alicia – assembly lines in circulation

Assembly Lines In CIrculAtion – smart digital tools for the sustainable, human-centric and resilient use of production resources

D8.3

DEC Plan (2nd)

version 2.0

Project details

Project acronym	ALICIA
Start / Duration	1 January 2023 / 36 Months
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Website	alicia-cme.eu

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0.3		Final review by M. Orgler and P. Url (TUG)	in review
1.0		Implementation of the final review.	final
2.0		Resubmission of the document	in review

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Executive Summary

This document outlines ALICIA's second Dissemination, Exploitation, and Communication (DEC) plan. Unlike the first DEC plan, Deliverable 8.3 (D8.3), this document is divided into two sections. These are dissemination and communication, which inform the public about ALICIA and exploitation to ensure further research and development and use beyond the project.

The DEC plan begins with an assessment of the baseline situation for communication and dissemination of the project and its results. Against this background, the selected channels for communication and dissemination are described, as well as how they have been used and how they will be used in the future.

The second section explains how to plan the use of the results obtained. To this end, the procedure for identifying the results is discussed first. The procedure results are then explained.

Changes included in this Re-submission

In response to reviewer feedback, the following significant updates have been incorporated into this revised DEC plan:

- **Website Redesign:** The project website is undergoing a comprehensive re-design to address previous concerns regarding interactivity, clarity, accessibility, and user experience. The new design facilitates easier access to essential project information and provides enhanced multimedia support. The design was finalized after initial surveys and multiple drafts. It is planned to launch at the end of April 2025. At the time of the deliverable resubmission the mock-up can be found with the following link:

https://xd.adobe.com/view/000ab337-389d-42ea-94e9-c734f1fef816-5559/

- **Communication Materials:** New communication materials are being developed, including an explanatory video and stakeholder interview videos, designed to clearly communicate the project's objectives, benefits, and outcomes to diverse audiences and stakeholders.
- **Community Interaction:** Community-building activities have been significantly expanded, including enhanced collaboration with related EU projects such as MASTT and CIRPASS, participation in joint workshops, and targeted engagement with industry networks like the European Factories of the Future Research Association (EFFRA).
- **Exploitation Planning:** Active participation in Horizon Results Booster workshops has been initiated, with Module A strategies completed and Modules B, C scheduled to refine exploitation strategies in the coming months.

List of acronyms

AI	Artificial Intelligence
DEC	Dissemination, Exploitation, and Communication
DS	Digital Shadow
DT	Digital Twin
DX.X	Deliverable X.X
EFFRA	European Factories of the Future Research Association
HaDEA	European Health and Digital Executive Agency
HRB	Horizon Result Booster
KER	Key Exploitable Result
KPI	Key Performance Indicator
LCA	Life Cycle Assessment
TX.X	Task X.X
WPX	Work package X

1. Introduction

This DEC Plan aims to provide insight into the planning and implementation of DEC activities. It builds on the first DEC plan (D8.2). The focus is on DEC opportunities, objectives, and a current statistical overview. The current DEC plan for the ALICIA project has two main objectives:
(1) to maximize the visibility of the project and its results and
(2) to consider subsequent exploitation during the project.

Additionally, the aim is to ensure project visibility, create interest in the research activities and prepare the ground for a successful exploitation beyond its duration.

It is essential to consider the following conditions for the DEC plan. On one hand, project partners from industry and research may require or have access to various channels and exploitation strategies. On the other hand, their target groups are diverse, ranging from for example scientific communities to customer groups composed of service providers or manufacturing companies (see Annex I – Communities by partner organizations for a detailed list of target groups). For instance, research institutions primarily disseminate findings through scientific conferences and peer-reviewed publications. Industrial stakeholders often engage with manufacturing and technology professionals, including system integrators and use case partners across sectors, where project-related developments can support broader solution offerings. Additionally, the project's focus on circularity attracts attention from organizations and individuals advocating for sustainable practices and the circular economy, who are interested in innovations that reduce waste and optimize resource use. To address these challenges, ALICIA's DEC plan is structured as follows: Communication and dissemination have been separated from exploitation to provide a clear differentiation between informing the general public and target groups about the project and utilizing the project results beyond the project's completion. Hence, Dissemination and Communication activities described in this report provides insights into the selection of preferred dissemination and communication methods and the current status of these efforts. Exploitation elaborates on the preparation of the results' exploitation and the partners' exploitation plans.

In order to ensure the broadest possible dissemination of this document, certain sensitive information has been separated into appendices.

2. Dissemination and Communication

This section outlines the procedure for planning and implementing dissemination and communication activities. The focus is on measures implemented to date and future actions. Firstly, the objectives for dissemination and communication are defined. Then, the target groups and communities, crucial to achieve these goals, are analyzed. Finally, the available channels through which these communities can be reached are examined. Based on these findings, a plan has been developed for each channel to ensure that it contributes best to the dissemination and communication of ALICIA.

2.1. Dissemination and Communication Objectives

The overall objective of this chapter is to raise public awareness and interest in the project. Building on this, the target groups are to be kept informed about the progress of the project and the elaborated results, and an exchange is to be initiated. These terms are used in this deliverable as follows:

Communication needs to reach out to citizens, stakeholders, and the media to inform, promote, and communicate project activities and results. This requires a strategy to deliver clear messages through the proper channels to the right audiences. It is crucial to attract the attention of stakeholders and experts to enable an exchange with them and the general public. It should also show how and on what topics scientific cooperation is supported in Europe.

Dissemination focuses on making results and knowledge available to the public and to researchers so that they can benefit from them. To maximize the impact, these scientific project results should be accessible free of charge. As a result of dissemination, scientific knowledge is expanded and contributes to the scientific process by enabling the next research steps.

In light of these objectives, one particular point must be made: in both communication and dissemination activities, it is always necessary to consider which groups should be addressed. This should ensure that the relevant aspects of the project are highlighted for each target group. At the same time, however, communication should also address the general public. This conflict of objectives must be considered when choosing communication and dissemination channels.

2.2. Target Audiences and Community

Categories of target audiences were presented in the first DEC plan. This categorization will not be repeated here. Instead, reference is made to this publicly available deliverable. At this point, the focus will be more on how individual target audiences from individual partners can be brought together to form a community.

The members of this community are united by their interest in at least one project outcome. However, as the partners have a wide variety of thematic focuses and target audiences, it is important to tailor the approach to the target audiences so that an abundance of untargeted information does not suppress initial interest. At the same time, existing and new community members should be able to access all project results as easily as possible, i.e., via the same platform.

To achieve this goal, partners' target audiences are brought together in a community through the following steps:

1) Identifying the target audiences of each partner (Annex I – Communities by partner organizations)
2) Linking the communities to individual results (Carried out by each partner)
3) Linking the results to communication and dissemination channels in order to target the linked audiences with the results relevant to them and to capitalize on the initial interest (Annex IV – Mapping of results to communication and dissemination opportunities).

2.3. Dissemination and Communication Channels

The key to achieving the general communication and dissemination goals outlined in the previous chapters is to build a community and make all information available to it. Therefore, a project website was created as a central platform. It not only provides an introduction to the project but also summarizes all publicly available information about the project. Additional communication materials were created and a LinkedIn group was set up to generate further attention for the project.

Publications will be used to disseminate results at the scientific level, while the community sector of industry will be addressed in particular through trade fairs and workshops. In addition, the community will be interactively involved in the project outside of these results presentations. The individual channels are presented below and their current and planned use is described.

To effectively illustrate how these aspects work together to promote the project and stimulate continuous engagement, the consortium follows the well-established **AIDA model** (Figure 1):

- **Awareness:**
  Targeted outreach through professional networks (e.g., LinkedIn posts (see 2.3.5), EU-project collaborative workshops, etc.), presentations at scientific conferences, and participation in industry events and fairs.

- **Interest:**
  Multimedia materials (e.g., explanatory videos, infographics, flyers) that highlight project benefits are featured prominently on social media and partner channels to stimulate curiosity (see 2.3.3 and 2.3.4).

- **Desire:**
  Clearly structured content designed to present valuable insights, benefits, and relevant results that address the audience’s needs and motivate them to seek further engagement. Research papers emphasize real-world applications and demonstrates tangible advantages, ensuring the audience understands the practical benefits and relevance of the project outcomes (see 2.3.6).

- **Action:**
  Integrated calls-to-action (CTAs) throughout communication materials and posts, strategically utilizing QR codes linking directly to the website (see 2.3.1). This makes it easy for the audience to access more detailed information and actively participate (e.g., joining the LinkedIn group, downloading resources, or contacting the consortium), culminating ideally in future workshop participations (see 2.3.9 and 2.3.10).

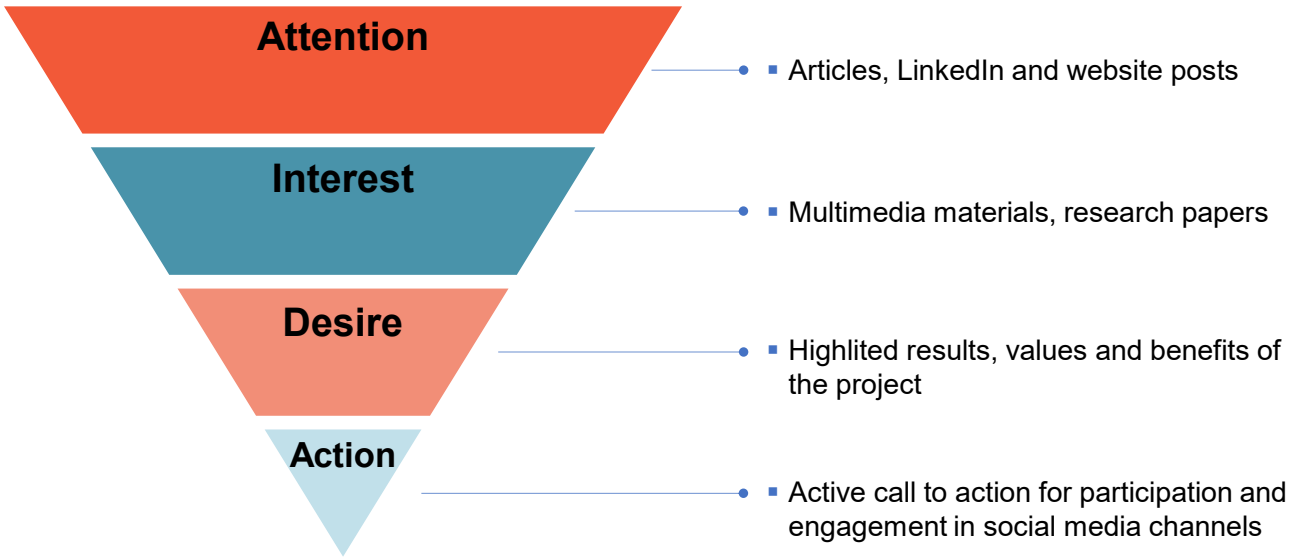

Figure 1: AIDA model

2.3.1. Website

As outlined in the initial DEC-Plan, ALICIA's public website (alicia-cme.eu) serves as the primary platform for disseminating project information, outcomes, and activities to a broad audience. Leveraging the accessibility and versatility of WordPress, the website is designed to facilitate seamless communication and engagement with stakeholders. The website is structured to provide comprehensive insights into the project's objectives, methodologies, and consortium. Its key pages include:

Home: Offering a concise yet informative introduction to ALICIA, this section provides visitors with a high-level understanding of the project's scope and significance. This is the main landing page of the website (Figure 2).

About: Delving deeper into the project's goals and methodologies, this section explains the strategic approach adopted by ALICIA in tackling its research objectives.

Partners: This page gives an overview of all the consortium partners and highlights the diverse expertise and contributions of each partner.

Events: Regularly updated to showcase project milestones and upcoming activities, this section enables stakeholders to stay informed about relevant events and opportunities for engagement.

Library: Serving as a repository for project publications and deliverables, this section grants visitors access to a wealth of research outputs and communication materials.

News: Keeping stakeholders updated on the latest project developments and announcements, this section ensures timely communication of important updates.

