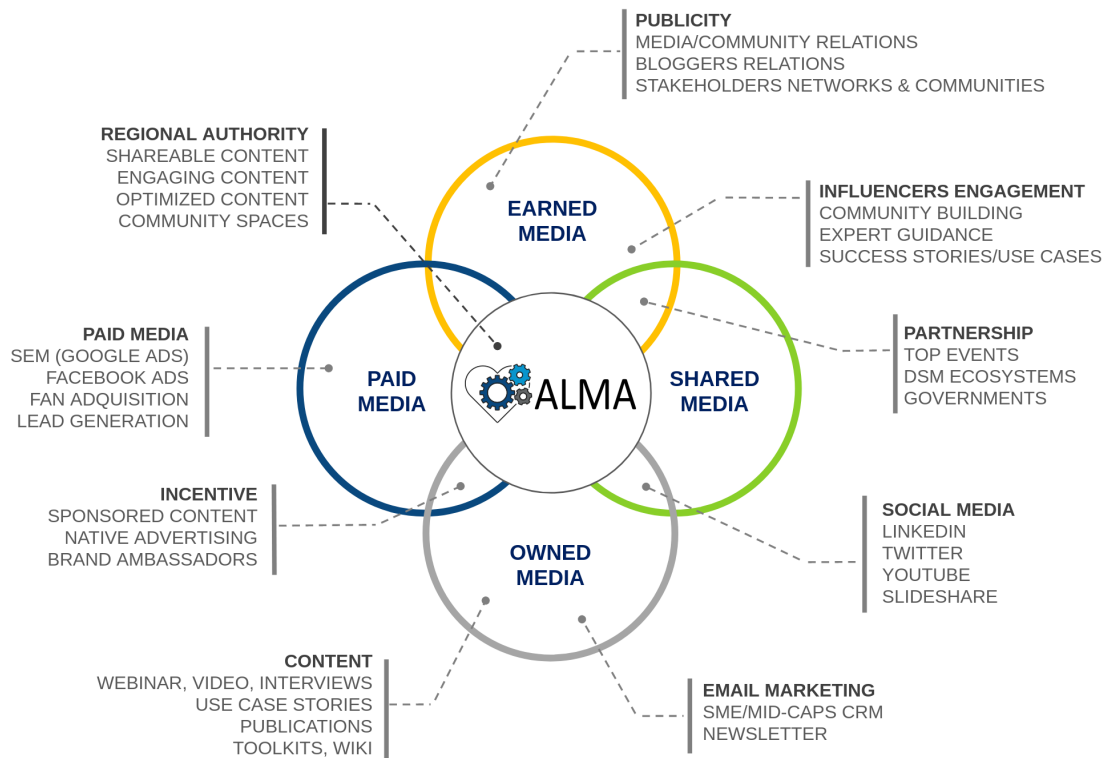


Figure 2: ALMA PESO Model

- **Position:** determines the position of ALMA and in particular of AML in today's collapsed market of available AI technologies.
- **Promotion:** defines the core element of our speech at events and conferences, including those sponsors and ambassadors of the ALMA brand.

As explained above, AML is a novel ML technology that, unlike traditional ML, is based on abstract algebraic mathematics. This is the reason why it is positioned in the market as the only ML paradigm that does not use statistical methods in the internal processes of learning, inference, classification, etc.

Among the ALMA project partners is DFKI, a leading AI research institute that aims to promote the use of this new paradigm. DFKI together with Inria and Champalimaud Foundation (CF) will undertake research projects on methodologies for the application of AML.

Furthermore, the ALMA project benefits from eProsima's position in the ROS community. eProsima, as a member of the ROS 2 Technical Steering Committee (TSC), aims to bring AML to the robotics industry by providing mechanisms that facilitate the integration of AML in robots developed using ROS 2. Thus, the AML-IP, an open-source platform developed at eProsima and fully compatible with ROS, will be the way to achieve the goal of bringing AML to the ROS community. Furthermore, thanks to ALMA being a European initiative, the foundations for the creation of a European ROS community aiming at the integration of AI into the ROS ecosystem are in place. This platform will also be compatible with

FIWARE context broker², thus facilitating adoption by its wide community.

The AML engine and the integration platform referred to as AML-IP will be released under open-source licenses, thus fostering the community's contribution to the development of these new technologies.

2.3.1 Brand messaging Framework

The ALMA message framework is a structured representation of the unique key features in the ML market. It presents in a clear and easy-to-understand manner the differentiating elements of the ALMA brand and AML from other ML technologies. This includes the value proposition, the target audience, and the competitive differentiator.

The ALMA brand message framework will slightly change as the project progresses but it builds the foundation for the creation of an ALMA business model and all its related functions such as marketing, communication, dissemination, business development, public relations, user support, etc.

The ALMA brand message framework is presented in Figure 3.

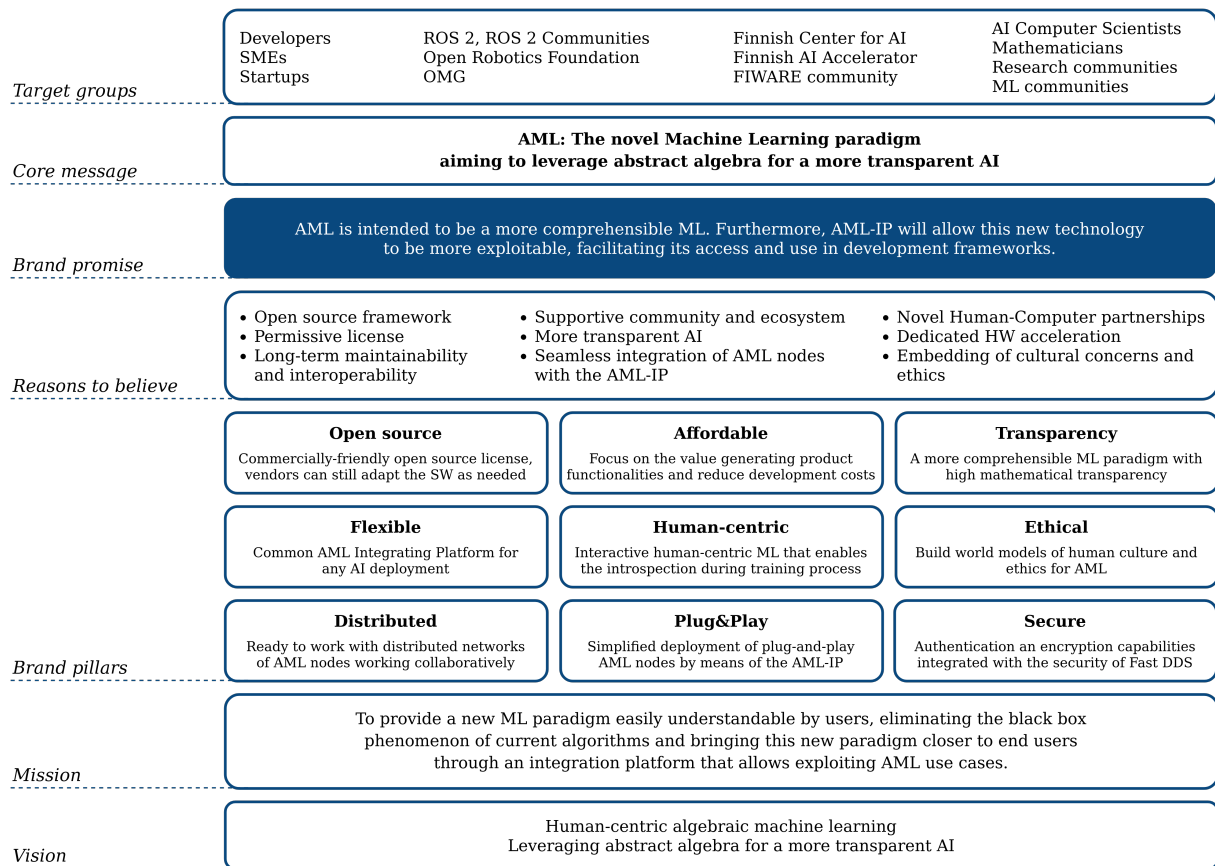


Figure 3: ALMA message framework

²<https://www.fiware.org/developers/catalogue/>

Vision

Human centric algebraic machine learning Leveraging abstract algebra for a more transparent AI

Mission To provide a new ML paradigm easily understandable by users, eliminating the black box phenomenon of current algorithms and bringing this new paradigm closer to end users through an integration platform that eases the exploitation of AML.

Brand promise AML is intended to be a more comprehensible ML. Furthermore, AML-IP will allow this new technology to be more exploitable, facilitating its access and use in development frameworks.

Core message

AML: The novel Machine Learning paradigm aiming to leverage abstract algebra for a more transparent AI

Reasons to believe

- Open source framework.
- Permissive license.
- Long-term maintainability and interoperability.
- Supportive community and ecosystem.
- More transparent AI.
- Seamless integration of AML nodes with the AML-IP.
- Novel Human-Computer partnerships
- Dedicated Hardware (HW) acceleration.
- Embedding of cultural concerns and ethics.

Brand pillars These are summarized in Figure 4

- Open source: commercially-friendly open source license, vendors can still adapt the SW as needed.
- Affordable: focus on the value generating product functionalities and reducing development costs.
- Transparency: more comprehensible ML paradigm with high mathematical transparency.
- Flexible: common AML Integrating Platform for any AI deployment.
- Human-centric: interactive human-centric ML that enables the introspection during the training process.
- Ethical: build world models of human culture and ethics for AML.
- Distributed: ready to work with distributed networks of AML nodes working collaboratively.
- Plug&Play: simplified deployment of plug-and-play AML nodes by means of the AML-IP.

- Secure: authentication and encryption capabilities integrated with the security of Fast DDS³.

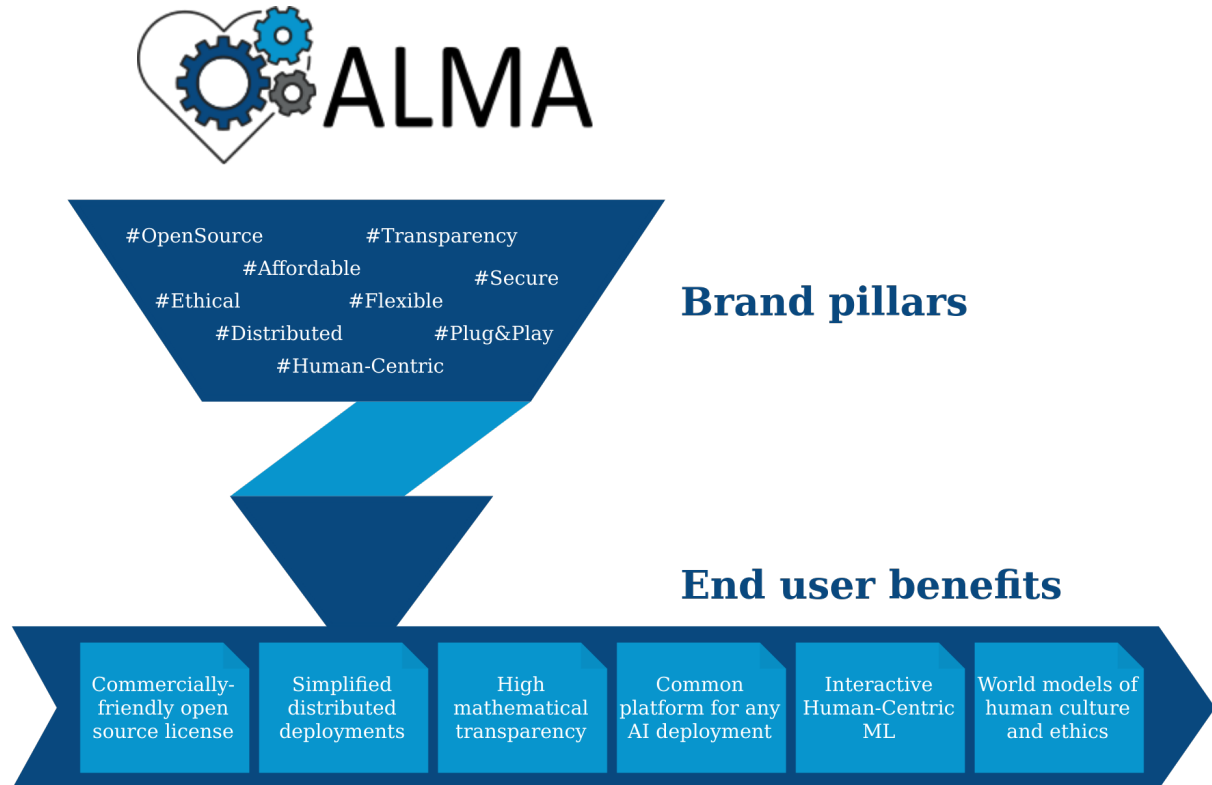


Figure 4: ALMA brand pillars

2.4 Target audiences

This section presents the target audiences of the ALMA project.

AI researchers Since the core element of the ALMA project is AML, presented as a novel ML paradigm, we are currently addressing researchers who work with statistics-based ML technologies. AML is presented to them in order to show that it is possible to use complex algebraic models for machine learning. The aim is for the AI research community to discuss the results obtained under the ALMA project, thus disseminating and promoting the use of AML among the AI research community and AI enthusiasts. ML communities, constantly sharing new improvements and results, are also considered part of this target group, as they are likely to show interest in this new paradigm.

The results of the AI research community's studies will also promote the adoption of AML by their colleagues who will also want to corroborate these results.

Developers AML is a novel technology that allows exploiting the use of ML in distributed systems. That is why AML-IP is presented as a platform that allows the connection of AML nodes, seamlessly

³<https://github.com/eProxima/Fast-DDS>

integrating them into ROS 2. Therefore, our focus is on the developer community, encouraging them to leverage this platform as the standardized method for AML integration, as opposed to relying on customized solutions for each application.

More specifically, application software developers are the primary users of AML and AML-IP, as they integrate ML into their end-user applications. They also stand to benefit from the open source integration, benchmarking, monitoring and evaluation packages released under the ALMA project to work with AML.

Furthermore, the AML user community plays a vital role in validating the development of the integration platform and the various open source tools for working with AML, making the development process more efficient and end-user oriented.

ROS community The ROS community is currently benefiting from AML through AML-IP, which serves as a framework designed for the seamless integration of AML easily into ROS 2 systems. This integration relies on the use of DDS as the AML-IP middleware for communications, which is the same used in ROS 2. Moreover, AML-IP uses Fast DDS as the DDS standard implementation, which is the default implementation of DDS used in ROS 2. AML-IP is a framework that uses familiar ROS concepts, thus facilitating the adoption, portability and interoperability with the established ROS ecosystem.

SMEs/Startups The AML results are also relevant for the FIWARE developer community, who may consider the integration of this new technology into their AI systems and smart applications. SMEs and Startups can benefit from FIWARE solutions such as the Context Broker or the Dataset Marketplace.

Other communities and working groups Table 2 shows the list of target communities as well as the partners in charge of raising awareness of the project results among these communities.

Target community	Partner(s) involved
ROS 2 TSC	EPROS
ROS / ROS 2 community	EPROS
Open Robotics Foundation	EPROS
FIWARE	FF
OMG	EPROS
International Data Spaces Association	FF
Finnish Center for AI	VTT/DFKI
Finnish AI Accelerator	VTT/DFKI
Computer Science community	ALG/CF/DFKI
Mathematics researchers	ALG/CF
ROS 2 Hardware Accelerator WG	TUK
ROS 2 AI Integration WG	EPROS

Table 2: ALMA target communities and partners responsible for raising awareness

2.5 Key messages

The key messages conveyed throughout the project vary depending on the phase of the project, i.e., the information communicated is not the same in the initial phases of the project, focused on research and development, as in the final phases dedicated to the exploitation and contribution of external entities to the project.

2.5.1 Project launch

At this project phase, the final product was not mature enough nor yet sufficiently tested as to involve the developer community in the use of AML. That is why at this stage the main focus was on the dissemination and communication of AML within the research community through the publication of papers and research articles.

ALMA is dedicated to the research of a new paradigm of artificial intelligence based on algebraic models that provide abstract knowledge, and thus, greater transparency to the learning process. This transparency favours human-machine interaction during this process, thus turning learning and subsequent inference into a human-centred process. At the same time, tools were developed to exploit this technology such as the AML interface, the AML computation engine, tools to describe AML problems, the AML-Dashboard, a development framework that exploits collaborative learning, cultural and ethical world models, hardware acceleration platforms for computation, and new paradigms of human-machine interaction for AML.