Contact us: This page shows the address of the coordinator's office, as well as an e-mail address and phone number for interested parties who want to get in touch about the project.

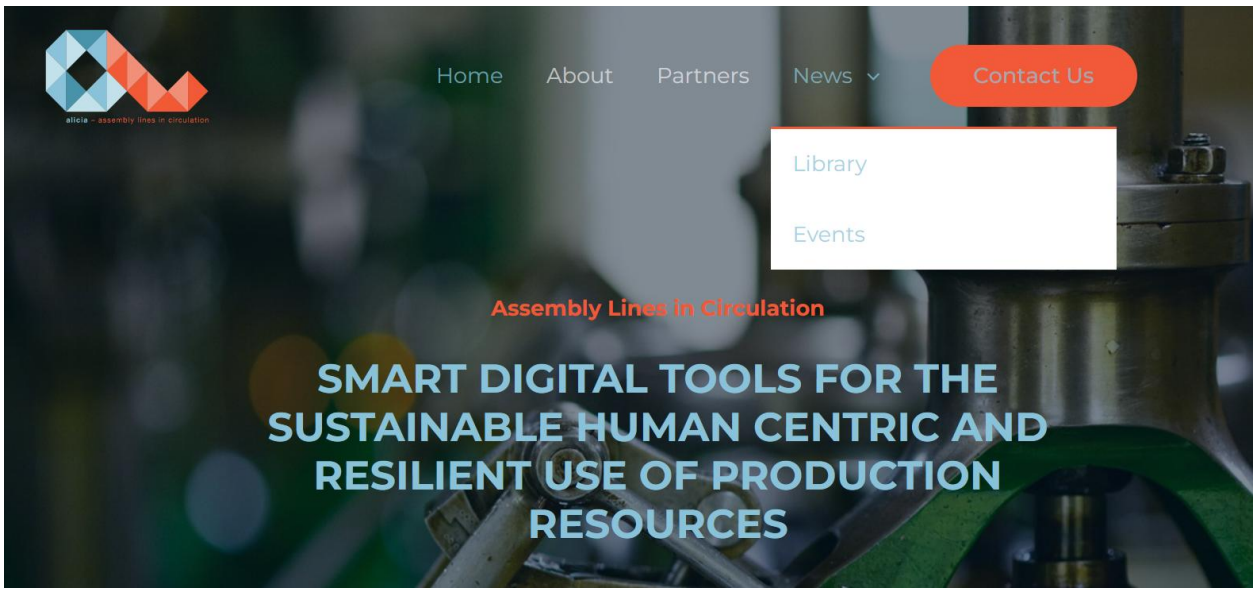

Figure 2: The ALICIA website (alicia-cme.eu)

The website's dynamic content and interactive features foster engagement and dialogue within the project community. Events and news are consistently refreshed to reflect the progress of the project and invite participation from interested parties. In addition to research outputs, communication materials such as flyers and posters are readily accessible for download, enhancing the accessibility and impact of ALICIA's findings. In January 2024, a statistic tool was implemented into the WordPress structure. Since then, the website has garnered significant traction, with over 11,800 visitors and 32,400 interactions recorded. These metrics are tracked to analyze how the project reaches and engages its target audience. Statistics for daily website visitors for the website until 31/03/2025 are shown in Figures 3, 4, and 5. Notable are certain spikes in the visitors and interactions, which can be traced back either to events, LinkedIn posts or conferences. Exemplary explanations are given in the figures and will be explained in more detail in later chapters (i.e., in chapter 2.3.9)

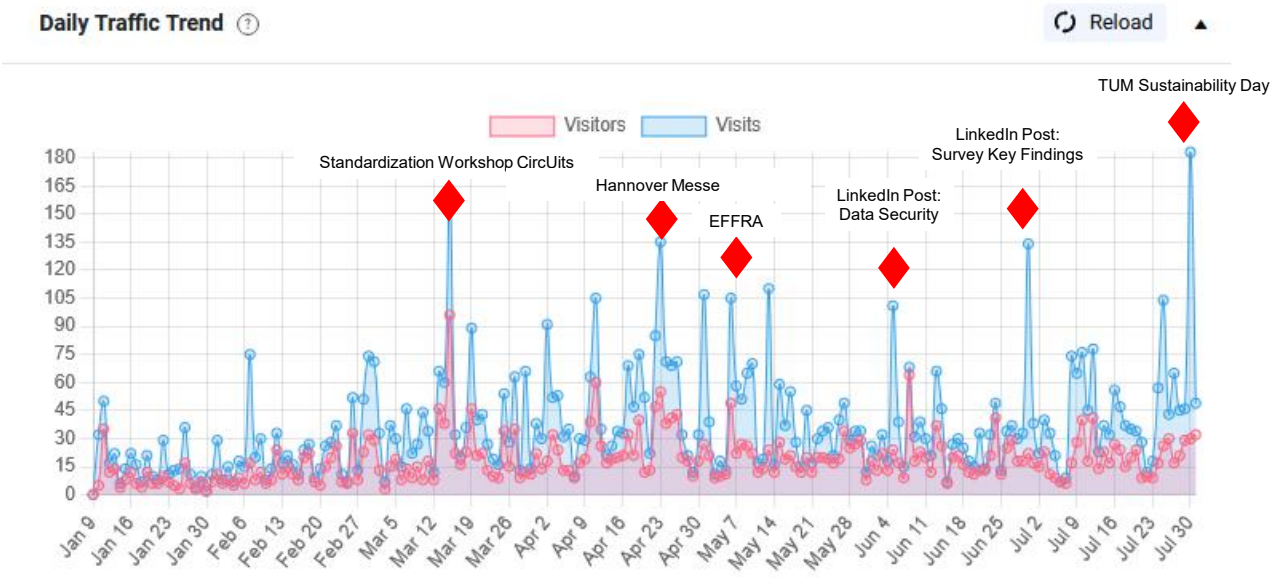

Figure 3: Website statistics 09/01/24 - 31/07/24

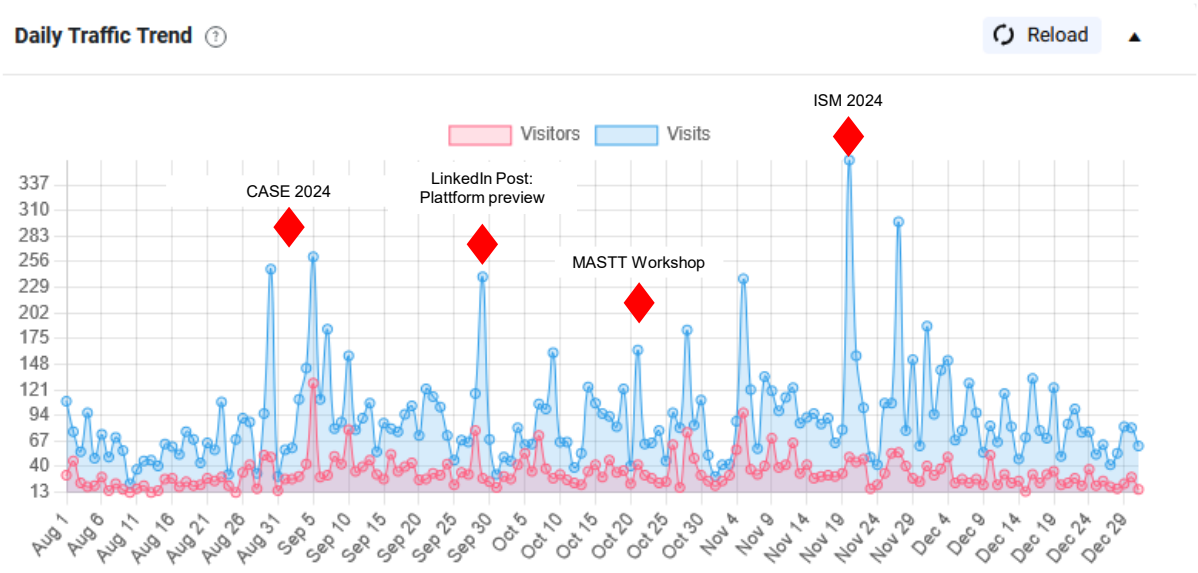

Figure 4: Website statistics 01/08/24 - 31/12/24

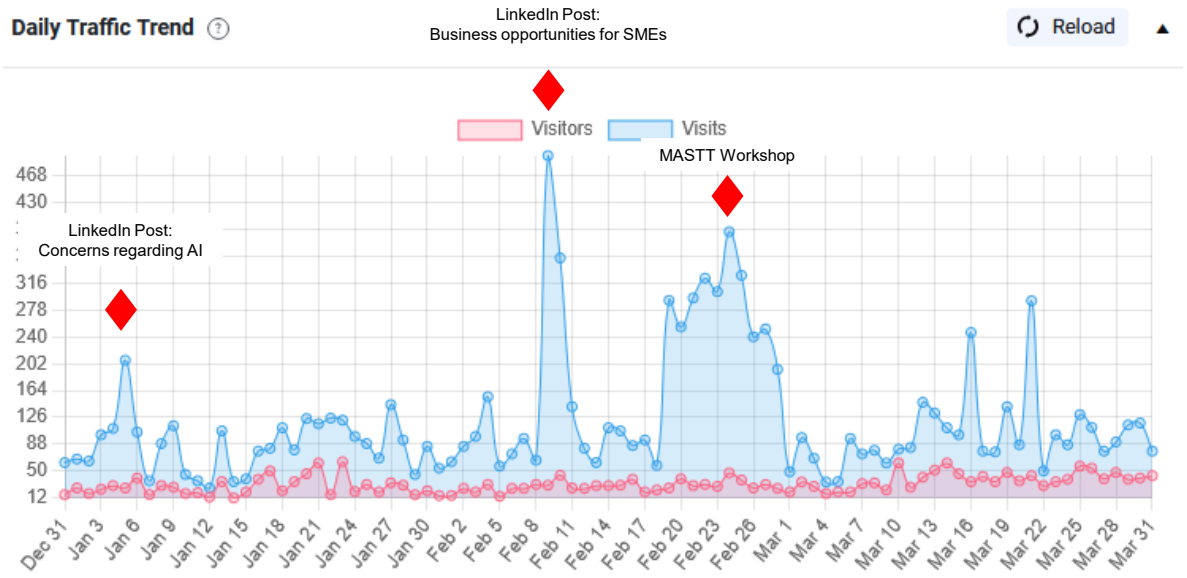

Figure 5: Website statistics 31/12/24 - 31/03/25

Due to privacy concerns, the decision was made not to implement a newsletter feature on the website. Instead, interested parties are encouraged to join the project's LinkedIn group, where they can receive regular updates and engage in discussions. Links to the LinkedIn group are prominently featured across multiple pages of the website, ensuring a seamless transition for users seeking further engagement opportunities.

2.3.2. Website Update

Following feedback received during the second review, the project website went through a thorough evaluation to identify and address critical shortcomings in design, usability, and accessibility. The reviewers particularly highlighted deficiencies related to interactivity, the clarity of presented information, and the convenience of accessing key project details.

To address these concerns comprehensively, the project consortium initiated a structured redesign process focused on improving user experience (UX) and ensuring compliance with best practices for web accessibility. Key issues identified during this analysis included insufficient interactivity, limited ease-of-use due to WordPress's native

constraints, inadequate support for multimedia content beyond standard documents, and accessibility concerns such as insufficient color contrast and small font sizes.

Due to the consortium not having a dedicated partner experienced in web design, a professional web design firm was engaged to collaboratively define and implement an enhanced design concept. After multiple design iterations involving consultations with project stakeholders. Specifically, a consortium-wide survey on the current and preferred state of the ALICIA design. The results showed a clear desire for a modern, multifaced and dynamic look. The consortium selected an improved layout focused on enhancing clarity, ensuring intuitive navigation, and enabling swift access to essential project information. The new design facilitates the seamless integration of multimedia content, such as videos and interactive presentations, significantly enriching the website's informational depth and user engagement capabilities.

The redesigned website structure prioritizes:

- Improved clarity and organization: Clear categorization and presentation of information allow visitors to quickly grasp the project's purpose, current progress, and research outputs.

- Enhanced interactivity: New interactive elements such as dynamic event calendars, multimedia galleries, and embedded videos foster deeper engagement from users.

- Better accessibility: Adjustments to color schemes, font sizes, and layout structures were implemented to comply with international web accessibility standards (e.g., WCAG 2.1), ensuring inclusivity for all user groups.

- Efficient updating and content management: Transitioning to a more versatile and powerful website backend enables efficient and regular updates, facilitating effective dissemination of news, announcements, and results.

Currently, the redesigned website is in the implementation phase, with the selected layout detailed in Figures 6 and 7 below. The plan is to go live by the end of April 2025. While the initial idea of a redesign was suggested by the EU after the review in November/December 2024, official work only started in February 2025. This is because of how the Technical University of Munich handles the award of contracts. The consortium anticipates the new website will considerably enhance stakeholder interaction, dissemination effectiveness, and overall impact of the ALICIA project. Therefore, we will

cross-check the impact of the new design with the already tracked website statistics.The full impact of the website redesign will be presented in the final DEC-report (D8.4).

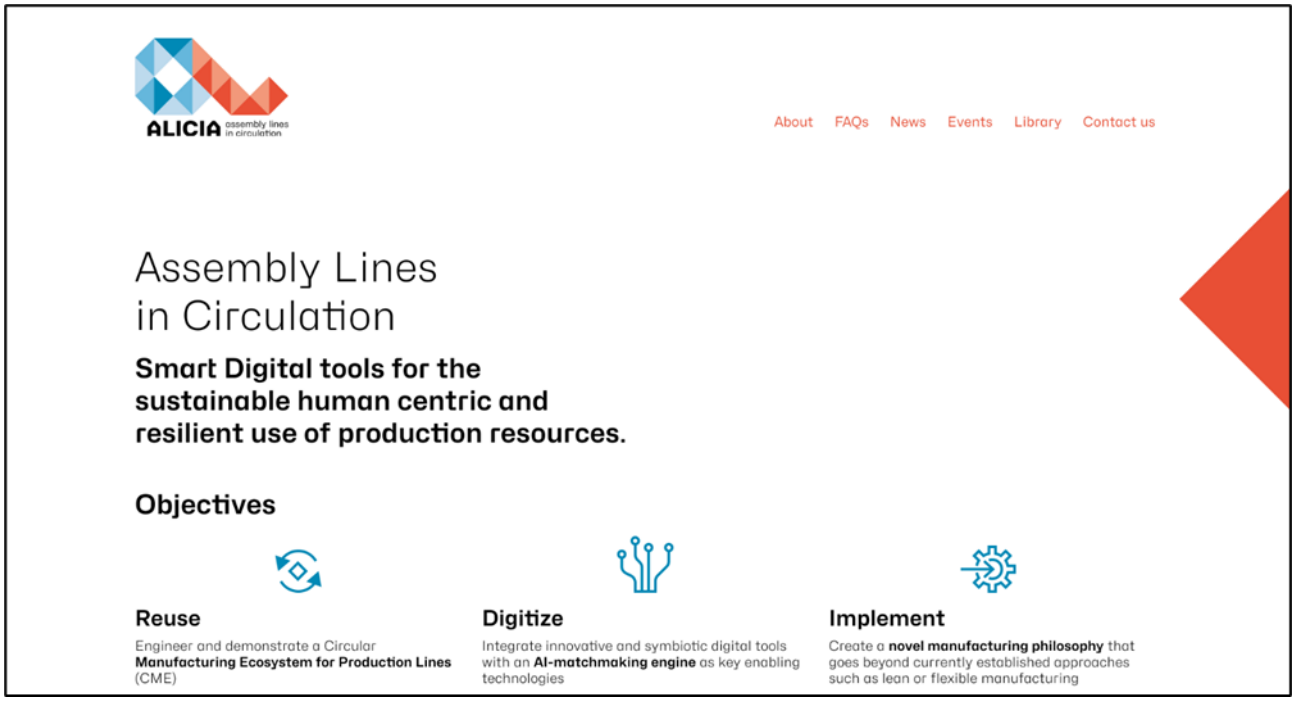

Figure 6: ALICIA website redesigned homepage

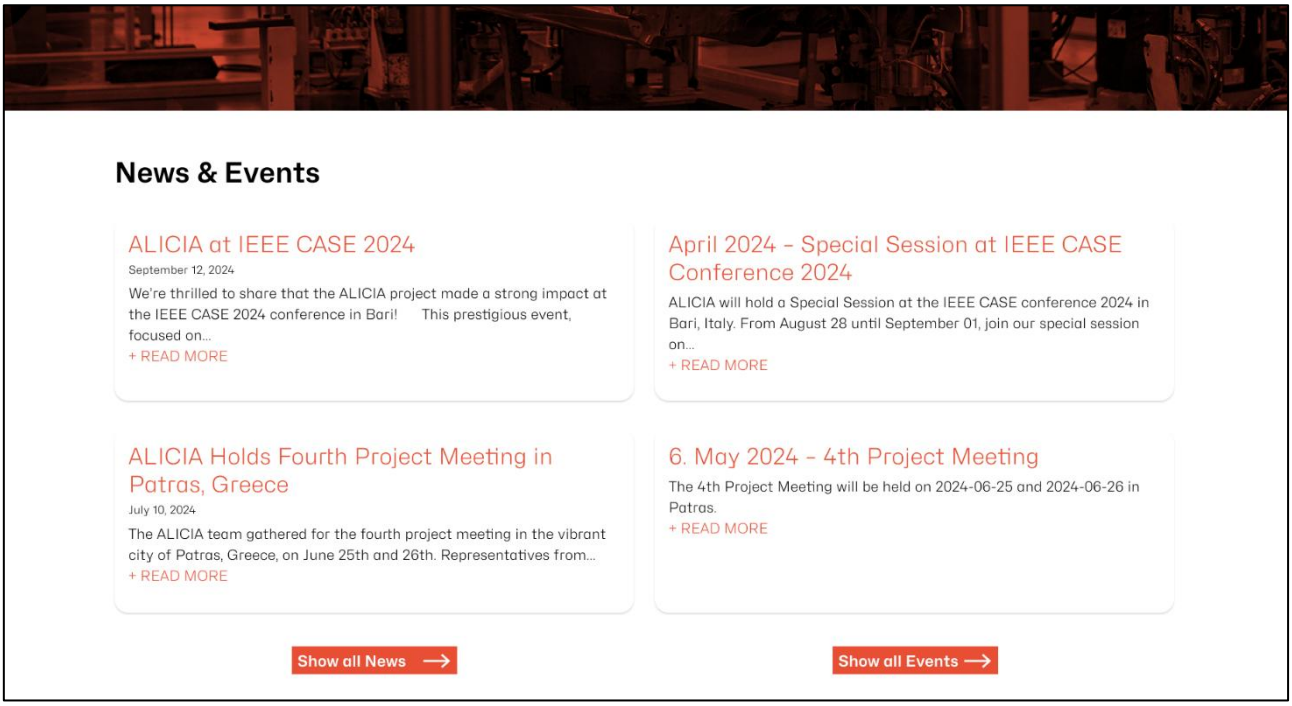

Figure 7: ALICIA website redesigned news page on the front page

2.3.3. Communication Materials

A range of communication materials has been developed to effectively communicate the objectives and results of the ALICIA project in various settings. These materials are designed to facilitate engagement and interaction with interested parties at conferences, industry fairs, and other events. The physical materials consist of a flyer, a poster (Figure 8), and a roll-up.

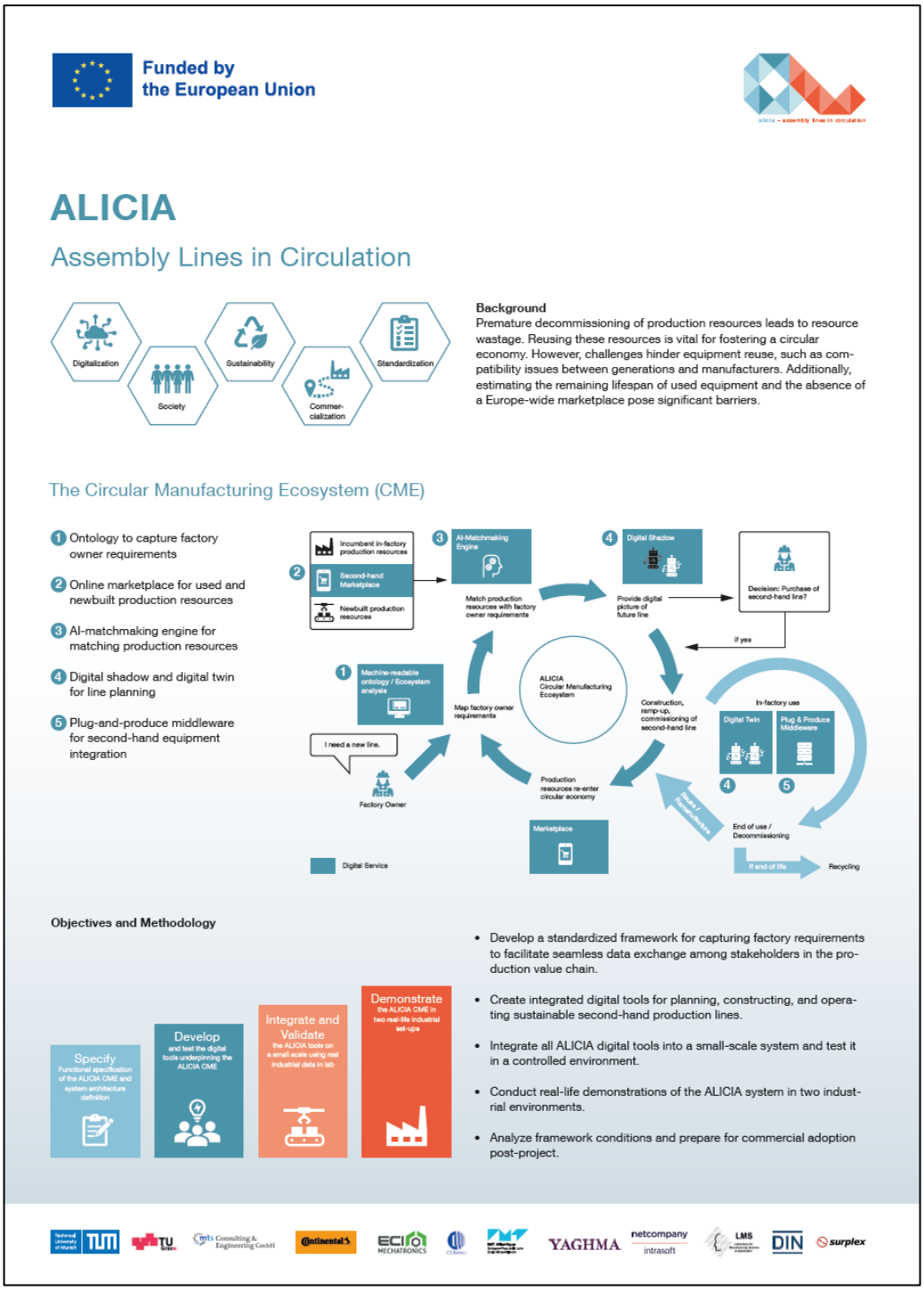

Figure 8: ALICIA Poster

The flyer was designed as a brief informational document to offer a concise overview of the project's goals and key findings. This serves as a tangible resource for potentially interested parties seeking a brief introduction to ALICIA's scope and significance. The project poster provides a comprehensive technical overview of ALICIA, consisting of detailed visual representations and explanatory text. The poster (Figure 8) has been designed with audiences who have a more profound interest in the project's methodologies and outcomes in mind. It offers a nuanced understanding of the research contributions. The roll-up serves as a tool for engaging attendees and generating interest in ALICIA's objectives and activities. It was explicitly designed as a simple overview of the project, showing the title, objectives, and a short description of ALICIA. Furthermore, it provides all contact details for getting in touch with the project coordinators.