2.5.2 Second phase of the project

The primary focus of the second phase was on improving AML. Additionally, we developed the integrated solution, AML-IP, which has received its own dedicated release, enabling our communication and dissemination team to actively promote it. Furthermore, we have done demonstrations utilizing this tool within the ROS 2 community, aimed at boosting its visibility and adoption.

Although AML cannot be used openly in the AML-IP, this tool is fully functional with any other Machine Learning technology. Thus, our ambition is to attract an existing AI/ML community to use the tool with technologies they are already familiar with and then make the leap to using AML in a straightforward and seamless approach.

2.5.3 Third phase of the project

The focus of this phase was to create a set of software tools that allow users to develop, train, and deploy Algebraic Machine Learning (AML) models. These tools are designed to be used by researchers, developers, and industry professionals who want to implement AML models in their applications. AML Toolkit aims to provide users, developers, and researchers with the documentation, guides, and examples needed to start working with AML.

These tools cover the entire process of developing AML applications, from data collection and preprocessing to generating embeddings for problem description, validating those embeddings, training the model using an AML engine, performing inference using the resulting AML model, and validating the results.

To maximize impact and reach, eProxima is actively promoting these tools through the ALMA website, sharing updates, news, and educational materials to engage the AI/ML community.

2.6 First results obtained and tools releases

The message focuses on highlighting the benefits of AML to promote its adoption by the research community.

- AML is the new machine learning paradigm based on complex mathematical structures focused on bringing greater transparency to the learning process.
- AML can be used to solve a wide variety of problems and in numerous artificial intelligence applications through the formal description of data.
- AML-IP is a framework that enables the effortless deployment of AML nodes in distributed environments to exploit the collaborative learning capabilities of AML. Furthermore, this platform is fully compatible with the ROS 2 ecosystem.
- AML displays great potential to support ethical actions in complex situations.
- The complexity of interaction with systems using AML is minimized by researching innovative human-machine interaction methodologies.

2.7 Mid-term results obtained and tools releases

In this section, we will provide an overview of the mid-term results achieved during the development of the ALMA project and highlight the key tools that have been released or updated as part of this progress.

- The DDS Router, designed by eProxima, facilitates distributed topologies by seamlessly connecting distributed DDS networks. It serves as a component for optimizing data communication, enhancing efficiency, and ensuring scalability.
- eProxima has designed the Fast DDS Monitor, a graphical desktop application. This tool simplifies the process of debugging and provides real-time monitoring capabilities for DDS networks, offering significant advantages in terms of development and maintenance.
- The commitment to optimizing Fast DDS, combined with bug-fixing and functionality enhancements, has resulted in significant improvements. These refinements result in superior system performance and an increase in overall reliability.
- The development of the AML-IP framework by eProxima represents a significant milestone. In this context, extensive testing of the capabilities provided has been carried out, simulating the AML Engine component has been simulated until its final availability.

2.8 Long-term results

In this section, we will provide an overview of the long-term results achieved during the development of the ALMA project.

- DDS Router is continuously maintained and updated to ensure compatibility with the latest dependencies while integrating new features.
- AML-IP has been updated to version v0.3.0, introducing several new features. This latest release includes integration with the FIWARE Context Broker and an upgrade to Ubuntu Noble (24.04), enhancing compatibility and functionality.
- The open AML Engine executes the AML algorithm, increasingly building the model as it learns and generalises knowledge from examples and pre-established rules. The open AML Engine can be found at <https://github.com/Algebraic-AI/Open-AML-Engine>.

- The AML Dashboard, developed by eProxima and INRIA, serves as a user-friendly platform for training, evaluating, and applying AML models across several datasets. It is an important tool since it allows non-expert users to interact with AML and AML-IP.
- The AML project has resulted in multiple publications, including some under peer review, covering topics such as advancements in atomized semilattices, applications, and model interpretability.

2.9 Elevator pitch

Multiple elevator pitches have been crafted to ensure a consistent and compelling message when presenting the ALMA project at conferences and events. These pitches concisely introduce ALMA, AML, and AML-IP, highlighting their ecosystem, key features, and strengths to effectively promote the project.

2.9.1 ALMA Elevator pitch

The ALMA project is redefining artificial intelligence by pioneering AML — a breakthrough technique rooted in Abstract Algebra and Model Theory. Funded by the European Union, ALMA aims to develop interactive, human-centric AI systems that go beyond traditional machine learning.

Our approach prioritizes trust, reliability, and fairness, reducing bias and preventing discrimination while enabling knowledge retention and learning transfer. ALMA's AI systems integrate complex ethical constraints, promote collaborative learning, and ensure seamless interaction between humans and machines. By harnessing AML's unique mathematical foundations, ALMA is shaping the next generation of AI — adaptive, ethical, and built for a world where intelligence is truly human-centred.

2.9.2 AML Elevator pitch

Algebraic Machine Learning (AML) is a new approach to Machine Learning (ML) developed by Algebraic AI. It is highly transparent by design and overcomes common limitations of state-of-the-art methods.

AML models can learn from examples and data, as well as from known characteristics of the problem. This prior knowledge is presented as relations and rules, using the same language that is used for data. Not only the input —both data and rules— but also the results and the model itself, share this same language. This level of transparency opens the door to new techniques for explainability and interpretability.

AML is not based on Statistics but on Model Theory, so it does not have many of the problems intrinsically associated with statistical methods. There is no cost function, error minimization, or optimization; models cannot even overfit and have a reduced dependency on the statistical properties of the training data. Also, since the structure of data is explained to models as relations and rules, there is no architecture to guess.

2.9.3 AML-IP Elevator pitch

Algebraic Machine Learning - Integrating Platform (AML-IP) is a communications framework in charge of data exchange between Algebraic Machine Learning (AML) nodes through local or remote networks.

AML-IP makes the transport protocols abstracted from the user, creating a platform that communicates each node without requiring the user to be concerned about communication issues.

AML-IP also allows the creation of complex distributed networks with one or multiple users working on the same problem.

2.10 Key channels

The main communication and dissemination channels of the ALMA project are represented in the marketing funnel shown in Figure 1. The use of these channels may be independent or combined depending on the target audience, the key message according to the status of the project, and the research results to be disseminated. These are summarized in the following points:

- Social media: each partner will make use of its own social networks as main channels for awareness and communication of the status and results of the project. All activities are promoted through the partners' own media including YouTube, Twitter, LinkedIn, or SlideShare. Given the partners' collaboration with communities in their respective research and development fields, the advantage will be taken of the support of third parties acting as evangelists and advocates.
- Online and offline international events: an effort is made to disseminate the project through dedicated events as well as events where partners are present.
- Online webinars: designed to target developers.
- Working groups and community building: both the project's website and social networks act as main entry points for the project's audience. Moreover, the creation of an AI Integration Working Group is being promoted to encourage the integration of AML into the ROS 2 ecosystem through the AML-IP.
- Earned and shared media: all social media content generated and created by project partners or end users will be shared through the partners' and influencers' own media. The goal is that the ALMA community strives to create valuable content that can be easily shared by others.
- Offline channels: although this is not the most relevant medium nowadays, the project results should be made available in physical spaces. Brochures, posters/roll-ups, event stands, presentations and other written content are intended to attract the audience and generate interest in physical events. The described offline communication means are intended to visually impact the target audience by increasing their interest in the project, its goals, activities, and results through a clear and concise message.

2.11 Roadmap

This section presents the roadmap of the dissemination (Figure 5) and communication (Figure 6) activities.

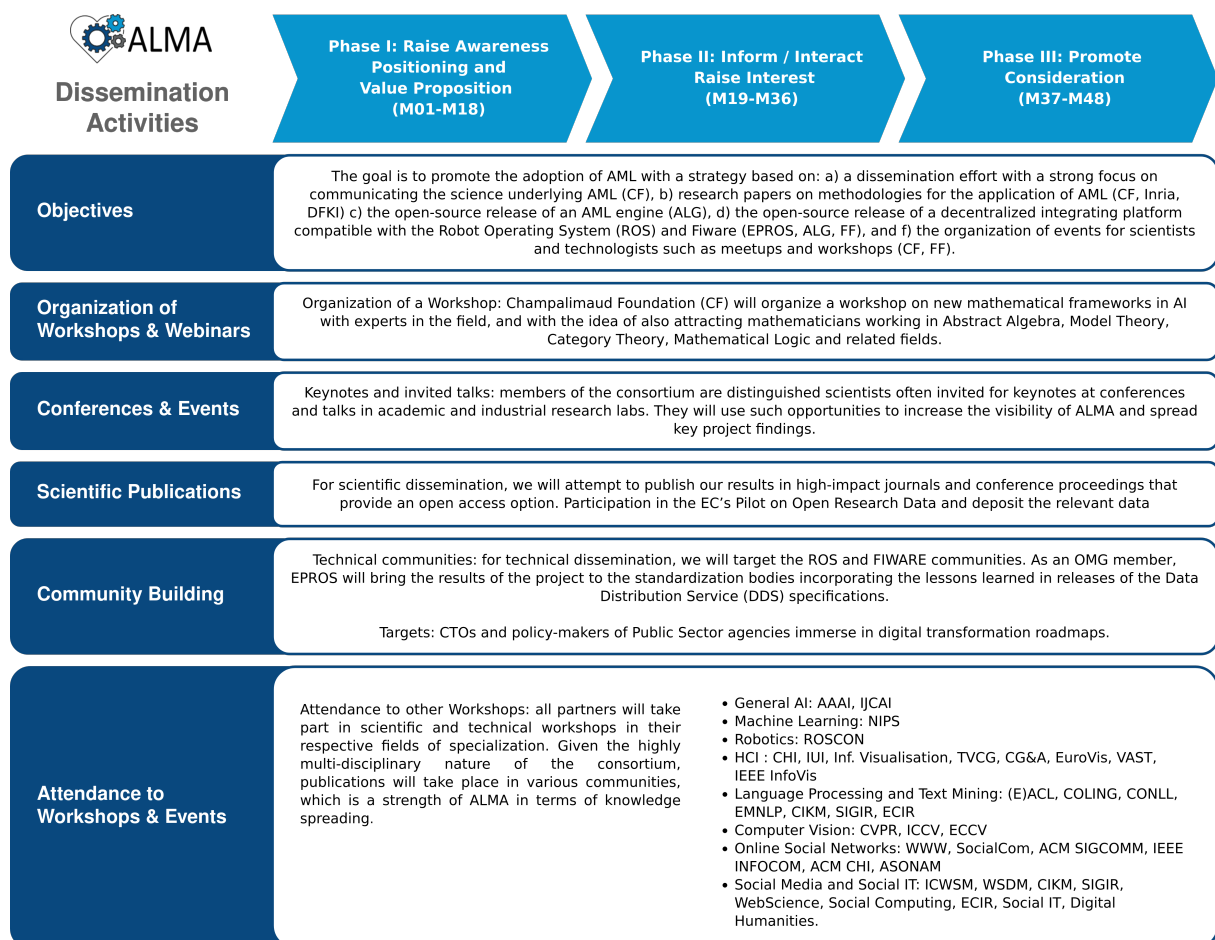


Figure 5: ALMA dissemination activities

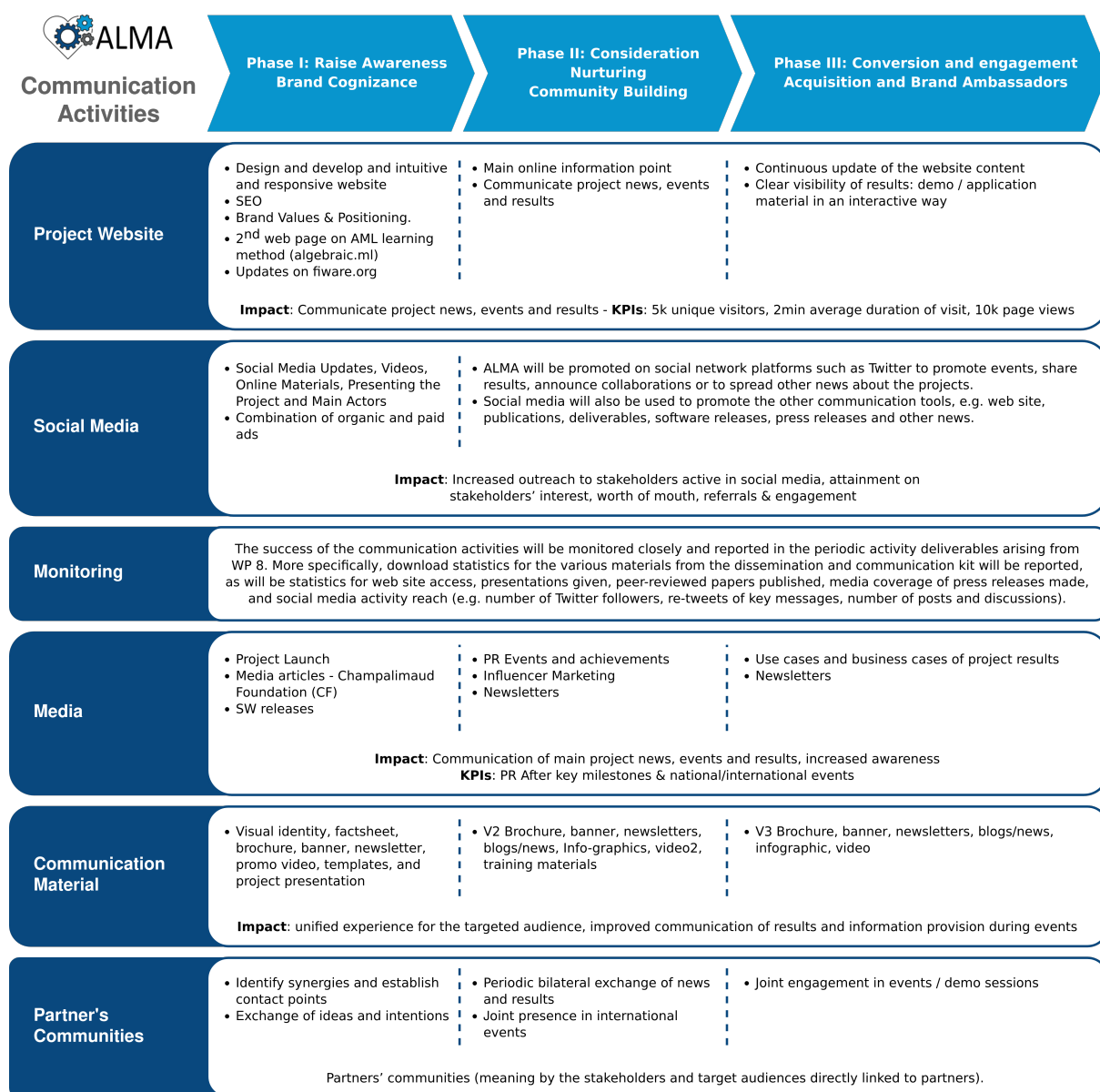


Figure 6: ALMA communication activities

3 Communication and dissemination activities report

The report of all dissemination and communication activities conducted during the four years of the project is described in this section. It is important to mention that during this mid-term phase of the project, great efforts have been placed in the realization of promotional and marketing materials to raise awareness of the ALMA project and AML as a new disruptive ML technology. Furthermore, this phase is focused on research tasks, leaving the innovation and implementation of tools that exploit AML for the following phases of the project. Therefore, dissemination tasks are focused on the publication of scientific papers to reach and engage the community of ML researchers and mathematicians, leaving the adoption of developer communities and end users of AML for the next phases of the project in which a tangible, tested and stable product will be available.

3.1 Phase I

Phase I of the project is *Phase I: Raise Awareness Brand Cognizance*. As the project is in an early development stage and the technology is not mature enough to generate market traction, the marketing efforts are currently focused on the creation of content around the AML technology to generate interest and expectation and start building an early community of AML potential adopters.

3.2 Phase II

The Phase II of the project is *Phase II: Consideration Nurturing Community Building*. In this phase, the project shifted its focus to engaging with the developer community, with a particular emphasis on the ROS 2 community.