In addition to physical materials, a digital presentation has been developed for deployment in keynote addresses and conference presentations. This presentation aims to give a brief fifteen-to-twenty-minute introduction to the project. The presentation provides an in-depth exploration of the project's motivation, objectives, and research methodology. Additionally, it offers a comprehensive overview of the consortium and the two use cases. All communication materials feature QR codes linking to the project's website and LinkedIn Group. This integration facilitates a seamless transition from offline and online engagement channels, enabling interested parties to access supplementary information and cohesively engage with the project community.

2.3.4. Update to Communication Materials

In alignment with the ongoing website redesign, additional communication materials are currently in development to address reviewer feedback and further enhance dissemination effectiveness. Central to these efforts is an explanatory video designed to clearly articulate the objectives, activities, and user-centric benefits of the ALICIA project. This video will be prominently featured on the website, displayed at industry fairs, and integrated into presentations and workshops, significantly expanding outreach capabilities.

Furthermore, supplementary marketing materials such as stakeholder interview videos, project booklets, and infographics are under consideration. These additional resources aim to provide diverse perspectives on the project's relevance, capture stakeholder experiences, and clearly communicate tangible benefits to industry users and customers. Collectively, these efforts aim to boost ALICIA's visibility, strengthen stakeholder relationships, and enhance the overall impact of the project's dissemination strategy.

2.3.5. LinkedIn

LinkedIn is used as part of a strategy to achieve two goals: generate visibility and awareness for the project and generate interest in the project. LinkedIn is particularly suitable for these purposes as a social media platform because it is used in a professional environment. The context and metrics for LinkedIn are briefly explained below. Then, the campaign of posts that was and is being implemented to achieve the objectives will be discussed. Finally, the metrics of the LinkedIn group are evaluated.

In addition to the LinkedIn Group mentioned above, there are basically two other ways to appear on LinkedIn: people and company profiles. This section briefly explains why a LinkedIn Group was created for ALICIA and what the advantages and disadvantages are.

Currently, it is impossible to create a profile on LinkedIn for a project, as a company profile must have a company behind it. Further, LinkedIn's guidelines only allow personal profiles to be created for real people. In principle, creating a personal profile for a project is possible, but if it is identified as such, the profile will be deleted. As a result, all of the project's achievements and reach would be lost. Therefore, a LinkedIn group was created for ALICIA.
Link: https://www.linkedin.com/groups/8149890/

This choice has some implications for the metrics as LinkedIn Groups are intended to connect people with similar interests. Consequently, it is impossible to follow the group

the same way as a company page. Instead, one can only join the group. However, joining is more like networking between two people on LinkedIn than following because joining also provides the opportunity to share posts in the group. It is, therefore, a stronger expression of interest than simply subscribing to a page. This is emphasized by the fact that the number of groups a person can join on LinkedIn is limited. The closest thing to a follower of a LinkedIn group is an "active member". These are people who consume posts in the group regularly. This should be taken into account when looking at the metrics. Another metric to estimate ALICIA's reach on LinkedIn is the number of times a post is viewed in the group. To reach a larger audience in a targeted manner, the partner organizations share relevant posts with their LinkedIn profiles.

The indicators for the LinkedIn group are as follows (for definitions please refer to this description):
Group Members: 116
Defined as: *The total number of members in the group.*
Active members: 9,871
Defined as: *Members who visit the group's page and/or engage with group posts in either group or main feed are counted as active members.*
Total post impressions: 103,250
Defined as: *[…] Aggregated count of the total post views of group posts either in the Group's feed or main LinkedIn feed.*
Figure 9 shows the new impressions per week achieved by the ALICIA LinkedIn group.

As shown in Figure 2Figure 3, Figure 4, and Figure 5, these impressions do not just mean that people see it in their feed, but the LinkedIn posts also lead to higher interactions and visits on the website. Some posts have a greater effect than others. Specifically, posts that address SMEs directly, either through targeting their concerns or value proposition with ALICIA, always lead to a peak in website visits (see highlighted titles in Table 1). This is in line with the results of our user acceptance survey and part of the strategy to address worries and barriers of future users (see 2.3.9).

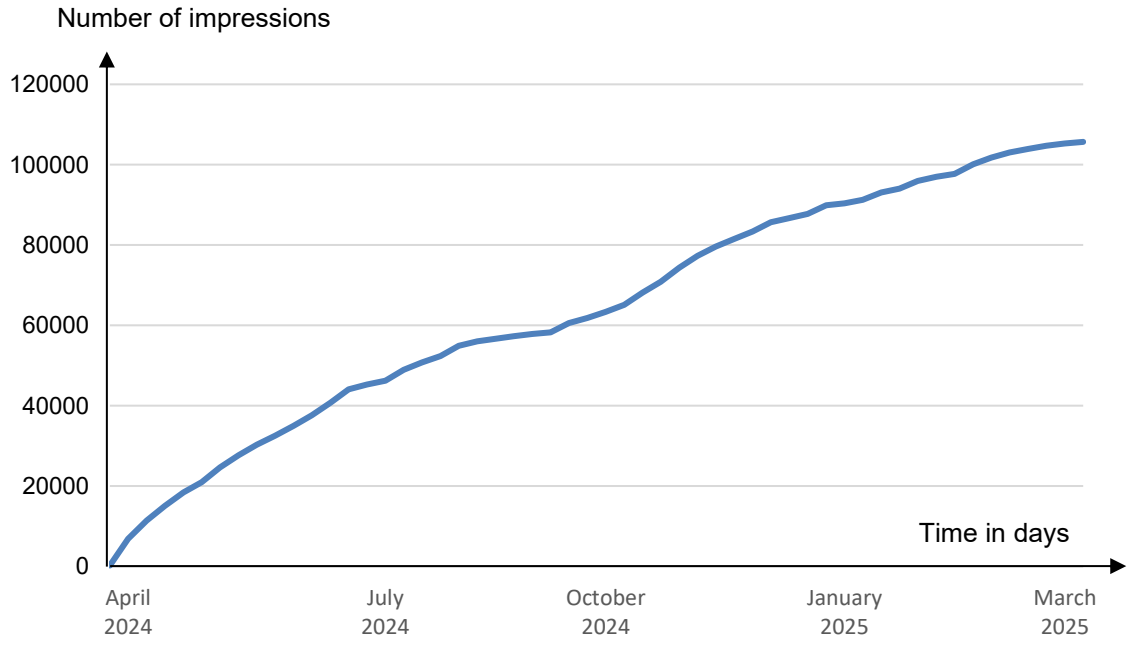

Figure 9: New impressions of ALICIA's LinkedIn group in the year 2024

These posts were used as part of a campaign to raise awareness of the group and ALICIA. Titles of posts mentioned in Figure 3, Figure 4, and Figure 5 are marked in bolt letters. ALICIA's LinkedIn campaign consists of three phases. The first phase briefly introduces the project, its content, and how the target groups can benefit from it. The second phase presents the planned technologies, and the third phase provides insights into the project's results and current status. The phases have been implemented using the following posts:

Table 1: The posts of ALICIA's LinkedIn campaign by March 2025. Highlighted posts had a particularly high response in the community.

Topic	Link	Date
Phase 1 – Introducing ALICIA		
What ALICIA is about		February 26, 2024
ALICIA's impact dimensions		March 1, 2024
The standardization potential workshop in cooperation with CircUits		March 13, 2024
What are the benefits of second-hand resources?		March 9, 2024
ALICIA's core functionality and where to start as a user		March 20, 2024
The system integrators' view on the core functionality		March 28, 2024
How ALICIA aims to revolutionize assembly resource selection by directly integrating services into the planning process		April 3, 2024
Ethical value exploration in ALICIA using LLMs		April 4, 2024
A unified vision of sustainability, how ALICIA contributes to new standards		April 9, 2024
Phase 2 – Present planned technologies		
Exploring the innovative AI functionality		April 19, 2024
"Make every day Earth Day" with ALICIA		April 22, 2024
Making second-hand equipment fit for I4.0 Part 1: ALICIA's DS providing data for the novel tools		April 24, 2024
Making second-hand equipment fit for I4.0 Part 2: Connecting the second-hand resources to the IIoT		April 30, 2024
Assessing the re-usability of second-hand equipment by analyzing their latest processes		May 7, 2024
ALICIA at the Manufacturing Partnership Days 2024		May 17, 2024
ALICIA's modules for data security and governance Part 1: Combining local instances and cloud services to adjust ALICIA to data confidentiality needs		May 29, 2024
ALICIA's modules for data security and governance Part 2: Protecting your data with IDS connectors		June 7, 2024
Phase 3 – Provide insights		
For ALICIA relevant Technical Committees and standards		June 13, 2024
Thanks for your contribution – The key findings of the first survey		June 18, 2024
How ALICIA supports producing companies in Europe		July 6, 2024

ALICIA in Patras		July 11, 2024
Take a first glance at the ALICIA marketplace		July 16, 2024
Why economic efficiency and sustainability go hand in hand?		July 25, 2024
ALICIA at the TUM Sustainability Day		July 31, 2024
Announcement: ALICIA's special session at IEEE CASE 2024		August 8, 2024
ALICIA at IEEE CASE 2024!		September 9, 2024
New chances for business in the ALICIA circular manufacturing ecosystem		September 11, 2024
Challenges when integrating legacy equipment into modern IIoT environments		September 17, 2024
Circularity, quality go along with economic benefits		September 24, 2024
Preview of the ALICIA CME platform		September 27, 2024
ALICIA at Brussels		October 11, 2024
Thinking of Buying Second-Hand Production Equipment? Here's What You Need to Know		October 23, 2024
Revolutionizing Equipment Selection and Line Optimization with ALICIA Digital Twin Technology!		October 30, 2024
Collaboration in action, ALICA meets MASTT2040		October 31, 2024
Meet ALICIA at the 6th International Conference on Industry 4.0 and Smart Manufacturing in Prague!		November 07, 2024
A Perspective on Digital Tool Impact and Sustainability		November 22, 2024
ALICIA at CEN/TC 473 - Circular Economy		November 29, 2024
Bringing legacy equipment into the IIoT with ALICIA's Middleware		December 02, 2024
ALICIA project at the 6th International Conference on Industry 4.0 and Smart Manufacturing		December 16, 2024
Mitigating concerns when introducing AI in an industrial context		January 02, 2025
Workforce Skills Matter in Times of Demographic Change		January 08, 2025
How service providers for industrial equipment can profit from ALICIA		January 24, 2025
New Business Opportunities for SMEs		February 10, 2025
Reducing production lead times for factory owners with ALICIA		February 21, 2025
How the ALICIA CME Platform puts data owners in control of their data		March 13, 2025

2.3.6. Publications

In addition to communicating the project, scientific publications also have the purpose of disseminating the results during scientific exchange. This exchange also has the advantage of receiving feedback from the scientific community.

Below is an overview of the publications to date. These are in the context of the ongoing development of partial technical solutions that will be completed in the near future. Publications on these technical solutions will be delivered during this project phase. Subsequently, publications on the integrated platform and the demonstrators can be published. Publications that have been published or are in the process of being published are listed in Annex II – List of dissemination activities. Table 2: Dissemination opportunities for ALICIA lists the appropriate journals and conferences for the upcoming publications. In the following, the special session at the IEEE CASE 2024 conference is presented, which is particularly suitable for disseminating the project results.

The special session dedicated to the ALICIA project was organized as part of the 2024 IEEE 20th International Conference on Automation Science and Engineering (CASE 2024). The CASE conference stands as one of the flagship events of the IEEE Robotics & Automation Society, providing a prominent platform for interdisciplinary research in automation across various industries. It took place from August 28 to September 1, 2024, in the region of Puglia, Italy.

Entitled "Assembly Lines in Circulation: A Focus on Human-Centric, Sustainable, and Resilient Manufacturing", ALICIA's special session addresses pressing challenges faced by manufacturers in the middle of intense global competition and rapid technological advancements. With a focus on the principles of sustainability, human-centricity, and resilience inherent in Industry 5.0, we seek to explore innovative approaches and applications that enhance assembly line design, operation, and maintenance. A picture from the Special Session can be seen in Figure 10

CASE 2024 witnessed the participation of over 900 attendees. As the target audience primarily comprises academics, this conference presented an ideal opportunity to disseminate the findings of the ALICIA project to a diverse audience and engage in fruitful exchanges of ideas with domain experts.

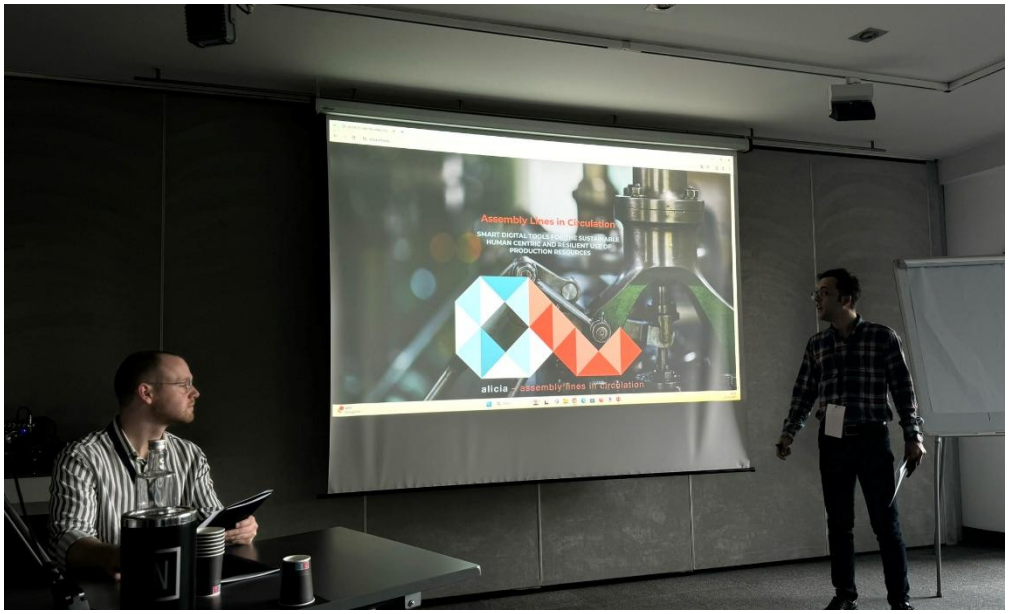

Figure 10: ALICIA CASE 2024 special session

Four articles were contributed to the conference, thereby ensuring a robust dissemination of ALICIA's outcomes. These contributions are:

(i) *Assembly Lines in Circulation – Towards a Holistic Framework to Enable the Reuse of Assembly Resources*;
(ii) *Exploration of socio-technical systems in the context of reuse of assembly lines*;
(iii) *A Mathematical Model Integrating Line Balancing, Equipment Selection, and Workforce Management*;
(iv) *Reinforcement Learning methods for preventive maintenance and machine replacement problem with second-hand equipment*;

The session encompassed a wide range of sub-topics, including the impact of Industry 4.0 and Industry 5.0 on production systems, innovative approaches to enhance sustainability in assembly lines, strategies for resilient production systems, and the integration of advanced digital tools and AI in assembly processes. A total of 21 researchers attended the session in person and the attendance of the conference lead to a clear spike in website visitors (Figure 4)

The next step in scientific dissemination is the publication of research results on the technical innovations developed. In parallel, the sub-modules of the work packages will be integrated so that the results of the complete system and demonstrators can be published. The following table provides an overview of the possible conference options for the individual project results. The final decision for a conference or journal will be based on whether the results fit the publication option and submission dates.

Table 2: Dissemination opportunities for ALICIA

Dissemination opportunity	Type	Possible result numbers (see Annex III – ALICIA's results)
IEEE ETFA: Emerging Technologies and Factory Automation	Conference	R001, R002, R003, R004
IEEE CASE: Conference on Automation Science and Engineering	Conference	R001 to R008, R012 to R022, R025, R026
FAIM: Flexible Automation and Intelligent Manufacturing	Conference	R001, R002, R003, R004
EJOR: European Journal on Operational Research	Journal	R003
IJPE: International Journal on Production Economics	Journal	R003, R005, R016, R020
IJPR: International Journal for Production Research	Journal	R003, R014, R015, R017, R021
COR: Computer and Operations Research	Journal	R003

A full list of published, submitted and planned scientific publications and dissemination activities can be found in Annex II – List of dissemination activities and planned dissemination activities. With the additional planned publications, most of the KPIs from the Grant Agreement will be fulfilled this year (see Table 3). This is in line with the project

being a Research & Innovation Action meaning it holds a lot of potential for dissemination research objectives.

Table 3:Overview of targeted and fulfilled publication KPIs

Integrated digital tools behind ALICIA CME						
Paper	Target	2	Status	2	Upcoming	1
Conference participations	Target	2	Status	2	Upcoming	1
Journal articles	Target	2	Status	1	Upcoming	1
Total publications	Target	4	Status	4		2
Data interoperability aspects and results from the two demos						
Paper	Target	2	Status	1	Upcoming	2
Conference participations	Target	2	Status	1	Upcoming	2
Journal articles	Target	2	Status	0	Upcoming	1
Total publications	Target	4	Status	1		3
ALICIA network analysis and sustainability measurement methodology						
Paper	Target	2	Status	1	Upcoming	2
Conference participations	Target	2	Status	1	Upcoming	1
Total publications	Target	2	Status	1		2

2.3.7. Trade shows and workshops

Trade shows provide an opportunity to meet potential future customers, contractors, and partners. As a result, participation in these events is essential not only for the communication of the project but also for later commercial exploitation. Therefore, the trade shows visited since the last DEC plan are presented first, and then possible trade show appearances are discussed.

ALICIA participated in the following workshops and trade shows:

- e_mob Electrical Mobility Conference
  Number of participants: approx. 100-200
  Description: National Italian conference on electrical mobility involving main e-mobility stakeholders. COMAU presented ALICIA project activities to a broad industry audience during the workshop.

- EIT Manufacturing Summit 2023
  Number of participants: 468
  Description: The event provides an opportunity to exchange views on skills shortages, climate change, and how technological innovation in manufacturing can help address these issues. In addition to presentations and discussions, the EIT Manufacturing Summit also provided an opportunity to exchange ideas on projects. In this context, an exchange on ALICIA took place and flyers were distributed to interested parties.

- Joint workshop on standardization of ALICIA and CircUits (Figure 11)
  Number of participants: 31
  Description: The ALICIA Standardization Workshop successfully navigated the critical steps of integrating standardization into research and innovation projects. By analyzing existing standards, identifying standardization opportunities, and initiating standardization activities, participants explored ways to increase the dissemination and impact of project results. By incorporating project results into

standardization processes, the workshop laid the groundwork for long-term collaboration and advancing sustainable manufacturing practices. As shown in Figure 3 above, this workshops lead to clear spike in interactions and visitors on the site.

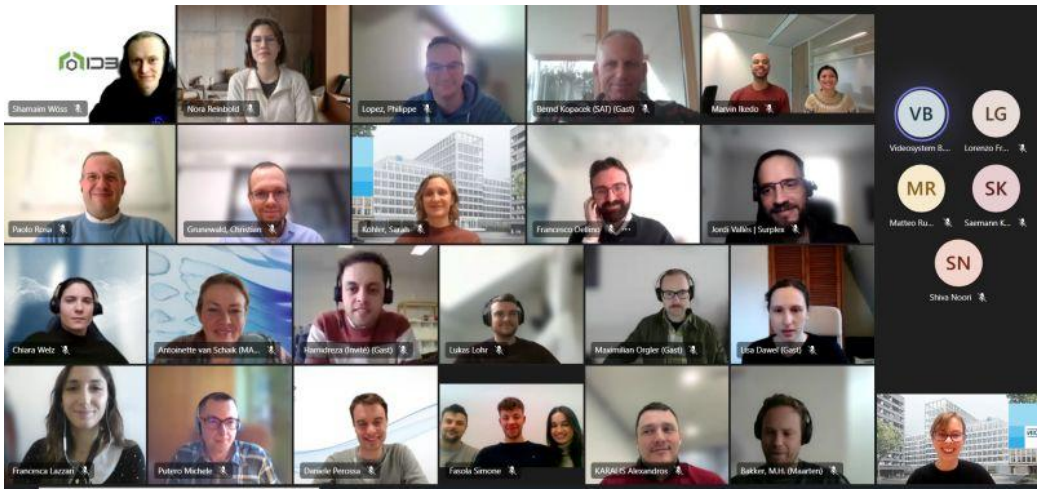

Figure 11: Joint standardization workshop with the research project CircUits (Grant No.: 101091490)

- Hanover Messe
  Number of participants: 130,000
  Description: Hannover Messe is one of the world's largest trade shows for industrial technology, innovation, and manufacturing. It showcases the latest advances in automation, digitalization, and industrial supply chains to attendees from around the world. Discussions about the project took place during the event and flyers were distributed. Being one the most important industry fairs in Europe, the interest in ALICIA showed a direct spike in website visitors in Figure 3, as the flyers have a QR-code that leads interested parties directly to the website.

- EFFRA Manufacturing Partnership Days 2024
  Number of participants: 37 EU research projects and other stakeholder, statistics were not yet known at the time of publication
  Description: ALICIA was represented by TUM and LMS at an exhibition stand (Figure 12). Interesting discussions were held and guests were given further information about the project in the form of a flyer. In addition, ALICIA was introduced in a center-stage presentation (Figure 13). This was followed by a discussion among Horizon projects on the topic "*Digital tools to support the engineering of a Circular Economy*". To see the impact of this event, refer to Figure 3

Figure 12: ALICIA's stand at the Manufacturing Partnership Days 2024

Figure 13: ALICIA's presentation on the center stage

Upcoming trade shows and workshops

Table 4 below lists potential trade shows and workshops to communicate ALICIA. The consortium aims to participate in three trade shows in the next year. In addition, as many workshops as possible with potential business partners or customers should be held.

Table 4: Overview of trade shows and workshops of high interest

Event	Type
BI-MU Milan	Trade show
EFFRA General Assembly 2025	Trade show

Advanced Machine Tools/Advanced Factories 2025	Trade show
Automatica/ World of Photonics 2025	Trade show
EMO Hannover 2025	Trade show
SPS Italia	Trade show
SPS Nuernberg	Trade show
EFFRA Manufacturing Partnership Days	Trade show
Annual Conference on Artificial Intelligence and Fundamental Rights 2024	Trade show
European Research and Innovation Days 2024	Trade show
European Robotics Forum (ERF)	Trade show
European Conference on Artificial Intelligence (ECAI) 2024	Trade show
European Manufacturing and Innovation Week (EMIW)	Trade show
ALICIA approach for circularity in production equipment	Workshop
BIEMH | Bienal Internacional de Máquina-Herramienta | BEC 2026	Trade show
Advanced Machine Tools 2025	Trade show
Workshops with standardization committees	Workshop
EIT Manufacturing Events	Trade show

Selected Trade Shows for 2025

After careful evaluation of relevance, potential audience, and strategic impact, the consortium has prioritized participation in the following four key trade shows for 2025:

- **Advanced Machine Tools/Advanced Factories 2025**: This event is strategically selected to showcase ALICIA's innovations directly to advanced manufacturing professionals, highlighting cutting-edge technologies and the project's potential to significantly improve efficiency and circularity in industrial processes. It will be attended by Surplex

- **Automatica/World of Photonics 2025**: This prominent international trade show provides an excellent platform to connect with industry leaders and potential customers in automation and robotics, presenting ALICIA's technological advancements and fostering industry-level collaboration. This fair will be attended by TUM.

- **EMO Hannover 2025**: As one of the largest and most influential international manufacturing trade shows, EMO Hannover offers extensive visibility and networking opportunities. Participation here will effectively demonstrate ALICIA’s contributions to manufacturing innovation, circular economy strategies, and the digital transformation of production equipment. This fair will be attended by COMAU.