3.3 Phase III

The Phase III of the project is *Phase III: Conversion and engagement. Acquisition and Brand Ambassadors*. During this phase, the website has been continuously updated with news articles, videos, and scientific publications, ensuring fresh and relevant content. Additionally, the AML-Toolkit documentation has been significantly expanded, featuring comprehensive tutorials and demos on AML-IP, AML, training classifiers, and creating embeddings. Moreover, the documentation of the AML-IP has been enhanced and refined, providing clearer, more accessible materials for developers, and facilitating seamless integration and adoption.

3.4 Communication materials

During the first semester of the project, the materials that are being used in the communication and dissemination activities of the ALMA project, such as in-person and online events, workshops, conferences, webinars, etc., were created. This section starts by explaining the official ALMA logo and the visual identity of the ALMA brand; continues with the presentation of the promotional tools to be used; and concludes with the support tools for internal communication.

3.4.1 Logo

The central element of the logo is the heart symbol, chosen to associate the brand with the universal element that represents the soul, which is the name of the project in Spanish. Furthermore, the heart symbol represents the letter "A" upside down, which is the initial letter of ALMA.

The objective of the brand is represented in the form of a heart with gears, which is adjusted and refined to summarize the objective of the project: *"To leverage AML properties to develop a new generation of*

interactive, human-centric machine learning systems". That is, these systems are something that, like the human soul, never stop learning and processing information centered on human experiences.

The blue and soft gray colors play a crucial role as they also represent one of the objectives of the project, which is to *"reduce bias and prevent discrimination"*.



Figure 7: Original ALMA Logo

3.5 Visual identity

3.5.1 Logo variations

Different versions of ALMA's corporate logo have been designed to be applicable to each type of presentation and background.

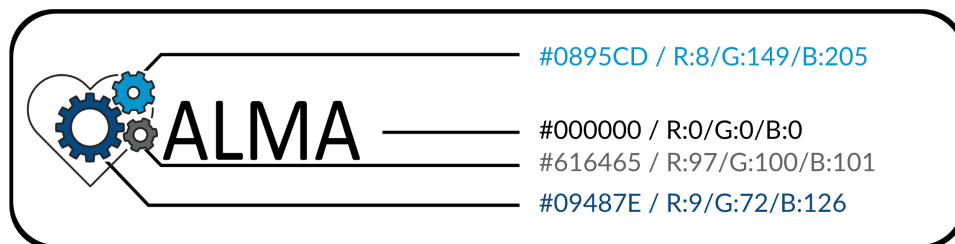


Figure 8: Color positive main version of the ALMA Logo



Figure 9: Dark blue background version of the ALMA Logo

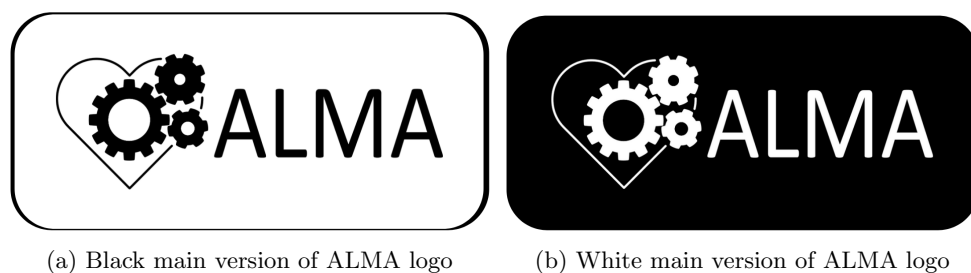


Figure 11: One ink main versions of ALMA logo

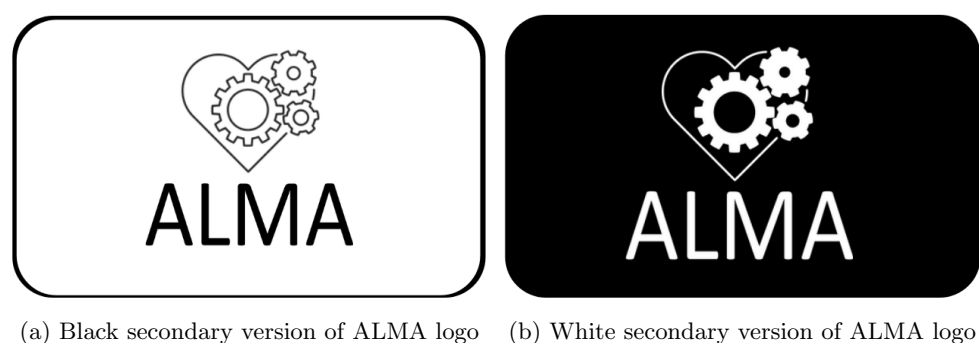


Figure 13: One ink secondary versions of ALMA logo



Figure 10: Bright blue background version of the ALMA Logo



Figure 12: Color positive secondary version of the ALMA logo

3.5.2 Typography

Fonts The fonts used in the various dissemination and communication materials of the ALMA project are listed below.

- Roman Serif: default font for documentation and reporting.
- Arial: font used for texts in presentations.
- Lato: font used as an alternative to Arial for texts in presentations.
- Comfortaa: font used for the titles and headers in presentations.

Colors Main colors are defined, which are the leading and predominant ones in the graphic materials and visual compositions of ALMA, and secondary colors, which are used as a support to the main colors, to highlight and add contrasts in ALMA's graphic materials. The secondary colors are always accompanied by the main ones, and are never the predominant colors in the visual materials.

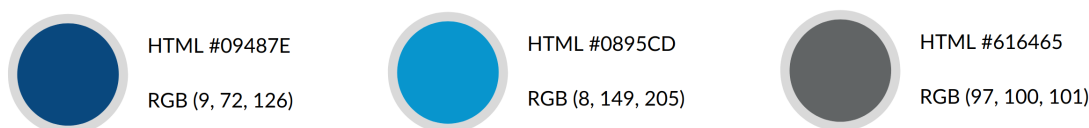


Figure 14: Main colors for ALMA marketing materials

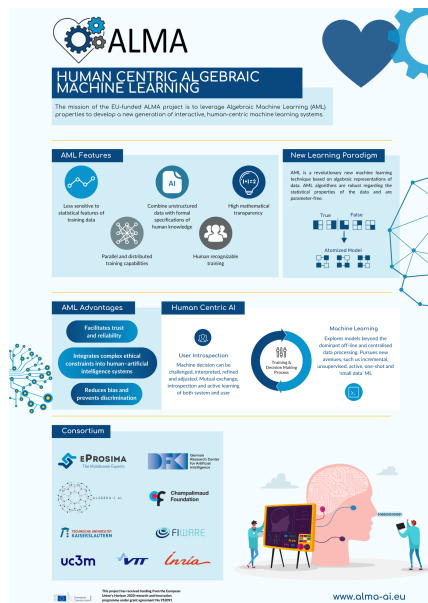


Figure 15: Secondary colors for ALMA marketing materials

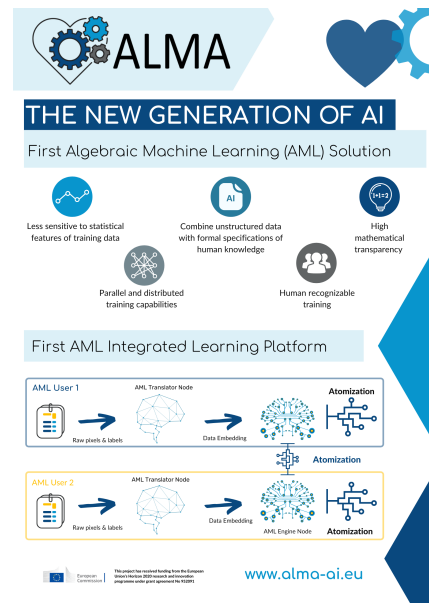
3.6 Promotional material

Several promotional materials have been created to summarize the mission and vision of the ALMA project and to reach the target audience. These materials are intended to serve as an attraction at conferences and live events in which the ALMA consortium participates to disseminate AML and the results obtained from research and innovation.

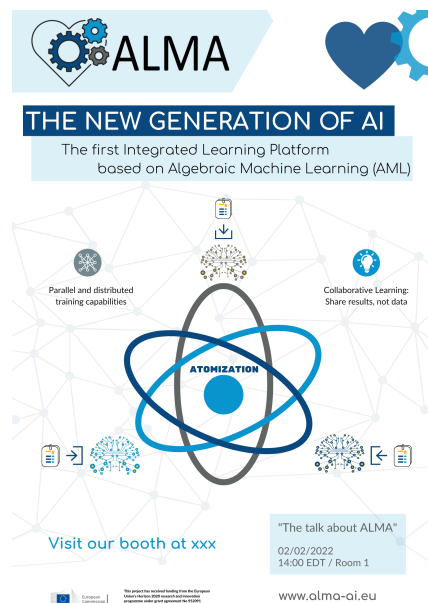
Figure 16 shows some examples of posters produced for the dissemination of ALMA at events and the engagement of our target audience.



(a) ALMA comprehensive poster



(b) ALMA wallpaper poster

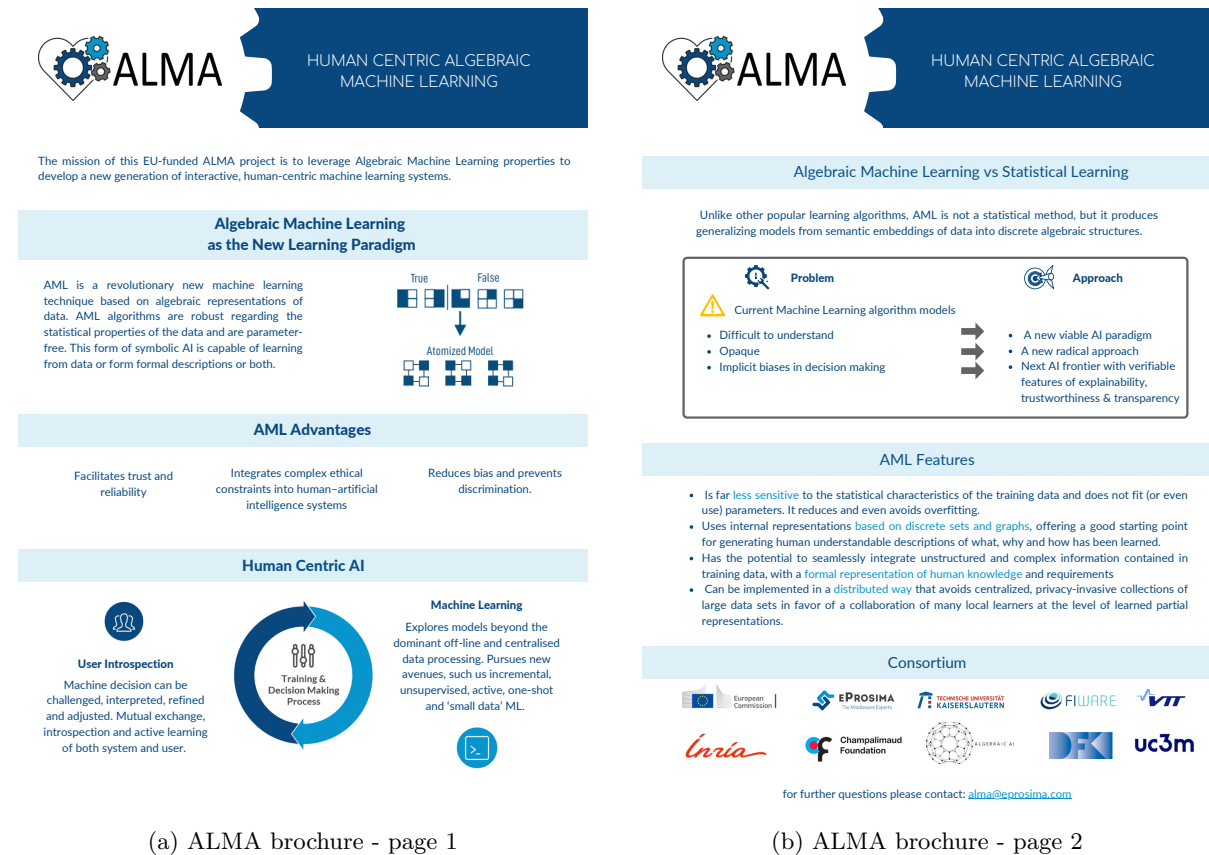


(c) ALMA event poster

Figure 16: ALMA promotional posters

These are included in enlarged size in Appendix A of this document.

A brochure has also been prepared paying special attention to define a clear and friendly message that best represents the idea of the project and captures the attention of the target audience. This brochure is shown in Figure 17.



(a) ALMA brochure - page 1

(b) ALMA brochure - page 2

Figure 17: ALMA brochure

3.7 Internal support tools

An important aspect of dissemination and communication is the achievement of homogeneity in the documents presenting research and innovation results of the ALMA project. This format homogeneity applies to project deliverables, presentations, or any other material produced.

To achieve this format homogeneity, we have created templates for documents and reports (Figure 18), and presentations (Figure 19) available for any member of the consortium.



(a) ALMA report template - page 1

(b) ALMA report template - page 2

Figure 18: ALMA report template



Figure 19: ALMA presentation template

3.8 Meetings and events

This section lists the events in which the ALMA partners have participated in the dissemination of the ALMA project and describes the most relevant ones.

3.8.1 Events summary

This section displays a summary table (Table 3) with all the events that consortium members have attended to in order to disseminate the ALMA project and communicate research results. As can be seen, most of these events are of a scientific nature, aimed at disseminating the results of the current phase of the project.

Partner	Event	Participation	Contributors	Place	Date	URL
EPROS ALG	ROS World 2020	Talk - ALMA: Bringing AI to ROS 2	Fernando Martín-Maroto, Raúl Sánchez-Mateos	Online	12/11/2020	· Live talk ⁴ · ROS World 2020 ⁵
Inria	CNRS Scientific Council	Panel presentation - Ethics and AI: Who are we protecting?	Wendy Mackay	Online	01/12/2020	
Inria	HumanE AI Network	Talk - Exploring the Impact of Agency on Human-Computer Partnerships	Janin Koch, Wendy Mackay	Online	10/02/2021	Talk ⁶
Inria	Center for Hybrid Intelligence	Panel - Artificial Intelligence Expert Virtual RoundTable	Wendy Mackay	Online	25/03/2021	
Inria	HumanE AI Network	Talk - HumanE AI Net - Closing the Loop Symposium	Wendy Mackay, Janin Koch	Online	19/05/2021	Live talk ⁷
UC3M	CEA Summer School	Talk - Introducción a la Inteligencia Artificial en Robótica	Juan G. Victores	Online	16/09/2021	CEA Summer School ⁸
UC3M	CEA Summer School	Talk - Robótica inteligente mediante reinforcement learning	Juan G. Victores	Online	17/09/2021	CEA Summer School ⁹
Inria	ACM Interact	Panel presentation - Artificial Intelligence for Humankind: A Panel on How to Create Truly Interactive and Human-Centered AI for the Benefit of Individuals and Society	Wendy Mackay	Online	02/10/2021	
CF	Dialogues on neural and machine intelligence	ALGEBRAIC MACHINE LEARNING: A symbolic approach to learn from data and prior knowledge without optimization	Gonzalo G. de Polavieja	Lisbon, Portugal	14/10/2021	Live talk ¹⁰
EPROS	ROS World 2021	Panel - ALMA: Human-Centric Algebraic Machine Learning	Raúl Sánchez-Mateos	Online	20/10/2021	ROS World 2021 ¹¹

⁴https://vimeo.com/480473016?embedded=true&source=vimeo_logo&owner=15710607

⁵<https://roscon.ros.org/world/2020/>

⁶<https://www.humane-ai.eu/project/exploring-the-impact-of-agency-on-human-computer-partnerships/>