- **EFFRA Manufacturing Partnership Days 2025**: Attendance at the EFFRA Manufacturing Partnership Days aligns closely with ALICIA’s strategic engagement objectives, facilitating direct interaction with key stakeholders and policymakers involved in European manufacturing research and policy initiatives. This event significantly enhances the visibility of ALICIA’s contributions to the European manufacturing innovation landscape. Additionally, the Partnership Days offer a strategic opportunity for potentially organizing a final project event and live demonstration of ALICIA tools. Currently, these plans remain preliminary and are still in the planning stages.

2.3.8. Teaching

Teaching is a unique way to communicate research projects. It is particularly suitable for universities. In addition to the project's marketing, it also offers the use of the project in the education of young engineers, computer scientists, and students of related disciplines. These points are not only relevant for European society but also for the future competitiveness of the European economy.

As part of ALICIA

- 190 students through the course “Sustainable Manufacturing” held at the TU Munich,
- 7 students as part of a student theses, with the following 4 at TUM:
    - Identification and Implementation of Key Performance Indicators to Consider Sustainability in an Ontology Describing Production Equipment
    - Integration of Second-Hand Assembly Resources Into The Industrial Internet of Things
    - Conceptual Design and Evaluation of a Data Management System for IIoT Device Data in Assembly
    - Analysis and Standardization of Ontology Based Resource Descriptions in Assembly
- 9 students in other ways, for example, by working on the project,

already benefited from ALICIA during their education.

Furthermore, the project was presented at the “TUM Sustainability Day”, where institutes and companies present their sustainable solutions to students in individual booths. The consortium presented the project at a booth of the Institute of Machine Tools and Industrial Management (see Figure 14). The project was explained to students and flyers

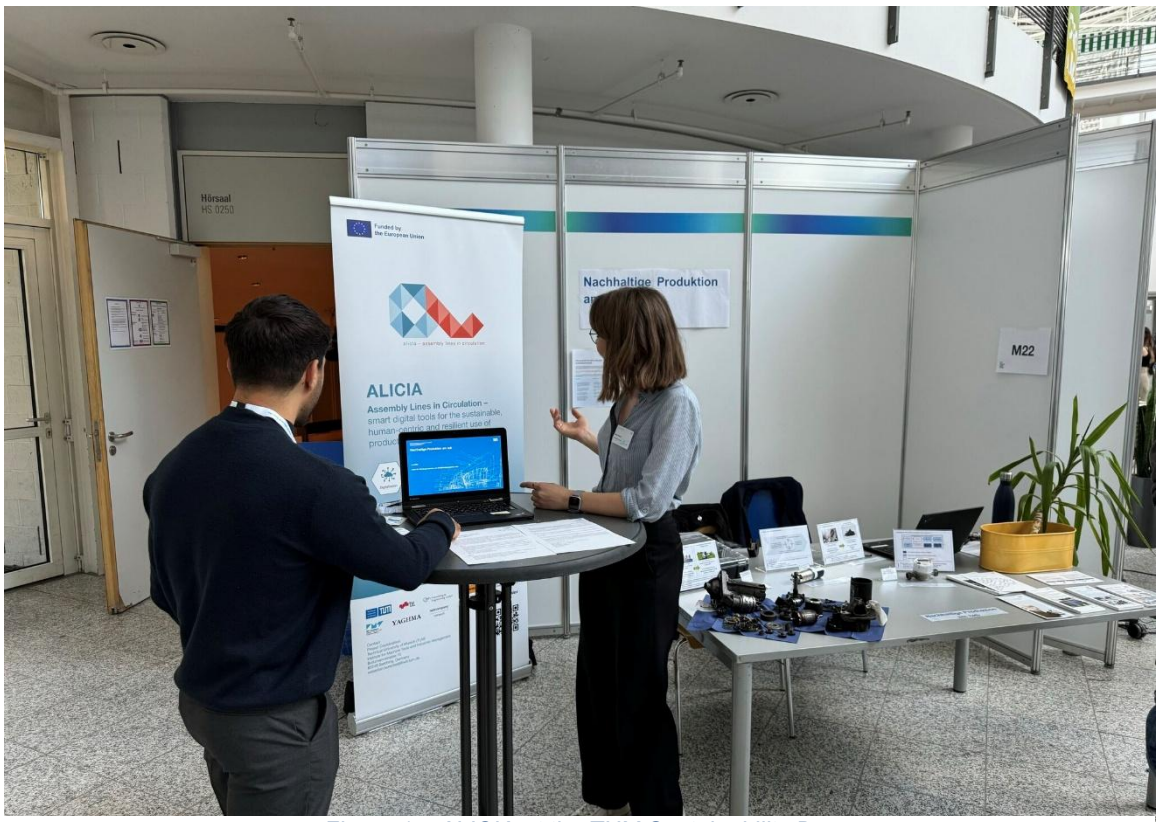

Figure 14: ALICIA at the TUM Sustainability Day

were given out. As seen in Figure 3, this interaction with the students of TUM lead to one of the highest interaction spikes on the website.

2.3.9. Community Interaction

The goal of community interaction is to bring the partners' individual target groups together and initiate a mutual exchange. For this to happen, the community's benefit of the exchange must be visible. This can be done by initiating the exchange through professional channels, such as trade shows or scientific conferences, or through the LinkedIn group. In principle, this is a good way to go, as the members already show a high level of interest in the project because they have actively joined the group. Another alternative is to target a community directly through a partner's contacts.

Scientific conferences in the context of publications and, of course, trade fairs and workshops are particularly suitable for personal exchange. As these have been discussed in detail in the previous chapters, another possibility is presented below.

Surveys allow to target specific audiences. Although these are less personal, they offer the advantage of a larger sample. They can also be used to set priorities and discover blind spots within the project. In ALICIA, the User Acceptance Survey is used for this purpose. This series of surveys, briefly introduced below, is not only used for community building but its results are also used directly in the project work. By reflecting and addressing the community's feedback, it can also identify more strongly with the project. In the following, the User Acceptance Survey will be briefly outlined:

The survey's context and objective
The user acceptance survey conducted by YAGHMA in collaboration with Surplex, TUM, and Comau identified drivers and barriers decisive for the commercial post-project uptake of ALICIA CME.

Which groups have been addressed by the survey, and how large are they?
The survey was distributed among industrial networks of Surplex, TUM, and Comau, which are stakeholders in the industrial manufacturing sector and represent ALICIA's target audience.

General information was given on the project.
The survey started with a short introduction text that explained the project and the survey's purpose to the participants. Approximately 85 % of the respondents are from SMEs (small-medium-sized enterprises). General insights are that, in principle, there is no reluctance to use ALICIA with its deployed innovative technological tools. Still, data sharing (for selling and buying scenarios) with third parties, such as logistical operators or equipment evaluators, remains a major issue. Detailed insights will be elaborated in D7.1.

How many responses did the survey already receive?
The survey has received 365 responses.

What are the next steps to engage with the community based on the first survey?
Following the analysis of the survey data, the insights gained are being used to further address perceived barriers to the adoption and implementation of ALICIA solutions. One particularly significant concern identified by respondents was data security, especially in relation to data sharing with third parties. In response, the consortium developed a

targeted communication approach, including dedicated LinkedIn posts aimed at clarifying how ALICIA addresses these concerns. These posts were positively received by the community and led to a noticeable increase in user engagement on the project website (see Figure 4).

In parallel, positive drivers—such as the innovative technologies deployed within ALICIA that scored highly in the survey—will be further emphasized during the remainder of the project. The consortium will strategically align communication and dissemination efforts to both mitigate identified concerns and reinforce these technological strengths. All aspects are being addressed collectively by the ALICIA project consortium to ensure effective engagement with the community and broader uptake of project outcomes.

2.3.10. Enhanced Community Building Efforts

In response to reviewer feedback emphasizing the importance of community building, additional targeted measures have been introduced:

Cross-Project Collaboration: ALICIA has intensified collaborative exchanges with complementary EU-funded projects, specifically MASTT. Given the alignment with ALICIA's thematic and strategic objectives, this projects offers considerable potential for shared community-building efforts and expanded stakeholder engagement**.** Active participation in two workshops organized with the MASTT project, including a strategic in-person meeting in Brussels, has facilitated mutual exchange of knowledge and exploration of potential synergies. Furthermore, the consortium is considering co-organizing a joint final event with MASTT, leveraging shared project completion timelines to maximize community outreach and strengthen stakeholder networks. The workshops are shown in Figure 15 and 16. Furthermore, first talks have been done with the project CIRPASS to identify potential collaboration potential.

EFFRA Collaboration: Engagement with the European Factories of the Future Research Association (EFFRA) represents another significant community-building avenue. The consortium has agreed to contribute a dedicated article to the EFFRA newsletter, significantly extending ALICIA's visibility among industry stakeholders. Additionally, discussions are ongoing to potentially showcase a practical demonstration of ALICIA's technology at the upcoming EFFRA Manufacturing Partnership Days 2025, providing a tangible, hands-on experience to industry communities.

Figure 15: Initial networking Workshop with MASTT

Figure 16: Collaborative Workshop with MASTT in Brussels

The ALICIA project was featured in two separate news articles, one from the French economic newspaper "Les Echos", one in the trade magazine "bbr", and one in the dutch magazine "Vraag & Aanbod".

Through these expanded and targeted community-building initiatives, the ALICIA project is actively addressing reviewer concerns by creating a robust foundation for sustained stakeholder engagement, thereby increasing project visibility and enhancing the potential for long-term impact and commercial uptake.

3. Exploitation

The aim of exploitation is to transfer benefits to the European economy and society over the lifetime of the project. Therefore, the exploitation of the results should be planned accordingly throughout the project. Therefore, effective technology management is important to maximize the benefits for European society and economy. In ALICIA, this is done based on three dimensions: increasing efficiency and reducing costs for European manufacturing companies, improving working conditions for assembly workers by taking into account human-centered approaches, and reducing environmental impact.

In ALICIA, these dimensions are transferred to the context of stakeholders and partners, whose interests can be divided into three categories (Figure 17). Due to this constellation, ALICIA's exploitation does not consist exclusively of economic reuse but also keeps social and research aspects in mind. Thereby, synergies can be achieved, which benefit economic exploitation. For example, a joint effort towards standardization can increase the applicability of the project's results to the economy in the long term. Incorporating the approaches into the training of the next generation of production planners can also positively impact the dissemination of and demand for the products and services generated. For this reason, all ALICIA partners are involved in the exploitation of the results and are planning to exploit the project results beyond the duration of ALICIA. One example would be the planned publication “Adaptive Robust Optimization for Resource Selection Under Uncertain Product Evolution in the Circular Economy Era” by IMT. This will present the results of the project to optimization focused scientific communities to create awareness of the gained expertise. Furthermore, it will enable for collaboration on future projects with interested research parties (see Annex II – List of dissemination activities and planned dissemination activities). With these results, research partners can be attracted for future projects build on ALICIA.

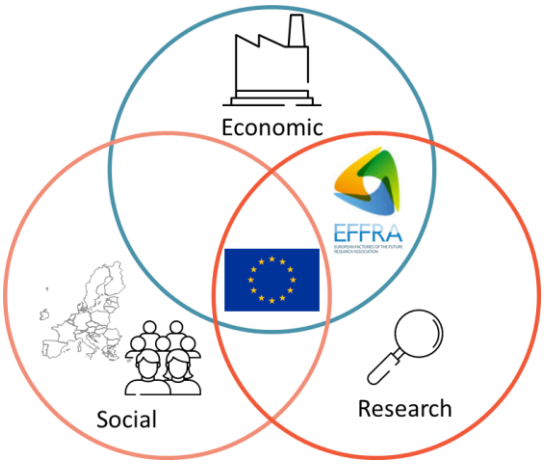

Figure 17: ALICIA’s stakeholder groups and corresponding interests’ classification

Especially in the context of commercial exploitation, it is essential to protect the technologies and the plan to transform them into products. For this reason, some of the content of this deliverable has been moved to non-public appendices in order to ensure maximum transparency while not jeopardizing the use of the project results. However, informing potential customers upfront of key features, e.g., data governance structures, supports lowering the entry barriers identified in the customer survey (see Table 1).