⁷https://www.youtube.com/watch?v=pw0y6KKh_tk

⁸<https://www.youtube.com/watch?v=sc7nBT4rt-w>

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

¹⁰<https://www.youtube.com/watch?v=afwFXKL-fyQ>

¹¹<https://roscon.ros.org/world/2021/>

ALG TUK	HumanE AI Network	Talk - Hardware acceleration for AML	Fernando Martín-Maroto, Nabil Abderrahaman	Berlin, DE	16/11/2021	
EPROS ALG	Future Tech Week	Talk - ALMA: Human-Centric Algebraic Machine Learning	Fernando Martín-Maroto, Raúl Sánchez-Mateos	Online	22/11/2021	· Live talk ¹² · Future Tech Week ¹³
Inria	NeurIPS Workshop	Workshop/Keynote - Human-Computer Partnerships	Wendy Mackay	Online	13/12/2021	
EPROS	ROS 2 Technical Steering Committee meeting	AML-IP: Integration of AI in ROS 2 ecosystem	Jaime Martín Losa, Raúl Sánchez-Mateos	Online	16/12/2021	ROS 2 TSC Meeting Minutes ¹⁴
Inria	Collège de France Talks	Talk - Human-centered AI	Wendy Mackay	Paris, FR	19/04/2022	Interagir avec l'ordinateur ¹⁵
UC3M	UC3M doctoral meeting 2022	Sim2real Transfer of Deep Reinforcement Learning Policies in a Humanoid Robot	Bartek Lukawski	Leganés, Spain	13/06/2022	Project wallpaper ¹⁶
UC3M	UC3M doctoral meeting 2022	Towards Impedance control on Curves for Upper-	Ignacio Montesino	Leganés, Spain	13/06/2022	Project wallpaper ¹⁷
EPROS	AI I Working Group	Intro to Alma, Sustain ML, Enabling ML technologies for ROS 2	Raul Sanchez-Mateos	online	28/06/2022	· Working Group ROS Discourse Post ¹⁸ · Talk presentation ¹⁹
EPROS	ROSCon 2022	Panel - AML-IP: Integration of AI in ROS 2 ecosystem	Jaime Martín Losa, Raúl Sánchez-Mateos	Kyoto, JP	October 2022	ROSCon 2022 ²⁰
FF	FIWARE Global Summit 2022	Next Generation AI	Rihab Feki, Nabil Abderrahaman	Gran Canaria, Spain	15/09/2022	FIWARE Global Summit 2022 ²¹
INRIA	AI I Working Group	Human Interface Interaction	Janin Koch	online	24/01/2023	· Working Group ROS Discourse Post ²² · Live talk ²³
CF	Conexión AIHUB-Industria	Algebraic Machine Learning and the the ALMA project	Fernando Martín Maroto	Madrid, Spain	22/02/2023	Conexión AIHUB-Industria ²⁴

¹²<https://www.youtube.com/watch?v=343axkMlCWk>

¹³<http://futuretechweek.fetfx.eu/>

¹⁴<https://discourse.ros.org/t/ros-2-tsc-meeting-minutes-12-16-2021/23541>

¹⁵<https://www.college-de-france.fr/site/en-wendy-mackay/course-2022-04-19-10h00.htm>

¹⁶<https://github.com/roboticslab-uc3m/assets/blob/9b70a6d36e569ffc8d9cf43abae7706e38c0cd8c/2022-06-13-doc-toral-meetings-bLukawski.pdf>

¹⁷<https://github.com/roboticslab-uc3m/assets/blob/9b70a6d36e569ffc8d9cf43abae7706e38c0cd8c/2022-06-13-doc-toral-meetings-iMontesino.pdf>

¹⁸<https://discourse.ros.org/t/ros-2-ai-integration-working-group/26119>

¹⁹https://docs.google.com/presentation/d/1xI7-ispW5hpNvCWA00449UAB-XUQecu0qiTj067B-_A

²⁰<https://roscon.ros.org/2022/>

²¹<https://alma-ai.eu/index.php/news/15-alma-at-fiware-global-summit-2022>

²²<https://discourse.ros.org/t/ros-2-ai-integration-working-group/26119/13>

²³<https://www.youtube.com/watch?v=U1165pHbj4U>

²⁴<https://alma-ai.eu/index.php/news/20-alma-at-conexion-aihub-industria>

EPROS	AI I Working Group	Computational effort distribution in ROS 2 & AI-Integrating Platform	Raul Sanchez-Mateos	online	28/03/2023	· Working Group ROS_Discourse Post ²⁵ · Live talk ²⁶
CF	Active Matter conference	Of fish and maths	Gonzalo G. de Polavieja	Dresden, DE	24/04/2023	Active Matter conference ²⁷
UC3M	AI I Working Group	Introduction to AI in Robotics	Juan G. Victores	online	25/04/2023	· Working Group ROS_Discourse Post ²⁸ · Live talk ²⁹
CF	MPI Konstanz seminar	Modelling agents and agents modeling	Gonzalo G. de Polavieja	Konstanz, DE	13/06/2023	Modelling agents and agents modeling ³⁰
EPROS	AI I Working Group	Building Intelligent Distributed Systems in ROS 2: Exploring AML-IP for Cloud Model Serving to Edge Robots	Raul Sanchez-Mateos	online	27/06/2023	· Working Group ROS_Discourse Post ³¹ · Live talk ³²
EPROS	ROSCon Madrid 2023	AML-IP Demo - TensorFlow Inference using ROSbot 2R	Raul Sanchez-Mateos	Madrid, Spain	29/09/2023	· ROSCon Madrid 2023 ³³ · Demo Documentation ³⁴
ALG	Theoretical and Computational Algebra 2024	Algebraic Machine Learning and Atomized Semilattices	Antonio Ricciardo, Fernando Martin-Maroto	Aveiro, Portugal	30/06/2024	· Theoretical and Computational Algebra 2024 ³⁵ · Algebraic Machine Learning and Atomized Semilattices ³⁶
CF	Artificial Intelligence and Theorem Proving	Algebraic Artificial Intelligence	David Méndez	Aussois, France	01/09/2024	· Artificial Intelligence and Theorem Proving ³⁷
EPROS	ROSCon Odense 2024	AML-IP Dissemination	Raul Sanchez-Mateos	Odense, Denmark	22/10/2024	· ROSCon Odense 2024 ³⁸
CF	Champalimaud Open Seminar	The Role of AI in Scientific discovery	Gonzalo de Polavieja, Mireia Castillo-Martin	Lisbon, Portugal	18/11/2024	· Champalimaud Open Seminar ³⁹
CF	ICMAT Seminar	Algebraic Machine Learning	Gonzalo de Polavieja	Madrid, Spain	27/01/2025	· ICMAT Seminar ⁴⁰

²⁵<https://discourse.ros.org/t/ros-2-ai-integration-working-group/26119/24>

²⁶<https://discourse.ros.org/t/ros-2-ai-integration-working-group/26119/27>

²⁷<https://www.pks.mpg.de/active23>

²⁸<https://discourse.ros.org/t/ros-2-ai-integration-working-group/26119/28>

²⁹<https://discourse.ros.org/t/ros-2-ai-integration-working-group/26119/30>

³⁰<https://www.ab.mpg.de/events/34094/345436>

³¹<https://discourse.ros.org/t/ros-2-ai-integration-working-group/26119/34>

³²<https://discourse.ros.org/t/ros-2-ai-integration-working-group/26119/36>

³³<https://roscon.org.es/ROSConMadrid2023>

³⁴https://aml-ip.readthedocs.io/en/latest/rst/demo/rosbot2r_inference.html

³⁵<https://sites.google.com/fct.unl.pt/t-c-algebra/homepage>

³⁶<https://sites.google.com/fct.unl.pt/t-c-algebra/program/abstracts>

³⁷<http://aitp-conference.org/2024/>

³⁸<https://roscon.ros.org/2024/>

³⁹<https://www.fchampalimaud.org/events/champalimaud-open-seminar-gonzalo-de-polavieja-and-mireia-castillo-martin>

⁴⁰<https://www.icmat.es/es/actividades/seminarios/listado/?tipo=dataLab>

CF	Alternative Mathematical Approaches in AI	Algebraic Machine Learning	Gonzalo de Polavieja, Fernando Martín-Maroto	Lisbon, Portugal	03/02/2025	· ALTAI25 ⁴¹
----	---	-------------------------------	---	---------------------	------------	-------------------------

Table 3: Events summary

AI Working Group eProxima (EPROS) AI Working Group is dedicated to empowering Machine Learning technologies for ROS 2 and applying Artificial Intelligence to various use cases.

Future Tech Week Fernando Martín-Maroto (ALG), coordinated together with Raúl Sánchez-Mateos (EPROS), gave an online presentation on the fundamentals of AML and presented the ALMA project at the Future Tech Week event. This is an event that promotes long-term and high-risk innovation research projects, encouraged by the European Innovation Council Pathfinder.

ROS World 2020 Fernando Martín-Maroto, founder of Algebraic AI (ALG), gave an online presentation of AML and the ALMA project at the ROS World 2020 (online) event. The talk was aimed at the robotics engineers of the ROS (Robotics Operating System) community interested in machine learning.

Presentation on Hardware Acceleration for Algebraic Machine Learning Champalimaud Foundation (CF) and Algebraic AI (ALG) participated in an event of the HumanE AI network at Berlin and gave a presentation on our approach to accelerate the computation of AML models. Our hardware acceleration program is the result of a collaboration with the microelectronics department of Kaiserslautern University.

ROSCon Odense 2024 eProxima disseminated AML-IP and the ALMA project at the eProxima showcased AML-IP and the ALMA project at ROSCon Odense 2024, highlighting their contributions to the intersection of robotics and machine learning.

Champalimaud Open Seminar The Champalimaud Foundation hosted a captivating Champalimaud Open Seminar (COPS) that delved into the groundbreaking applications of artificial intelligence (AI) in scientific discovery and cancer research. The event featured two distinguished researchers, Gonzalo de Polavieja and Mireia Castillo-Martin, who shared insights into their innovative work.

NOVA Math Seminar NOVA Math hosted a captivating Seminar of Algebra and Logic featuring Fernando Martín-Maroto from the Champalimaud Foundation and Algebraic AI. Fernando provided a fascinating introduction to AML, a unique approach to machine learning that eschews traditional statistical methods in favor of pure algebra. Fernando also delved into Atomized Semilattices, the mathematical framework that underpins AML. This powerful tool enables efficient operations and computations within AML models.

3.9 Scientific publications

Table 4 shows the scientific papers published so far and those expected to be published in the coming months.

⁴¹<https://sites.google.com/view/altai25>

Partner	Type	Title	Media	Contributors	Date	URL
CF ALG	Preprint document	Finite Atomized semilattices [1]	arXiv preprint	Fernando Martin-Maroto, Gonzalo G. de Polavieja	16/02/2021	https://arxiv.org/abs/2102.08050
CF ALG	Report	Semantic Embeddings in semilattices [2]	arXiv preprint	Fernando Martin-Maroto, Gonzalo G. de Polavieja	25/05/2022	https://arxiv.org/abs/2205.12618
CF ALG	Report	Algebraic Machine Learning: learning by the extraction of stable components in the freest model	arXiv preprint	Fernando Martin-Maroto, Gonzalo G. de Polavieja	December 2022	
VTT	Scientific journal paper	Psychomotor predictive processing [3]	Online journal (MDPI)	Stephen Fox	24/06/2021	https://doi.org/10.3390/e23070806
VTT	Scientific journal paper	Behavioral ethics ecologies of human-artificial intelligence systems [4]	Behavioral Sciences (MDPI)	Stephen Fox	April 2022	https://doi.org/10.3390/bs12040103
VTT	Scientific journal paper	Practical implications from distinguishing between Pearl blankets and Friston blankets [5]	Behavioral and Brain Sciences (Cambridge University Press)	Stephen Fox	October 2022	https://doi.org/10.1017/s0140525x22000061
VTT	Scientific journal paper	Human-artificial intelligence systems: How human survival first principles influence machine learning world models [6]	Systems (MDPI)	Stephen Fox	December 2022	https://doi.org/10.3390/systems10060260
INRIA	CHI Workshop	Combining Human-centred Explainability and Explainable AI	ACM CHI Workshop Human- Centered Perspectives in Explainable AI	Janin Koch and Vitor Fortes Rey	12/05/2022	https://www.dropbox.com/s/vqkox4ycnnhiqSc/HCI2022_paper_40.pdf
UC3M	Scientific journal	Deep Robot Sketching: An application of Deep Q-Learning Networks for human-like sketching [7]	Cognitive Systems Research (Elsevier)	Raul Fernandez- Fernandez, Juan G. Victores, Carlos Balaguer	September 2023	https://doi.org/10.1016/j.cogsys.2023.05.004
UC3M	Scientific journal	Transferring human emotions to robot motions using Neural Policy Style Transfer [8]	Cognitive Systems Research (Elsevier)	Raul Fernandez- Fernandez, Bartek Lukawski, Juan G. Victores, Claudio Pacchierotti	December 2023	https://doi.org/10.1016/j.cogsys.2023.05.010
UC3M	Conference proceedings	An inverse kinematics problem solver based on screw theory for manipulator arms	XLIII Jornadas de Automática: libro de actas (Universi- dade da Coruña. Servizo de Publicacións)	Lukawski, Bartek; Montesino Valle, Ignacio; Victores, Juan G.; Jardón Huete, Alberto; Balaguer, Carlos	September 2022	https://doi.org/10.17979/spu dc.9788497498418.0864
UC3M	Conference proceedings	Impedance based Gym environment for the IIWA Collaborative robot towards human robot interaction	XLIII Jornadas de Automática: libro de actas (Universi- dade da Coruña. Servizo de Publicacións)	Montesino Valle, Ignacio; Lukawski, Bartek; Victores, Juan G.; Jardón Huete, Alberto; Balaguer, Carlos	September 2022	https://doi.org/10.17979/spu dc.9788497498418.0762
UC3M	Conference proceedings	Manipulación de objetos dirigida a la asistencia de personas con movilidad reducida	XLIII Jornadas de Automática: libro de actas (Universi- dade da Coruña. Servizo de Publicacións)	Naranjo-Campos, Francisco J.; Matías-Martínez, Ainhoa; de Victores, Juan G.; Álvarez, Nicolás; Alcaide, Almudena; Balaguer, Carlos	September 2022	https://doi.org/10.17979/spu dc.9788497498418.0798

UC3M	Workshop proceedings	Extending Piecewise Bezier Fitting Methods to $SO(3)$ and $SE(3)$ for Robot Paths	FW12: Geometric Representations: The Roles of Screw Theory, Lie algebra, and Geometric Algebra	Montesino Valle, Ignacio; Vitorres, Juan G.; Balaguer, Carlos; Jardón Huete, Alberto	September 2023	https://www.icra2023.org/programme/workshops-tutorials
UC3M	Conference proceedings	A generic controller for teleoperation on robotic manipulators using low-cost devices	XLIV Jornadas de Automática 2023	Lukawski, Bartek; Vitorres, Juan G.; Balaguer, Carlos	September 2023	https://xliv.jautomatica.es/
DFKI	Conference proceedings	Finetune encoders for better Self-Supervised HAR	Adjunct Proceedings of the 2023 ACM International Joint Conference on Pervasive and Ubiquitous Computing & the 2023 ACM International Symposium on Wearable Computing (UbiComp/ISWC '23 Adjunct)	Vitor Fortes Rey, Dominique Nshimiyimana, and Paul Lukowicz	October 2023	https://doi.org/10.1145/3594739.3610790
CF ALG	Preprint document	Infinite Atomized Semilattices [9]	arXiv preprint	Fernando Martin-Maroto, Antonio Ricciardo, David Mendez and Gonzalo G. de Polavieja	02/11/2023	https://arxiv.org/abs/2311.01389
VTT UC3M	Scientific journal paper	Safety of Human-Artificial Intelligence systems: Applying safety science to analyze loopholes in interactions between human organizations, artificial intelligence, and individual people [10]	Informatics (MDPI)	Stephen Fox and Juan G. Vitorres	29/05/2024	https://www.mdpi.com/2227-9709/11/2/36
VTT DFKI	Scientific journal paper	Representing human ethical requirements in hybrid machine learning models: Technical opportunities and fundamental challenges.[11]	Machine Learning and Knowledge Extraction (MDPI)	Stephen Fox and Vitor Fortes Rey	08/03/2024	https://www.mdpi.com/2504-4990/6/1/27
VTT DFKI	Scientific journal paper	A Cognitive Load Theory (CLT) analysis of machine learning explainability, transparency, interpretability, and shared interpretability [12]	Machine Learning and Knowledge Extraction (MDPI)	Stephen Fox and Vitor Fortes Rey	02/07/2024	https://www.mdpi.com/2504-4990/6/3/71
CF ALG	Preprint document	Algebraic Machine Learning: Learning as computing an algebraic decomposition of a task [13]	arXiv preprint	Fernando Martin-Maroto, Nabil Abderrahaman, David Mendez and Gonzalo G. de Polavieja	27/02/2025	https://arxiv.org/abs/2502.19944

Table 4: Scientific publications

3.10 Posts analytics

This section shows the dissemination activities carried out to date for the dissemination of the ALMA project. As explained in Section 2.4, the target audience to be reached with these posts are developers, the applied computer science community, ROS 2 community, and SMEs/Startups that are going to use AML and the AML-IP. The problem with these communities is that they require that the developments can be tested and evaluated, so it is difficult to reach them at the moment due to the lack of robustness and reliability of the final products. This is why efforts have been put into creating marketing material

for events rather than creating posts on social networks or developer community forums.