This results in the following structure for the ALICIA project exploitation plan. First, Chapter Framework 3.1 provides an overview of the legal framework and defines basic terms. Chapter 0 then presents the method for planning the exploitation and places it in the project’s current state. The results of this method are, first of all, a list of the results

achieved in the project. From these, those particularly relevant to one or more of the objectives listed in Figure 17 have been selected. For these results, the relevant partners have formulated exploitation paths for their organizations. Building on these, joint exploitation should then be sought (0).

3.1. Framework

This section briefly outlines the framework in which ALICIA's exploitation is carried out. The legal documents regulating the exploitation of ALICIA are:

- Grant Agreement Nr. 101091577 signed by the European Health and Digital Executive Agency (HADEA) and the consortium
- Consortium Agreement signed by all project partners

Within the Grant Agreement, exploitation is defined as (Article 16, definitions):
"The use of results in further research and innovation activities other than those covered by the action concerned, including among other things, commercial exploitation such as developing, creating, manufacturing and marketing a product or process, creating and providing a service, or in standardisation activities."

In turn, all three named interests are relevant to the exploitation. Further, it is obligatory for all partners to participate in exploitation (Grant Agreement Article 16).

"Beneficiaries which have received funding under the grant must — up to four years after the end of the action (see Data Sheet, Point 1) — use their best efforts to exploit their results directly or to have them exploited indirectly by another entity, in particular through transfer or licensing."

In the context of exploitation, the following definitions are relevant (Grant Agreement, article 16, definitions):

- **Access rights** are the rights to use results or background.
- **Fair and reasonable conditions** define appropriate conditions, including financial conditions, under which access to results and background can be requested. Within these conditions, the specific circumstances of the request, the actual potential value of the results or background, scope, and duration need to be acknowledged.
- **Background** any data, know-how, or information brought into the project without which implementation and/or exploitation is impossible. These assets must be identified in a written form. Background that can not be made accessible under fair and reasonable conditions must not be used and explicitly excluded.

Methodology

ALICIA's goal is to provide European society and economy with tools to meet future challenges in the field of assembly line construction in the long term. Thereby, the project contributes to sustainability from a social, research, and economic perspective (Figure 15). To achieve this goal, the steps shown in Figure 18 are applied. First, a shared understanding of

- the research field of manufacturing,
- designing assembly lines,
- human-centered aspects in manufacturing,
- environmental and social Life Cycle Assessment (LCA),
- the deployed technology, such as Digital Shadow, AAS, etc., and

- a common vocabulary must be established.

This is particularly important given the multidisciplinary nature of the consortium, which has backgrounds in production engineering, IT, economics, and sustainability research. Based on this understanding, the innovations can be developed, and the results can be derived. From these results, it is then necessary to identify and protect those results that are particularly relevant for exploitation. Alongside the protection of these results has been ensured, the exploitation planning and implementation can begin. The results must be exploited in all three categories - business, society, and research to provide long-term benefits.

Figure 18: Overall exploitation steps

Figure 18's steps need to be implemented into the course of the project. They are divided into three phases based on the project milestones (Figure 19). Phase one is dedicated to creating a shared understanding and vision of the contribution to the economy, society, and science. In phase two, the project results, based on the solutions of the work packages, are identified and planned for protection and use by the individual partners. Finally, phase three focuses on collaborative exploitation and ensures sustainable use in business, society, and science.

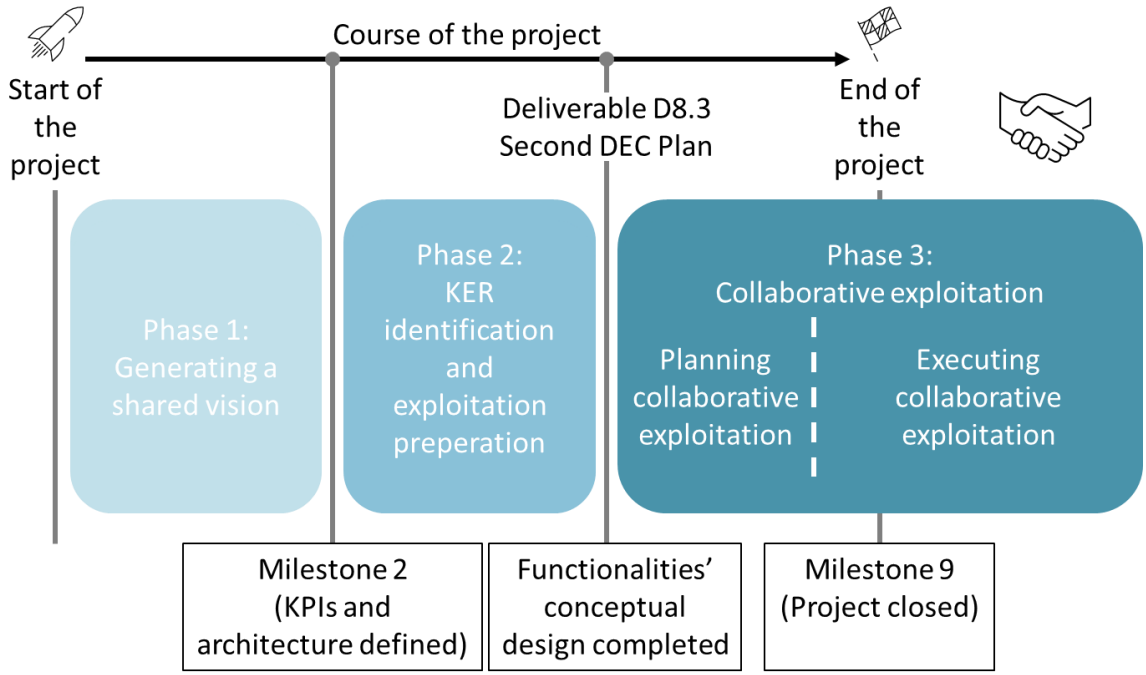

Figure 19: Exploitation phases

The phases outlined below are integrated into the project as follows, Phase 1 is completed with the definition of the Key Performance Indicators (KPIs) and the system architecture, which coincides with Milestone 2. The results of Phase 1 are contained in D1.1, D1.2, and the technical specifications of WPs 2 to 5 and 7. Phase 2 identifies the results based on the derived functionalities and plans their partner-specific use. This phase can, therefore, be completed once the last technical component (D 1.3) has been specified (D1.3). This DEC Plan will be delivered towards the end of Phase 2. Therefore, the deliverables will only contain the results of Phase 2. Phase 3 will start after this report.

It provides an outlook on the steps to be taken to the follow-up document (D8.4 - Third DEC Plan) and the objectives to be achieved.

Phase 1: Establishing a common understanding, bridging gaps, and creating a vision (M01 – M09)
Phase 1 lays the foundation for the subsequent exploitation of the project results by establishing a common understanding of the problems addressed and comparing the foundations on which the project can be built. In this context, it is essential to consider the requirements of the end users. To this end, Task 1.1 (T1.1) identified the use of the project solution by manufacturing companies (represented by Continental) and system integrators (represented by Comau) in the context of a use case analysis. Based on this, the functional requirements were defined to ensure usability (T1.4, T2.1, T3.1, T4.1, and T5.1). Implementing these functionalities in the work packages is the basis for Phase 2.

Phase 2: Identifying KERs and preparing the collaborative exploitation (M10 – M17)
The overarching goal of Phase 2 is to identify, define, and protect the KERs. The exploitation of the KERs per partner organization is then planned. This should ensure three points:

- Each partner organization not only identifies the KERs that can be exploited for itself but also identifies for itself the intrinsic motivation to pursue these beyond the project.
- Each partner organization classifies the resources it needs for individual exploitation; in case of doubt, this should ensure the individual pursuit of the KERs.
- The partners identify dependencies on other partners and synergies for joint exploitation. Consequently, Phase 3 is prepared, in which all partners know the advantage of a joint pursuit. This is particularly relevant as the aim is to achieve collaborative exploitation.

Based on the functionality defined and elaborated in Phase 1, the results and main results are identified. Figure 20 provides a clear overview of the relationship between results, main results, and KERs. These results are general results that can be any output from the project. To give an example, they can be anonymized datasets for LCA research to comply with data protection or the implementation of an API for linking functionalities. The main results are a subset of the results and are central components of the functionalities that ultimately generate value for the application partners from the use cases. They can also be concrete results, such as the basis for standards or research results. The KERs are finally selected from the main results. Hence, KERs are the main results with an exceptionally high value for business, society, and/or science.

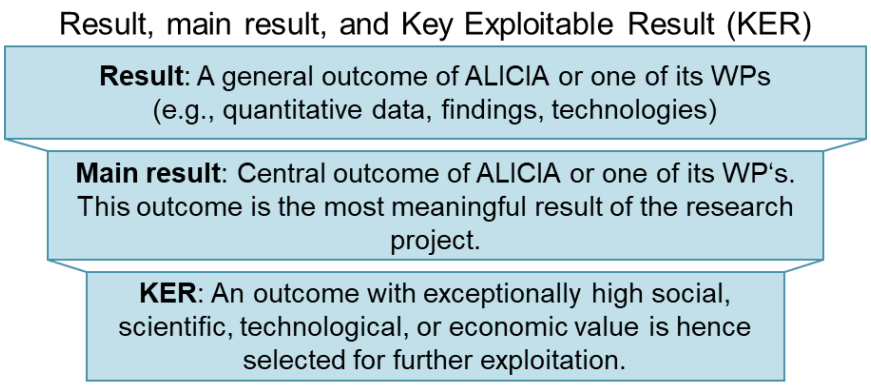

Figure 20: Visualization of results, main results, and KERs

To identify the KERs, the results and main results were first collected from the partners. This allowed partners to take advantage of their expertise in the respective functionalities and, simultaneously, to include the perspective of the use case partners. The collected results and main results were then transferred into a standardized presentation.

The KERs were then identified in a workshop. During this workshop, the partners discussed the main results and their potential for exploitation and considered which main results their organization can exploit or can contribute to the exploitation. For each identified KER, the partners that can or have to, due to ownership of foreground or background, engage in any form in the KERs' exploitation were documented as related partners. Further, the WPs developing related functionalities and the TRL were identified. These items were included in particular with a view to joint exploitation to bring together functions and partners in Phase 3.

Among the related partners, a partner was defined to organize a revision of the KER's definition concerning their use by the partners concerned, and protection mechanisms and ownership were defined.

Based on the defined KERs, the partners have planned an exploitation for their organizations. This may or may not involve collaboration with other partners, as the development of joint exploitation is part of Phase 3. The partners have considered the following points in developing their individual exploitation plans:

- Related partners and backgrounds
- Target groups
- Expected exploitation form and benefit
- Required steps for exploitation

To enable effective exploitation of the results in the further course of the project, the project's communication is designed so that the partners can draw the attention of customers and partners to the business project at an early stage. In this way, customers and business partners are integrated into the community, and their requirements are considered in the project as early as possible.

Phase 3: Planning collaborative exploitation and refining KERs (M18-M36)
As seen in the identified KERs, although exploiting by individual partners is theoretically possible, the most significant benefit to potential customers and, thus, the most significant exploitation potential arises only in the combination of functionalities. For this reason, it is essential to bring the partners together to define and develop joint exploitation scenarios based on individual exploitation plans. The knowledge gained from identifying new business models (T7.2) can also be used to plan the next steps in these alliances. The following steps will be carried out in workshops with the specified results.

1) Define a business model
2) Definition of the backgrounds and foregrounds introduced
3) Define and analyze the target market, potential customers, and competitors
4) SWOT analysis and value proposition
5) Involvement of partners' non-technical departments, legal department, and marketing
6) Development of steps for further development to market readiness and market launch

The steps developed in 6) are intended to transform the exploitation pathways of the partners into sustainable partnerships. Therefore, step 6 shall be completed by the end of 2024. While steps 1) to 6) are aimed at commercial exploitation, they are also intended to serve as a basis for long-term collaboration between the partners in the areas of research, standardization, and education, which in turn can serve as a multiplier for commercial exploitation.