3.10.1 Social Media

During the first year of the project, ALMA's presence on social media platforms was relatively limited. This was primarily due to the project's early research-oriented phase, which meant that our target audience at the time comprised scientists, mathematicians, and researchers. Developers and end-users, who require stable and functional products for testing, were not within our initial scope. As mentioned in subsection 2.11, the presence in social media was reduced in the launching phase of the project to focus all efforts on scientific publications.

Nevertheless, posts have been published on platforms such as Twitter and LinkedIn to promote ALMA's presence in the events in which it has participated, shown in Table 3.

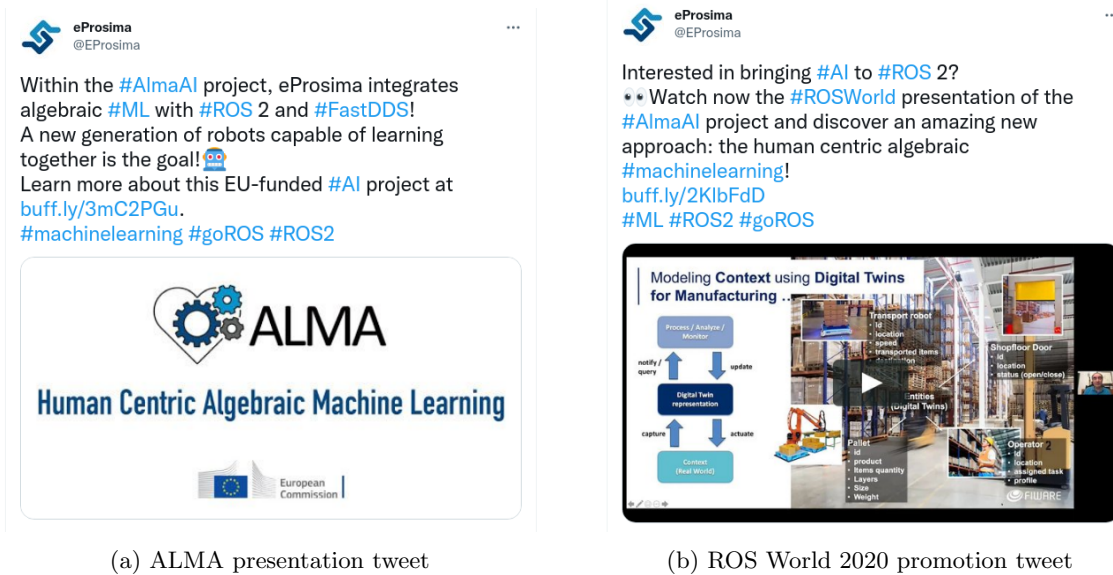


Figure 20: Twitter post examples

Over the next two years, ALMA's presence on social media, particularly on Twitter and LinkedIn, significantly increased. We've been tracking key metrics such as reactions, impressions, and engagement to continually enhance our content, as depicted in Table 5.

Partner	Start Date	Type of Action	Reactions	Impressions	Engagement	URL
EPROS	12/11/2020	Twitter	5	919	-	https://twitter.com/EProsimia/status/1326989756958445568
EPROS	3/12/2020	Other	10	951	-	https://discourse.ros.org/t/alma-algebraic-machine-learning-ros-2-fast-dds/17704
EPROS	22/12/2020	Twitter	13	3564	-	https://twitter.com/EProsimia/status/1341420808049217537
EPROS	21/04/2021	Twitter	2	572	-	https://twitter.com/EProsimia/status/1384892230478016512
EPROS	04/06/2021	Twitter	6	879	-	https://twitter.com/EProsimia/status/1400833497552543744
EPROS	14/09/2022	Twitter	1	275	2.20%	https://twitter.com/EProsimia/status/1570069987934576643
EPROS	14/09/2022	LinkedIn	2	419	1.91%	https://www.linkedin.com/feed/update/urn:li:activity:6975821067026067456

D8.3 - Report on Communication and Dissemination - M54



EPROS	23/09/2022	Twitter	3	204	4.90%	https://twitter.com/EProsima/status/1573330856139268097
EPROS	23/09/2022	LinkedIn	4	413	1.69%	https://www.linkedin.com/feed/update/urn:li:activity:6979096550077575168
EPROS	06/10/2022	Twitter	0	237	1.30%	https://twitter.com/EProsima/status/1578041643898470400
EPROS	06/10/2022	LinkedIn	3	314	2.55%	https://www.linkedin.com/feed/update/urn:li:activity:6983807339527065600
EPROS	27/10/2022	Twitter	1	263	2.70%	https://twitter.com/EProsima/status/1585653051515445248
EPROS	27/10/2022	LinkedIn	5	331	2.42%	https://www.linkedin.com/feed/update/urn:li:activity:6991418740873547776
EPROS	22/11/2022	Twitter	2	274	5.10%	https://twitter.com/EProsima/status/1595104273758818304
EPROS	22/11/2022	LinkedIn	5	435	2.54%	https://www.linkedin.com/feed/update/urn:li:activity:7000869966497345536/
EPROS	9/12/2022	Twitter	1	236	5.50%	https://twitter.com/EProsima/status/1601274615128784896
EPROS	9/12/2022	LinkedIn	3	388	1.03%	https://www.linkedin.com/feed/update/urn:li:activity:7007040401973636096/
EPROS	30/12/2022	Twitter	4	521	2.90%	https://twitter.com/EProsima/status/1608759553914544128
EPROS	30/12/2022	LinkedIn	3	355	1.69%	https://www.linkedin.com/feed/update/urn:li:activity:7014525244606443520/
EPROS	4/01/2023	Twitter	2	284	4.60%	https://twitter.com/EProsima/status/1610677691837026304
EPROS	4/01/2023	LinkedIn	4	365	2.19%	https://www.linkedin.com/feed/update/urn:li:activity:7016443383225192448/
EPROS	24/01/2023	Twitter	1	284	2.80%	https://twitter.com/EProsima/status/1617936005738409984
EPROS	24/01/2023	LinkedIn	4	300	2%	https://www.linkedin.com/feed/update/urn:li:activity:7023701873773658112/
EPROS	14/02/2023	Twitter	4	445	2.90%	https://twitter.com/EProsima/status/1625540134073409536
EPROS	14/02/2023	LinkedIn	3	397	2.27%	https://www.linkedin.com/feed/update/urn:li:activity:7031305817819656193/
EPROS	28/02/2023	Twitter	2	258	2.30%	https://twitter.com/EProsima/status/1630605250540322825
EPROS	28/02/2023	LinkedIn	2	263	1.14%	https://www.linkedin.com/feed/update/urn:li:activity:7036371075840016384/
EPROS	09/03/2023	Twitter	2	220	3.20%	https://twitter.com/EProsima/status/1633873772146229248
EPROS	09/03/2023	LinkedIn	1	235	2.55%	https://www.linkedin.com/feed/update/urn:li:activity:7039639614764003328/
EPROS	16/03/2023	Twitter	3	315	1.90%	https://twitter.com/EProsima/status/1636405972750028802
EPROS	16/03/2023	LinkedIn	2	304	0.99%	https://www.linkedin.com/feed/update/urn:li:activity:7042171768316256257/
EPROS	28/03/2023	Twitter	9	911	2.20%	https://twitter.com/EProsima/status/1640702091239649986
EPROS	28/03/2023	LinkedIn	4	300	2.67%	https://www.linkedin.com/feed/update/urn:li:activity:7046469249929768961/
EPROS	19/04/2023	Twitter	2	321	5%	https://twitter.com/EProsima/status/1648723403174445066
EPROS	19/04/2023	LinkedIn	5	492	2.85%	https://www.linkedin.com/feed/update/urn:li:activity:7054489760349728768/
EPROS	07/06/2023	Twitter	4	328	3.40%	https://twitter.com/EProsima/status/1666470576603512833
EPROS	07/06/2023	LinkedIn	5	358	3.35%	https://www.linkedin.com/feed/update/urn:li:activity:7072236373994332160/
EPROS	15/06/2023	Twitter	1	393	2.00%	https://twitter.com/EProsima/status/1669370686316445697
EPROS	15/06/2023	LinkedIn	6	455	4.18%	https://www.linkedin.com/feed/update/urn:li:activity:7075479645801914370/

EPROS	11/07/2023	Twitter	13	1577	2.70%	https://twitter.com/EProsimas/status/1678794603942621185
EPROS	11/07/2023	LinkedIn	8	644	4.04%	https://www.linkedin.com/feed/update/urn:li:activity:7084654436101967872/
EPROS	09/08/2023	Twitter	0	254	-	https://twitter.com/EProsimas/status/1689302270444244993
EPROS	09/08/2023	LinkedIn	7	514	3.31%	https://www.linkedin.com/feed/update/urn:li:activity:7095068064135675904
EPROS	30/08/2023	Twitter	1	461	-	https://twitter.com/EProsimas/status/1696903353685381194
EPROS	30/08/2023	LinkedIn	2	406	2.96%	https://www.linkedin.com/feed/update/urn:li:activity:7102669149948026880
EPROS	4/12/2024	LinkedIn	8	516	3.88%	https://www.linkedin.com/feed/update/urn:li:activity:7270002898107838465/?actorCompanyId=5128803
EPROS	12/12/2024	LinkedIn	7	420	2.08%	https://www.linkedin.com/company/5128803/admin/post-analytics/urn:li:activity:7272871562012225536/

Table 5: Social Media partners' actions dashboard

3.10.2 ALMA website

A dedicated project website has been established, with ongoing efforts to enhance its accessibility and attract new collaborators and adopters of AML. As of February 2025, the website has received over **2700** impressions. You can access the website through the following link: <https://alma-ai.eu/>.

Home The Home section of the website provides a comprehensive overview of all available sections, offering quick access to key content.

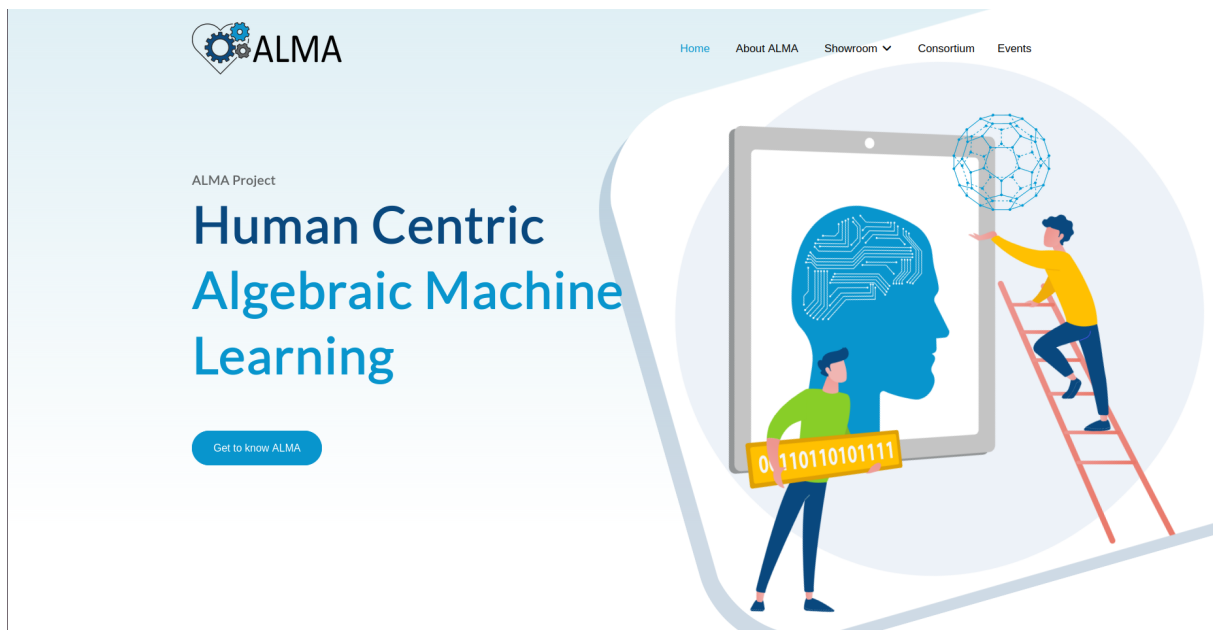


Figure 21: ALMA Website - Home Section

- **About:** A brief introduction to the ALMA project.

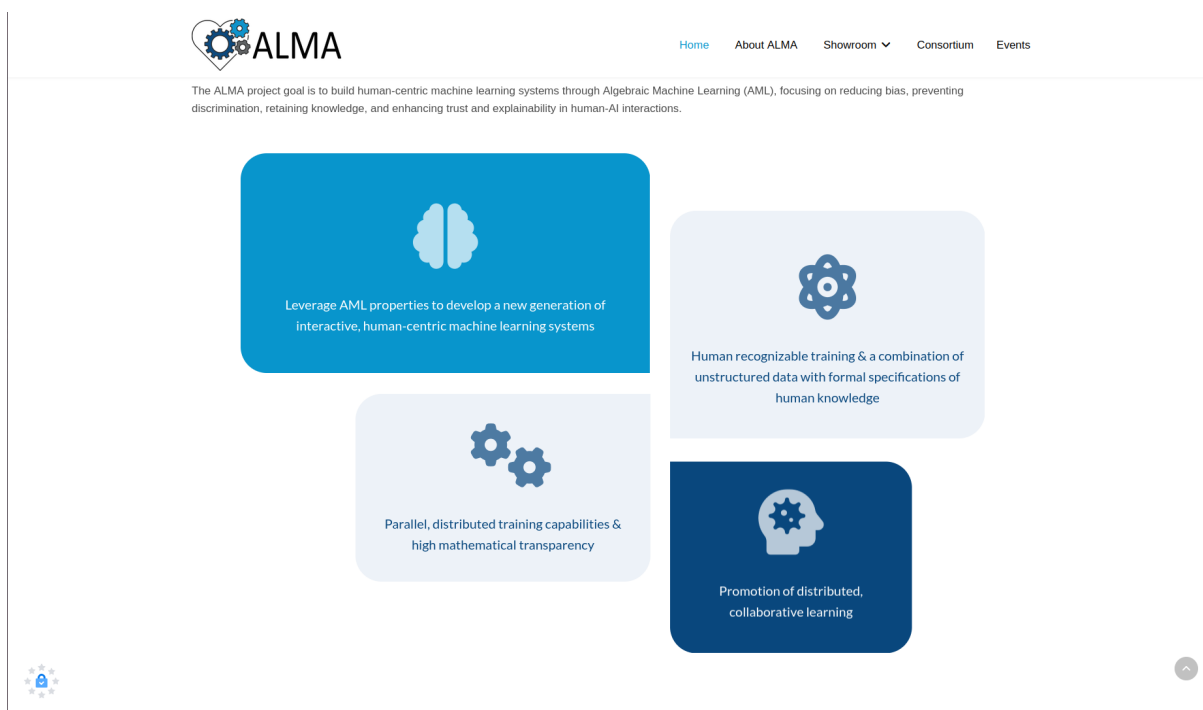


Figure 22: ALMA Home Section: About

- Latest News: Highlights the three most recent news updates.

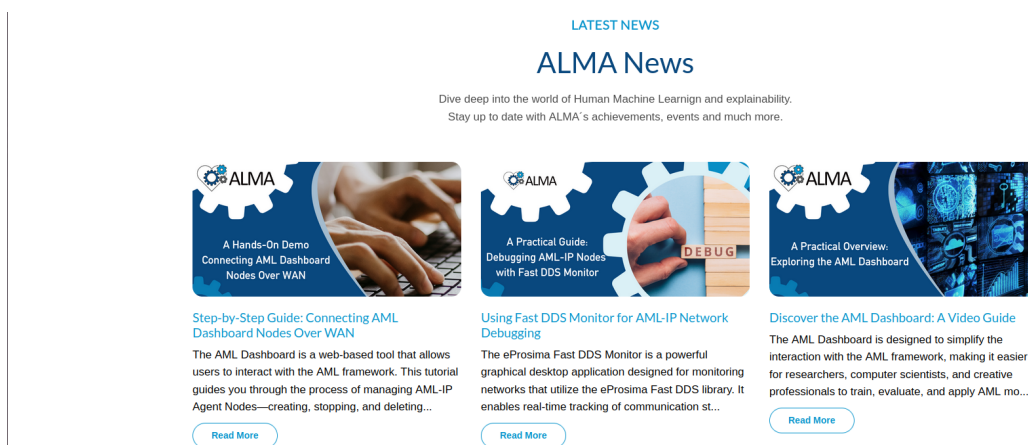


Figure 23: ALMA Home Section: Latest News

- Publications: Direct access to the latest publications, including deliverables, work packages, and scientific articles.

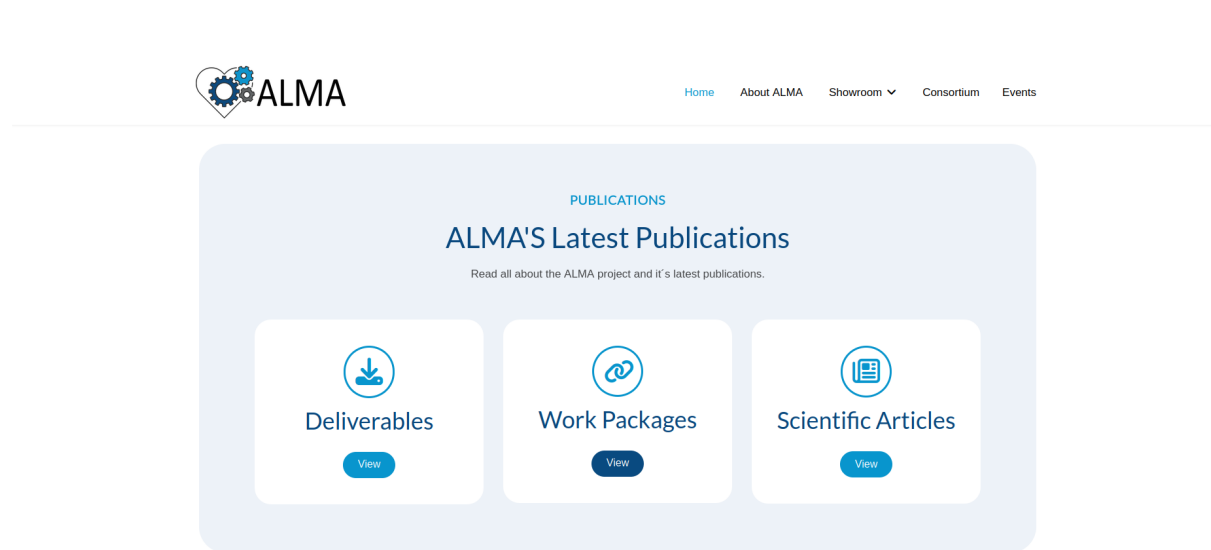


Figure 24: ALMA Home Section: Publications

- Videos: A link to the video section, showcasing the two most recently uploaded videos.

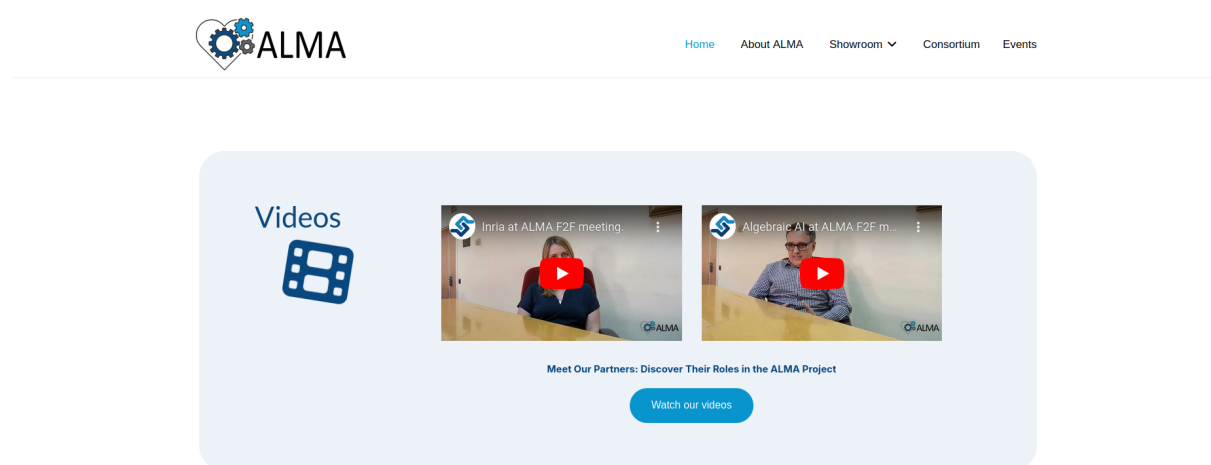


Figure 25: ALMA Home Section: Videos

- Events: Quick access to ALMA's latest events.

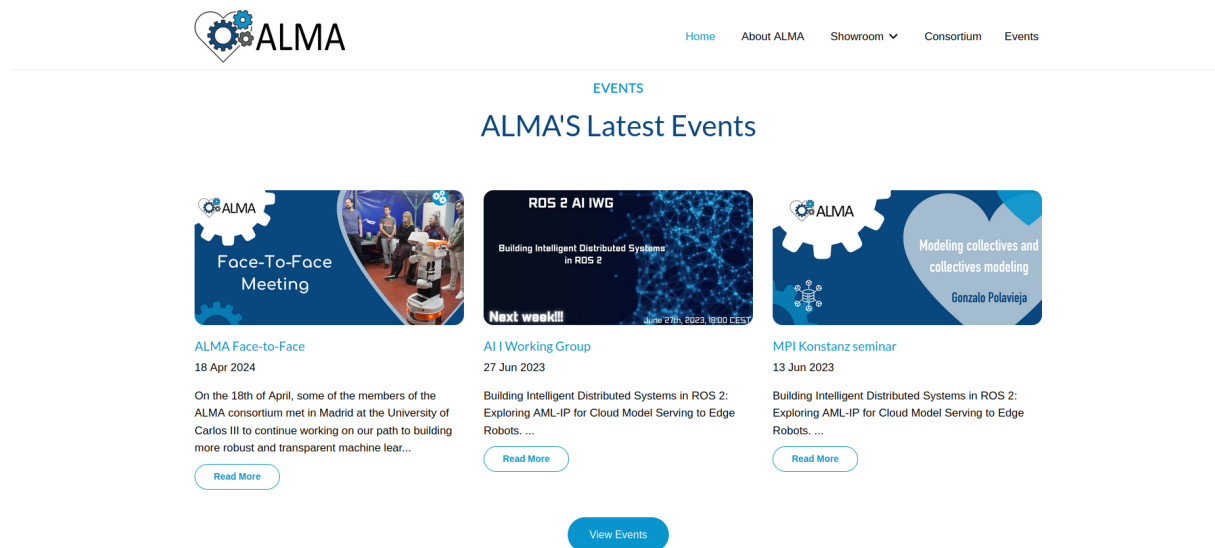


Figure 26: ALMA Home Section: Events

About Under the about section of the ALMA website, you can find more details about the objectives, methodology and features of ALMA.

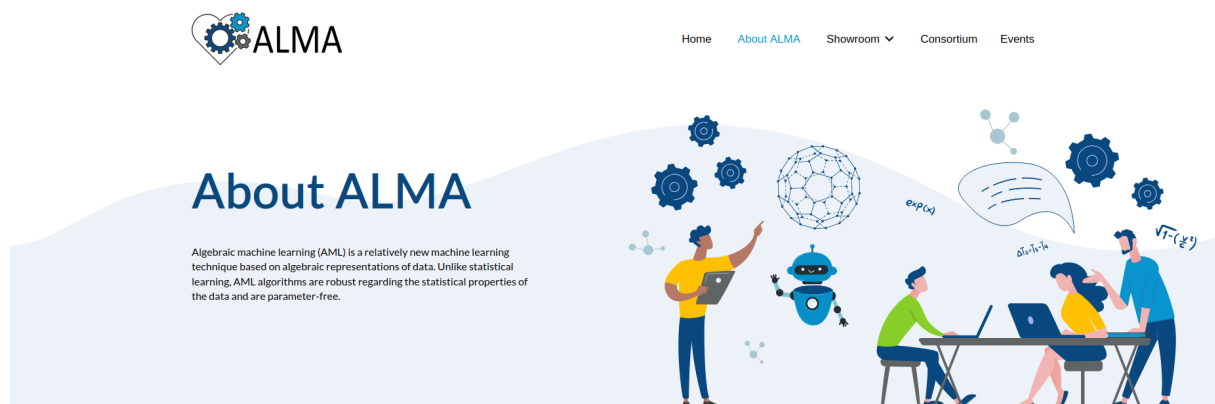


Figure 27: ALMA website - About Section

Deliverables The Deliverables section provides an overview of the project's outputs, including details on the AML algorithm, the AML-IP framework, ethical considerations, and various tools and demos developed throughout the project.

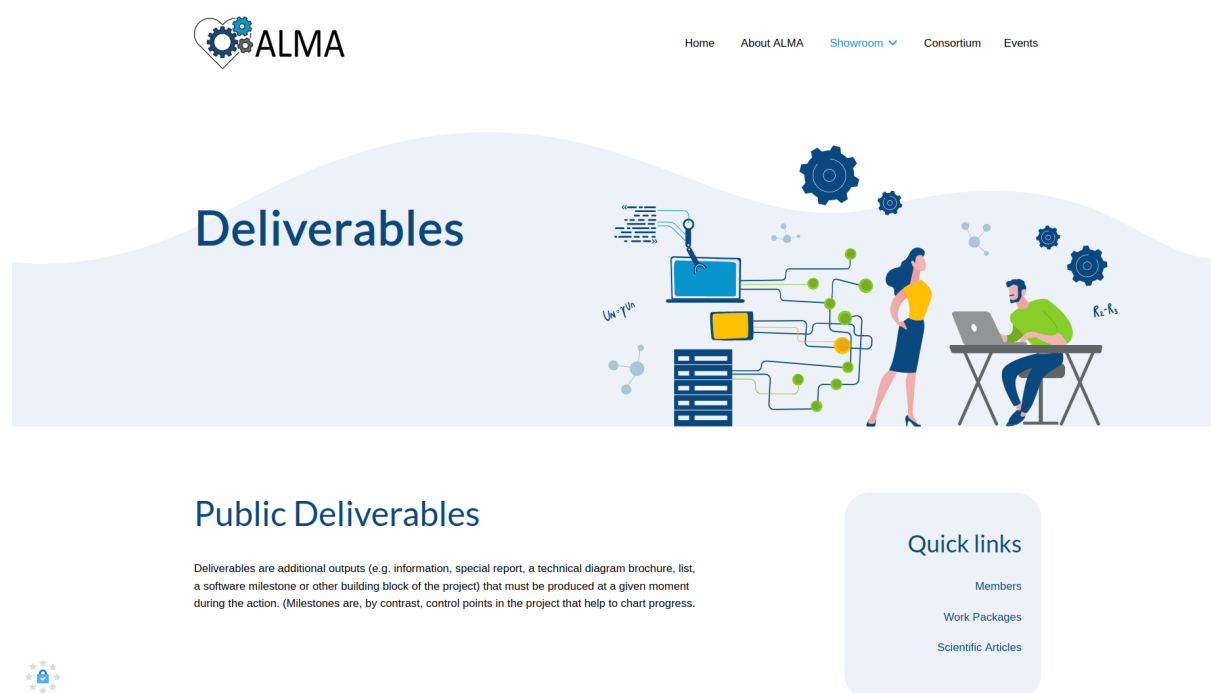


Figure 28: ALMA website - Deliverables

Work Packages The Work Packages section outlines the key components of the project, covering project management, the fundamentals of AML, the AML Description Language, human interaction with AML, learning world models, ethics and cultural considerations, as well as the systems and tools for AML deployment.

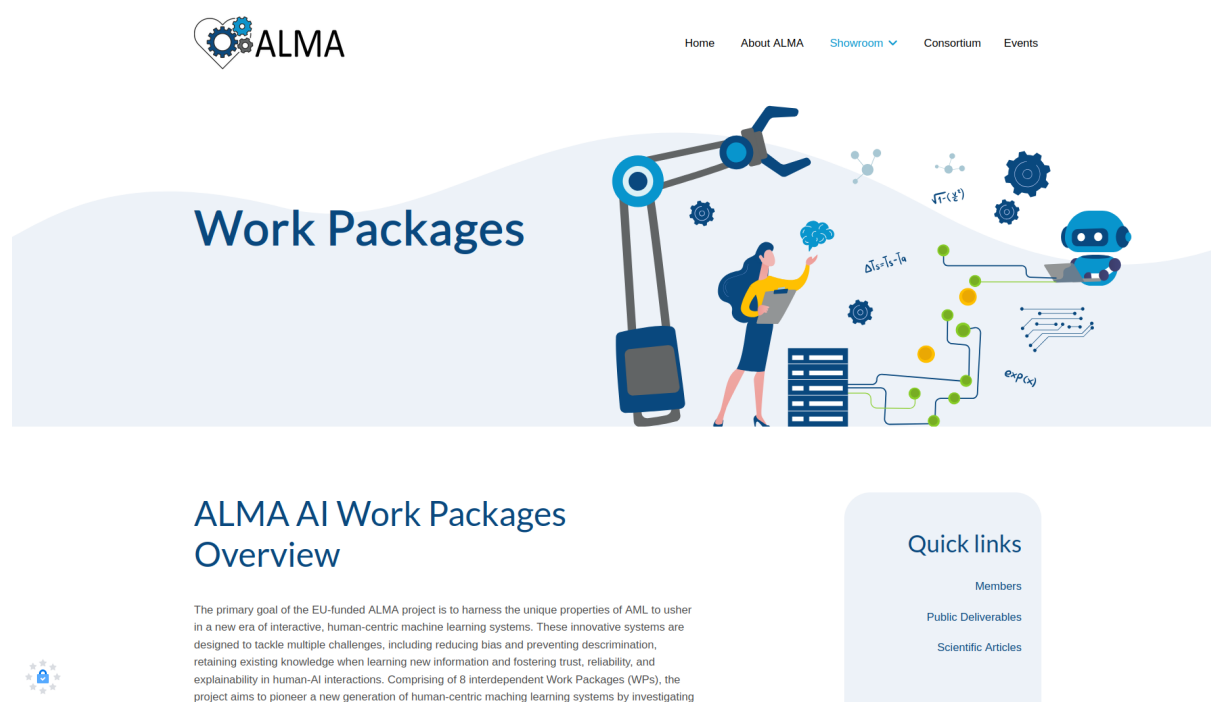


Figure 29: ALMA Website - Work Packages

Scientific Articles The Scientific Articles section features publications in scientific journals and preprints related to ALMA.

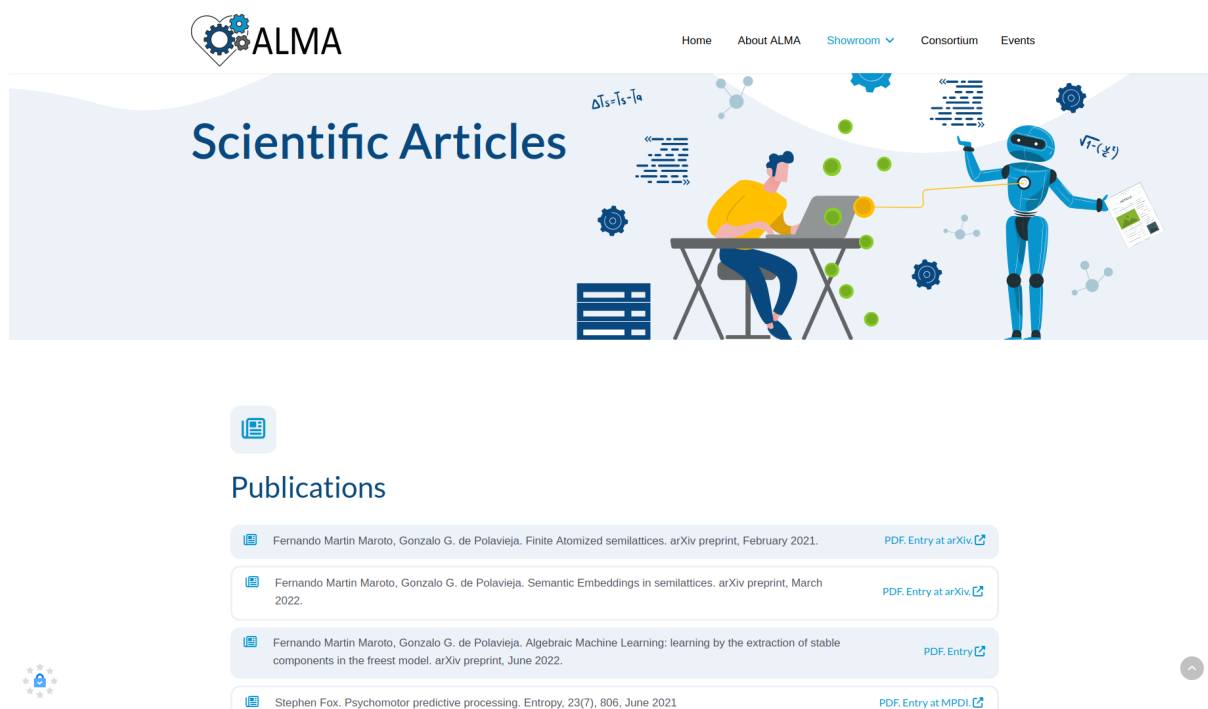


Figure 30: Scientific Articles

Videos The Videos section features discussions on various aspects of the ALMA project, with a focus on each partner's role in the initiative.

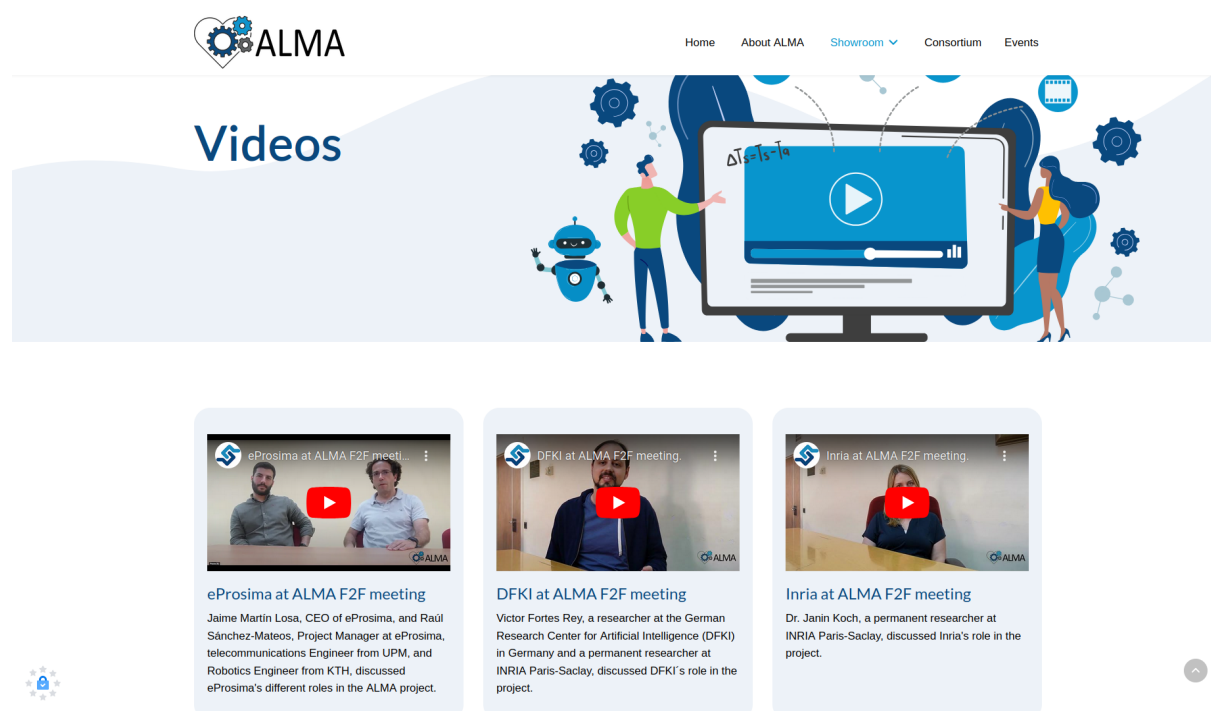


Figure 31: ALMA website - Videos

Documentation This section provides direct links to the documentation for ALMA's software, including the AML-IP documentation and AML-Toolkit documentation.

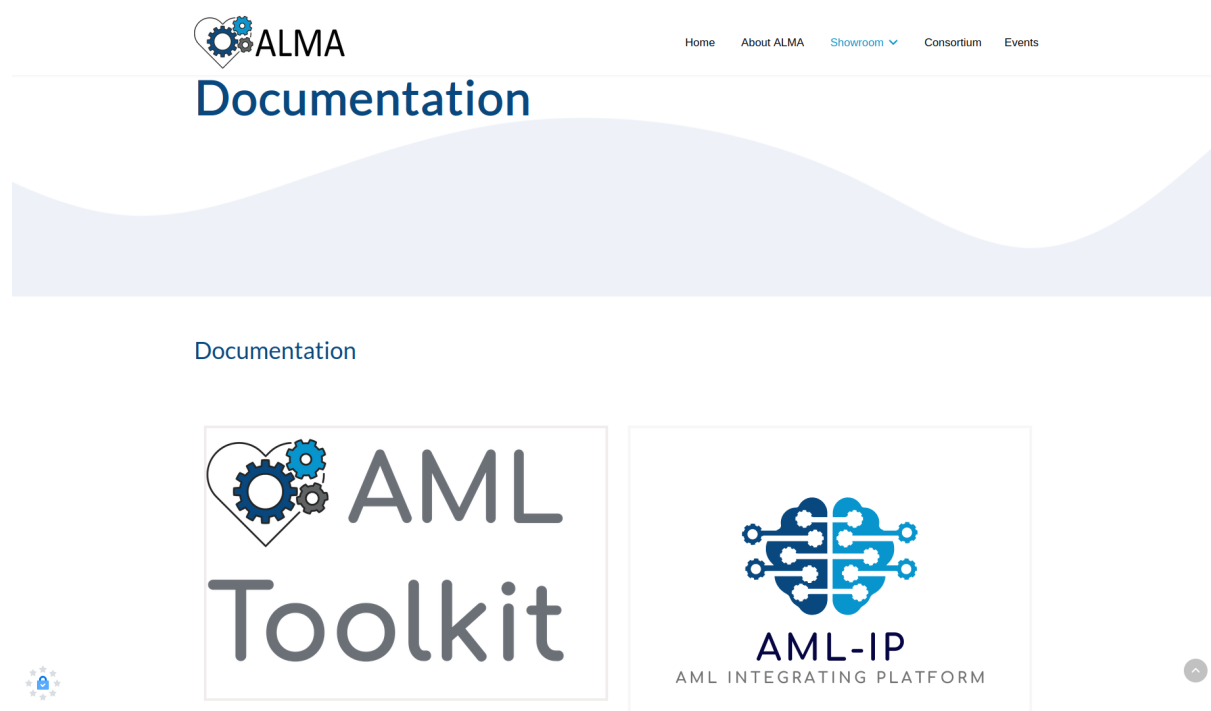


Figure 32: ALMA website - Documentation

Consortium This section provides information about the project's partners.

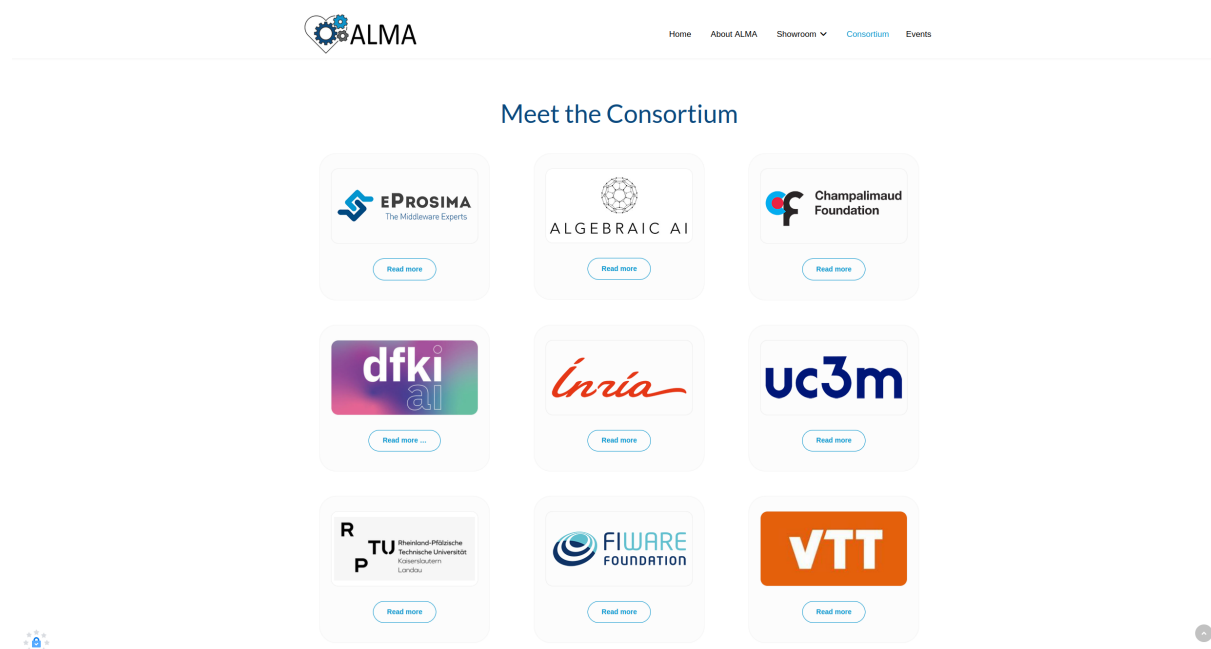


Figure 33: ALMA website - Consortium

Events This section highlights events where ALMA is discussed or organized by consortium members to promote and disseminate the project.



Figure 34: ALMA website - Events

Latest News We maintain a regular publication of news articles on the website to promote ALMA and provide updates on our progress.



Figure 35: ALMA website - Latest News

Below is a summary table presenting the analytics of these published articles:

Partner	Title	Publication Date	Impressions	URL
DFKI	First steps of Algebraic Machine Learning for Human Activity Recognition	16/09/2022	1924	https://alma-ai.eu/index.php/news/12-first-steps-of-aml-for-human-activity-recognition
VTI	Learning world models, ethics and culture with Algebraic Machine Learning (AML)	04/10/2022	1100	https://alma-ai.eu/index.php/news/14-learning-world-models-ethics-and-culture-with-aml
FF	ALMA at FIWARE Global Summit 2022	06/10/2022	1316	https://alma-ai.eu/index.php/news/15-alma-at-fiware-global-summit-2022
TUK	Building hardware architectures for Algebraic Machine Learning	22/11/2022	1158	https://alma-ai.eu/index.php/news/16-learning-world-models-ethics-and-culture-with-aml-2
EPROS	Making Algebraic Machine Learning node communication easy with AML Integrating Platform	09/12/2022	1000	https://alma-ai.eu/index.php/news/17-making-aml-easy-with-aml-ip
INRIA	Explainability and Interpretability of AML	30/12/2022	927	https://alma-ai.eu/index.php/news/18-explainability-and-interpretability-of-aml
CF ALG	Algebraic Machine Learning: a new program for Symbolic AI	24/01/2023	907	https://alma-ai.eu/index.php/news/19-algebraic-machine-learning-a-new-program-for-symbolic-ai
ALG	ALMA and Algebraic at "Conexión AIHUB-Industria"	28/02/2023	865	https://alma-ai.eu/index.php/news/20-alma-at-conexion-aihub-industria
EPROS	AML-IP Workload Distribution Scenario	16/03/2023	693	https://alma-ai.eu/index.php/news/22-aml-ip-workload-distribution-scenario
ALG EPROS	Algebraic Machine Learning (AML) & ALMA: an in-depth overview	15/06/2023	488	https://alma-ai.eu/index.php/news/26-algebraic-machine-learning-aml-alma-an-in-depth-overview

EPROS	Build intelligent distributed systems in ROS 2	18/07/2023	245	https://alma-ai.eu/index.php/news/27-build-intelligent-distributed-systems-in-ros-2
EPROS	ALTAI2025 - Exploring Alternative Mathematical Approaches in AI	03/01/2025	-	https://alma-ai.eu/showroom/news/altai2025-exploring-alternative-mathematical-approaches-in-ai
EPROS	AML Dashboard: A User-Friendly Interface for the AML Framework	16/01/2025	-	https://alma-ai.eu/showroom/news/aml-dashboard-a-user-friendly-interface-for-the-aml-framework
EPROS	eProsima DDS Router: Connecting AML-IP Nodes over WAN	23/01/2025	-	https://alma-ai.eu/showroom/news/eprosima-dds-router-connecting-aml-ip-nodes-over-wan
EPROS	Building an AML-IP Agent Node: A Practical Walkthrough	24/01/2025	-	https://alma-ai.eu/showroom/news/building-an-aml-ip-agent-node-a-practical-walkthrough
EPROS	Discover the AML Dashboard: A Video Guide	27/01/2025	-	https://alma-ai.eu/showroom/news/discover-the-aml-dashboard-a-video-guide
EPROS	Using Fast DDS Monitor for AML-IP Network Debugging	28/01/2025	-	https://alma-ai.eu/showroom/news/using-fast-dds-monitor-for-aml-ip-network-debugging
EPROS	Step-by-Step Guide: Connecting AML Dashboard Nodes Over WAN	30/01/2025	-	https://alma-ai.eu/showroom/news/step-by-step-guide-connecting-aml-dashboard-nodes-over-wan
EPROS	Tensorflow Inference	05/02/2025	-	https://alma-ai.eu/showroom/news/tensorflow-inference
EPROS	AML-IP Collaborative Learning	06/02/2025	-	https://alma-ai.eu/showroom/news/aml-ip-collaborative-learning
EPROS	AML Dashboard: Sending Data to the Context Broker new Tutorial	11/02/2025	-	https://alma-ai.eu/showroom/news/new-aml-dashboard-tutorial-sending-data-to-the-context-broker-and-retrieving-inferences
EPROS	Parallelizing AML Model Training with AML-IP	12/02/2025	-	https://alma-ai.eu/showroom/news/parallelizing-aml-model-training-with-aml-ip
EPROS	Train a Model with AML Dashboard	17/02/2025	-	https://alma-ai.eu/showroom/news/train-a-model-with-aml-dashboard
EPROS	How to Create a Custom Dataset for AML Model Training	18/02/2025	-	https://alma-ai.eu/showroom/news/how-to-create-a-custom-dataset-for-aml-model-training
EPROS	Tutorial: Adding Your Custom Model to the AML-Dashboard	19/02/2025	-	https://alma-ai.eu/showroom/news/tutorial-adding-your-custom-model-to-the-aml-dashboard
EPROS	Fetch a model with AML-Dashboard	26/02/2025	-	https://alma-ai.eu/showroom/news/fetch-a-model-with-the-aml-dashboard
EPROS	TensorFlow Inference using ROSbot 2R	26/02/2025	-	https://alma-ai.eu/showroom/news/tensorflow-inference-using-rosbot-2r
EPROS	Make predictions with AML Dashboard	26/02/2025	-	https://alma-ai.eu/showroom/news/make-predictions-with-the-aml-dashboard

Table 6: Posts on ALMA news website

3.10.3 eProsima News

On the eProsima website, news have been published to promote ALMA among the users of eProsima products. Below is a summary table with the analytics of the articles published:

Title	Publication Date	Impressions	URL
ALMA - AI project coordinated by eProsima	22/07/2020	1990	https://eprosima.com/index.php/company-all/news/153-alma-ai-project-coordinated-by-eprosima

ALMA at the Future Tech Week 2020	18/09/2020	1003	https://eprosima.com/index.php/company-all/news/161-alma-at-the-future-tech-week-2020
Introducing the ALMA News Section	14/02/2023	-	https://eprosima.com/index.php/company-all/news/307-introducing-alma-news-section

Table 7: Posts on eProsimas news website

3.10.4 ROS Discourse

The ROS community is one of the main target audiences for the dissemination of AML-IP. That is why the ROS Discourse channel is used to reach and attract this community by publishing the news resulting from the development of the AML-IP framework, which will have full compatibility with the ROS 2 ecosystem.

As explained above, at this stage of the project it is only possible to inform the community that we are working on a new ML paradigm called AML and that it will be exploitable on ROS 2 systems by utilizing AML-IP. Following are the analytics of the post made in ROS Discourse promoting the ALMA project.

Title	Publication Date	Views	Likes	Replies	URL
ALMA: Algebraic Machine Learning, ROS 2 & Fast DDS	03/12/2020	996	16	8	https://discourse.e.ros.org/t/alma-algebraic-machine-learning-ros-2-fast-dds/17704
ROS 2 AI Integration Working Group	02/06/2022	3.7k	49	35	https://discourse.ros.org/t/ros-2-ai-integration-working-group/26119

Table 8: Posts on ROS Discourse

A ALMA promotional material

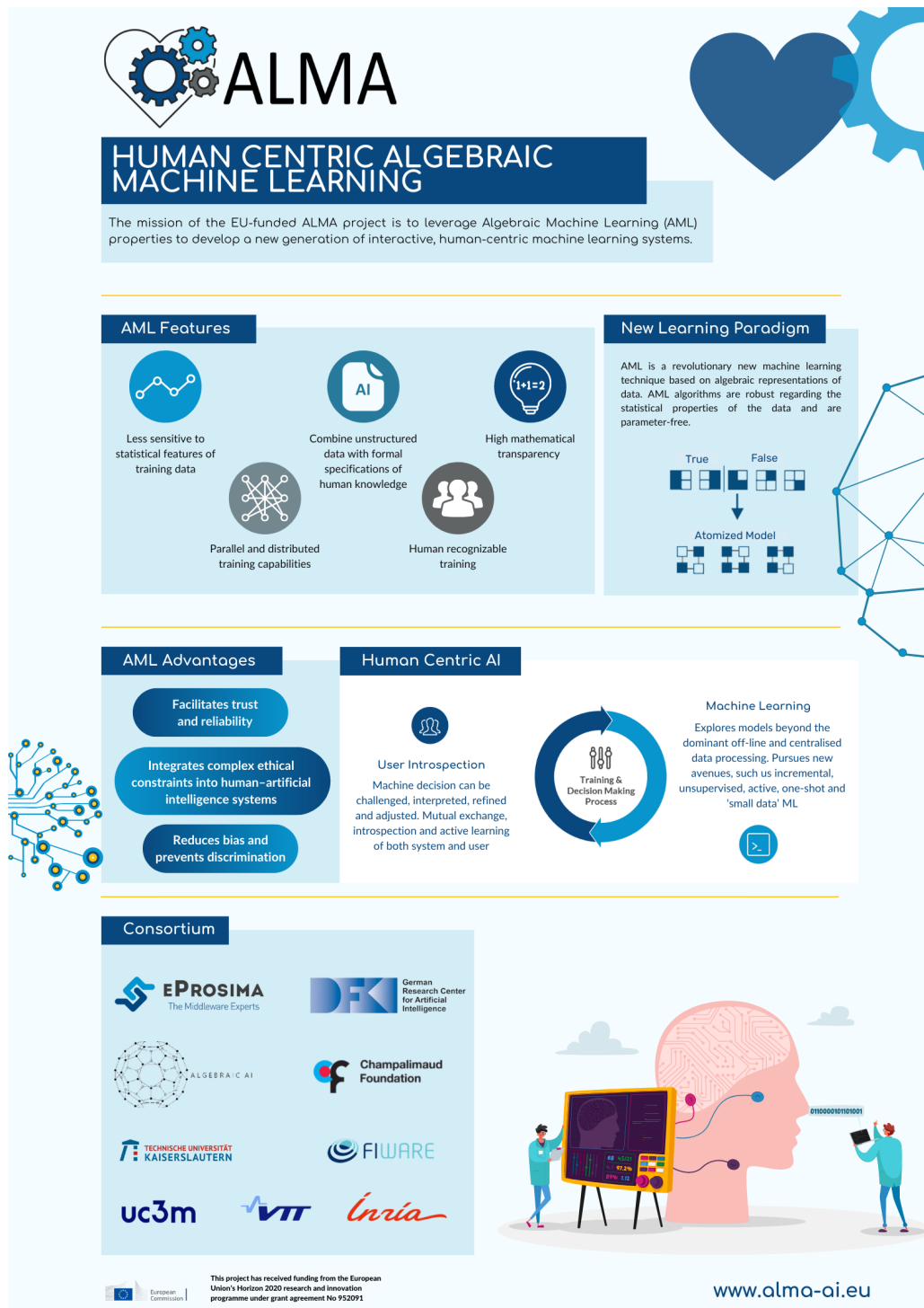


Figure 36: ALMA comprehensive poster

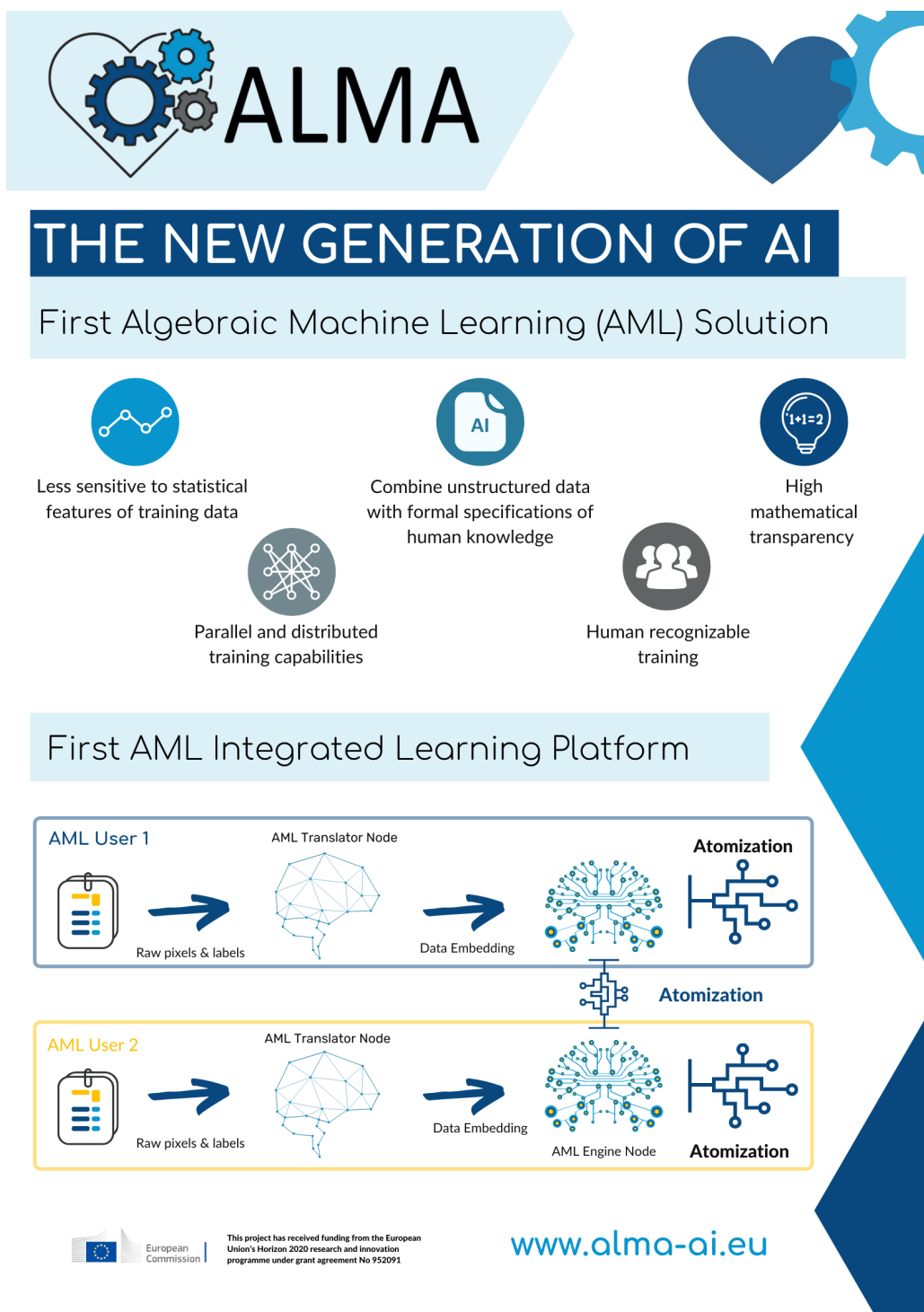
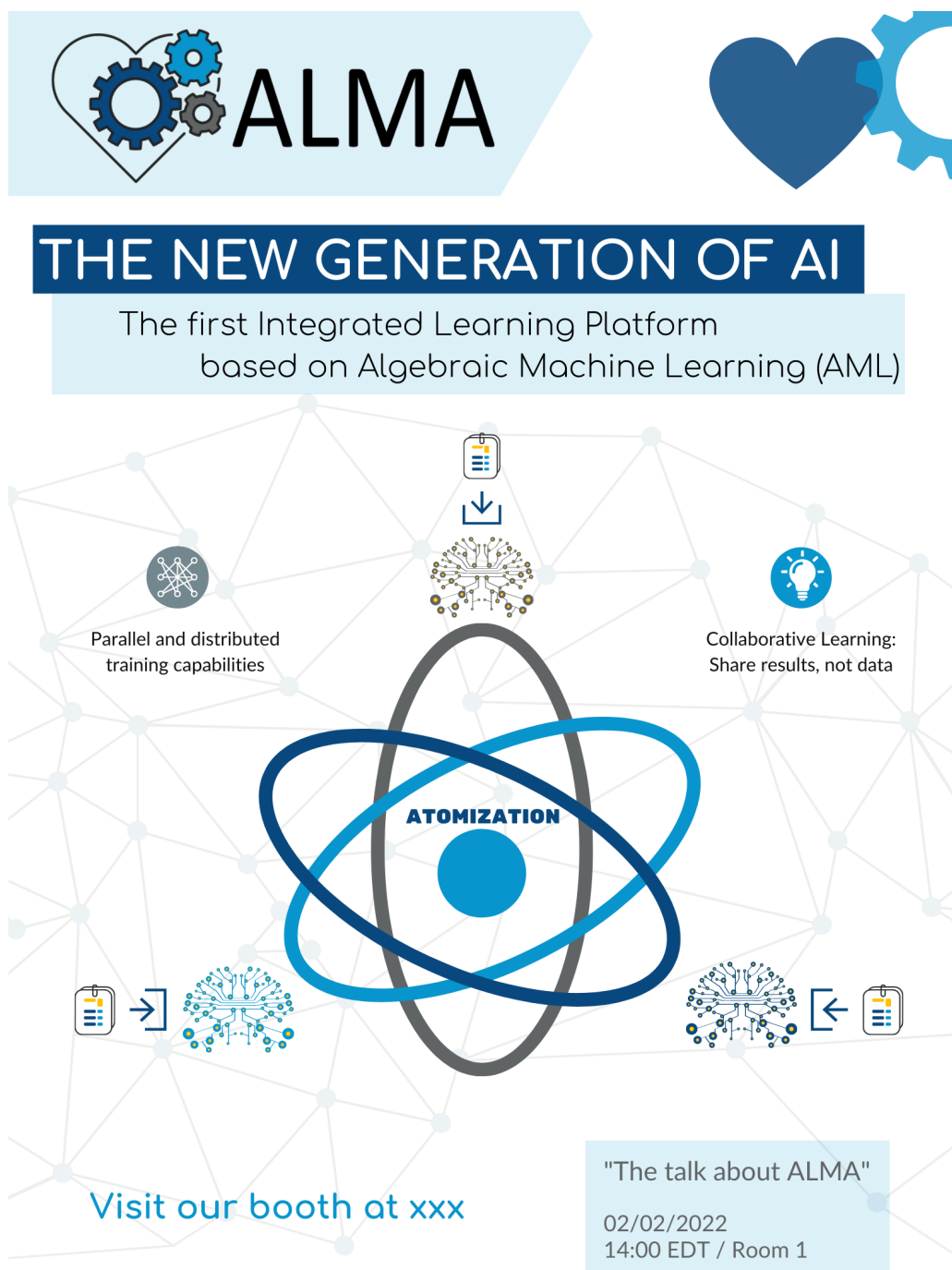


Figure 37: ALMA wallpaper poster



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952091

www.alma-ai.eu

Figure 38: ALMA event poster

References

- [1] Fernando Martin-Maroto and Gonzalo G. de Polavieja. *Finite Atomized Semilattices*. 2021. arXiv: 2102.08050 [math.RA].
- [2] Fernando Martin-Maroto and Gonzalo G. de Polavieja. *Semantic Embeddings in Semilattices*. 2022. DOI: 10.48550/ARXIV.2205.12618. URL: <https://arxiv.org/abs/2205.12618>.
- [3] Stephen Fox. “Psychomotor Predictive Processing”. In: *Entropy* 23.7 (2021). ISSN: 1099-4300. DOI: 10.3390/e23070806. URL: <https://www.mdpi.com/1099-4300/23/7/806>.
- [4] Stephen Fox. “Behavioral Ethics Ecologies of Human-Artificial Intelligence Systems”. In: *Behavioral Sciences* 12.4 (2022). ISSN: 2076-328X. DOI: 10.3390/bs12040103. URL: <https://www.mdpi.com/2076-328X/12/4/103>.
- [5] Stephen Fox. “Practical implications from distinguishing between Pearl blankets and Friston blankets”. In: *Behavioral and Brain Sciences* 45 (2022), e194. DOI: 10.1017/S0140525X22000061.
- [6] Stephen Fox. “Human & Artificial Intelligence Systems: How Human Survival First Principles Influence Machine Learning World Models”. In: *Systems* 10.6 (2022). ISSN: 2079-8954. DOI: 10.3390/systems10060260. URL: <https://www.mdpi.com/2079-8954/10/6/260>.
- [7] Raul Fernandez-Fernandez, Juan G. Victores, and Carlos Balaguer. “Deep Robot Sketching: An application of Deep Q-Learning Networks for human-like sketching”. In: *Cognitive Systems Research* 81 (2023), pp. 57–63. ISSN: 1389-0417. DOI: <https://doi.org/10.1016/j.cogsys.2023.05.004>. URL: <https://www.sciencedirect.com/science/article/pii/S1389041723000372>.
- [8] Raul Fernandez-Fernandez et al. “Transferring human emotions to robot motions using Neural Policy Style Transfer”. In: *Cognitive Systems Research* 82 (2023), p. 101121. ISSN: 1389-0417. DOI: <https://doi.org/10.1016/j.cogsys.2023.05.010>. URL: <https://www.sciencedirect.com/science/article/pii/S1389041723000499>.
- [9] Fernando Martin-Maroto et al. *Infinite Atomized Semilattices*. 2023. DOI: <https://doi.org/10.48550/arXiv.2311.01389>. URL: <https://arxiv.org/abs/2311.01389>.
- [10] Stephen Fox and Juan G. Victores. “Safety of Human–Artificial Intelligence Systems: Applying Safety Science to Analyze Loopholes in Interactions between Human Organizations, Artificial Intelligence, and Individual People”. In: *Informatics* 11.2 (2024). ISSN: 2227-9709. DOI: 10.3390/informatics11020036. URL: <https://www.mdpi.com/2227-9709/11/2/36>.
- [11] Stephen Fox and Vitor Fortes Rey. “Representing Human Ethical Requirements in Hybrid Machine Learning Models: Technical Opportunities and Fundamental Challenges”. In: *Machine Learning and Knowledge Extraction* 6.1 (2024), pp. 580–592. ISSN: 2504-4990. DOI: 10.3390/make6010027. URL: <https://www.mdpi.com/2504-4990/6/1/27>.
- [12] Stephen Fox and Vitor Fortes Rey. “A Cognitive Load Theory (CLT) Analysis of Machine Learning Explainability, Transparency, Interpretability, and Shared Interpretability”. In: *Machine Learning and Knowledge Extraction* 6.3 (2024), pp. 1494–1509. ISSN: 2504-4990. DOI: 10.3390/make6030071. URL: <https://www.mdpi.com/2504-4990/6/3/71>.
- [13] Fernando Martin-Maroto et al. Algebraic Machine Learning: Learning as computing an algebraic decomposition of a task. 2025. arXiv: 2502.19944.