Update Phase 3 in collaboration with Horizon Booster (M25-M36)
This section provides an update on the recent adjustments made to the KER refinement and exploitation planning approach. To enhance the overall methodology, ALICIA has initiated a collaboration with the Horizon Results Booster (HRB) and has aligned its exploitation strategy with the tools and services offered through this partnership. A summary of the selected HRB services is provided below, followed by a detailed explanation of each individual step.

The adopted methodology, outlined in Figure 21, follows the HRB structure and consists of three modules, recommended by HRB’s experts. Module A focuses on refining the KERs and aligning them with exploitation and commercialization objectives. In Module B, together with HRB experts, the Unique Value Proposition is defined for each KER and the market potential by identifying key drivers and customer needs is analyzed. Finally, Module C leads to the development of a targeted exploitation strategy, setting clear priorities, objectives, and actionable steps to position the KERs for successful market uptake.

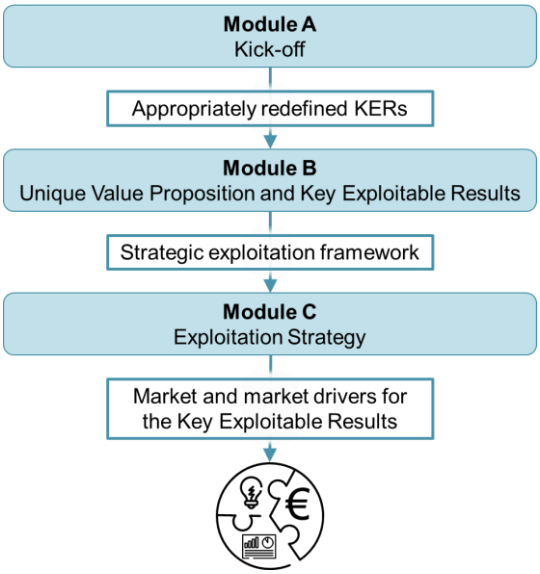

Figure 21: The HBR's modules and the modules results

Before the start of Module A, the previously identified KERs underwent a reassessment and refinement process. This step was completed in June 2024, and the results were presented during the second review meeting. As part of this step, the original set of 22 KERs (listed in Annex V) was consolidated and grouped into four clusters, as exemplarily shown in Figure 22. From these, three priority KERs, namely the platform, connectivity, and matchmaker, were selected for further development within the HRB program.

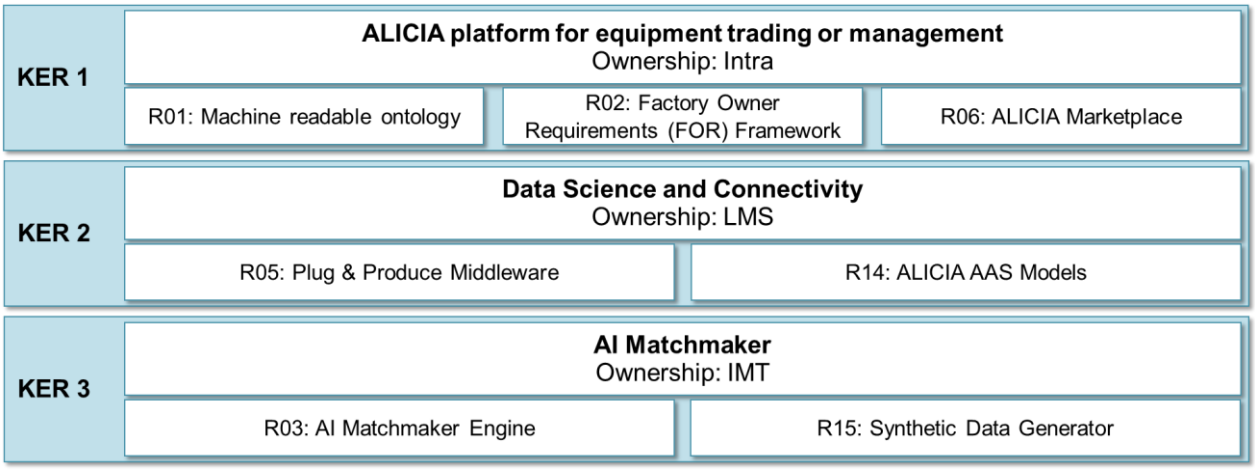

Figure 22: The revised KERs and the results they are based on.

To ensure a structured refinement of the selected KERs, each one was further defined following a systematic approach. The process began with a compulsory short definition of each KER, followed by a deeper analysis across several key aspects: target market and end users, end-user needs and challenges, competitive advantages, and the intended use model. Further considerations included identifying early adopters and their specific needs and reviewing alternative solutions and competitors. The process concluded with formulating the Unique Value Proposition, assessing market timing, and developing a preliminary IP strategy.

Building on the KER refinement completed in the previous module, Module B focuses on identifying the market and key drivers for each KER. This begins with refining the market definitions for the selected KERs, using HRB's Market Definition Canvas to ensure understanding of the market landscape. The process includes defining the target market,

identifying job executors, and understanding the KER's functional role in relation to other products. Next, the Unique Value Proposition for each KER is drafted using the Value Proposition Canvas, aligning customer jobs, pains, and gains with the KER's value-creating features. Additionally, Module B reviews intellectual assets by refining the Horizon Results Platform profile, further aligning the KERs for strategic market positioning. This structured approach ensures that each KER is well-positioned for the next phase of exploitation planning.

Building on the insights and tools from earlier modules, the final exploitation plan and framework will be developed in Module C. This process begins with the creation of an exploitation roadmap, which defines key actions, roles of partners, milestones, costs, revenues, and financial considerations such as funding sources to increase TRL and cover costs prior to generating revenue. Exploitation objectives and KPIs will be outlined, using HBR's Lean Canvas tool to focus on the Unique Value Proposition and analyze product metrics. KPIs may include revenue growth, market adoption rate, and customer satisfaction to track progress and success. Various exploitation routes and use models will be evaluated, including direct options like commercialization and contract research and indirect routes such as IP assignment or spin-offs. A thorough risk assessment will evaluate risks related to partnerships, technology, market dynamics, IP and legal aspects, as well as financial, management, and environmental factors. Based on this, mitigation strategies will be developed, such as continuous market research to address market risks and strengthening IP protection to reduce IPR risks. Finally, the roadmap toward exploitation will be discussed to ensure a clear, actionable path for successful market uptake.

4. Conclusion and next actions

In general, progress in dissemination, exploitation, and communication has been achieved (see , Figures 3, 4, 5, 22, Table 4). When it comes to communication, the LinkedIn campaign has achieved interest in the project, as shown with the impact on the website. Furthermore, the User Acceptance Survey lead to direct insights from future potential users. This was addressed by the presented Communication Strategy (see Chapter 2.3.5). The whole consortium must carefully carry out the next steps outlined throughout the project. The next actions must be:

- **Dissemination**: By continuously completing the functionalities and integrating them, the scientific findings must be made public under the FAIR principle. Therefore, the scientific publications need to be extended. Active collaboration with other EU-funded projects like MASTT and CIRPASS will be strengthened through joint workshops, shared publications, and combined dissemination activities, amplifying the project's visibility and credibility.

- **Communication**: Continuously reach out to the community and encourage them to further exchange adapting our Communication Strategy to directly address the biggest barriers from potential future users (i.e., data security, see Chapter. Further, it will be necessary to utilize the opportunities for such an exchange, mainly trade shows. Moving forward, the website will be redesigned to boost user interaction and engagement. The updated website will emphasize interactivity, clarity, and accessibility, addressing previous usability concerns and significantly enhancing the user experience. Additionally, the deployment of new multimedia tools, such as explanatory videos, will further enhance the effectiveness of communication efforts, ensuring the project's objectives and benefits are clearly articulated to diverse audiences. The consortium has also initiated targeted collaborations with industry networks such as EFFRA, planning the publication of an article in the EFFRA newsletter and exploring opportunities to showcase ALICIA’s technologies at industry-specific events. These activities represent newly introduced strategic measures aimed explicitly at enhancing the project's industrial visibility.

- **Exploitation**: While the project proceeds, the results and KERs must be continuously reconsidered, and their definitions updated. At the same time, the partners' individual exploitation plans must be updated. It is also important to implement the joint exploitation carefully, according to Phase 3. Moreover, the consortium will actively participate in Horizon Results Booster (HRB) workshops to further support exploitation planning. Specifically, Module A is scheduled for February and March 2025, consisting of two consortium-wide workshops. Module B will follow in April 2025, featuring three workshops focused individually on each KER. Module C is planned for May and June 2025, again comprising three workshops, each addressing specific KERs.

These emphasized revisions reflect the proactive measures taken to address reviewer recommendations and enhance ALICIA’s overall DEC strategy, thereby setting a strong foundation for successful project outcomes and post-project sustainability.

5. Annex I – Communities by partner organizations

Partner	Category	Description
Comau	Industry partners	Industry partners (e.g. components and machinery suppliers, system integrators) involved in production systems business.
Comau	End users (practitioners, etc.)	Customers e.g. belonging to automotive sector which may be interested in new business models for manufacturing systems supply
Comau	Investors	Company Stakeholders interested in increasing profitability in manufacturing systems supply.
Comau	Business partners	Companies supporting delivery of technical solutions.
Comau	EU Institutions and/or agencies	European Commission, National Agencies managing R&D funding
Comau	Education/training organization/ learners	EU Institutions and/or agencies
CONTI	End users (practitioners, etc.)	Process Engineer
CONTI	End users (practitioners, etc.)	Launch manager
CONTI	Business partners	Machine supplier
DIN	Standardization bodies	DIN has contact to the project manager of the relevant (national) standardization committees, the project/committee managers have direct contact to the experts participating in technical committees
IMT	Researchers	We commonly disseminate our research towards other researchers in conferences, and with publication in scientific journals.
IMT	End users (practitioners, etc.)	The participant of IMT Atlantique in ALICIA can reach out to few industry partners they were in close contact during previous project. In addition, IMT Atlantique has access to large network of industrial in the Pays de la Loire region thought the POLE EMC2.
IMT	Education/training organization/ learners	Students who are following courses given by the DAPI department of IMT Atlantique
INTRA	Industry partners	Manufacturing and Industry Professionals: INTRA as developer and system integrator is connected to a wide portfolio of use case partners of other projects (and those as well in different sectors). Via collaboration with use case partners in those different projects (mainly during requirement definition phase), often demand for additional solutions are discovered that are outside their actual project solution. Within Netcompany and Netcompany-Intrasoft all solutions are continuously screened to check their usability for being offered in other clients sectors.
INTRA	Other	Circular Economy Advocates: The project's goal of promoting circularity aligns with the principles of the circular economy. Individuals and organizations passionate about reducing

		waste, maximizing resource utilization, and minimizing environmental impact would be interested in ALICIA.
INTRA	End users (practitioners, etc.)	Robotics, Human-Robot collaboration, circular manufacturing, re-usage of complex machines, industrial marketplaces and Automation Enthusiasts: ALICIA combines two INTRA owned solutions (Industrial marketplaces and AAS platforms). The ALICIA approach allows to have not only a secure marketplace model via IDS connectors, but also the AAS standard to be used directly creating a standardized data flow even down to machine level.
INTRA	Research Infrastructures	Digital Twin and AI Communities: ALICIA introduces a machine-readable ontology for mapping factory requirements and an AI matchmaking engine for combining factory assets. Researchers and practitioners in the fields of digital twin technology and artificial intelligence would find ALICIA's innovations intriguing. Moreover, This community comprises professionals, researchers, and enthusiasts in the fields of artificial intelligence, machine learning, and data science. They would be attracted by ALICIA's innovative approach to developing advanced AI algorithms and tools for addressing environmental and agricultural challenges, such as crop monitoring, yield prediction, and land-use optimization.
INTRA	Industry partners	European Industry Stakeholders: Given that ALICIA aims to test its circular manufacturing approach in real industrial environments, European industry stakeholders, including manufacturers, policymakers, and industry associations, would closely follow the project's progress.
LMS	Researchers	LMS plans to prepare and submit at least three scientific papers presenting ALICIA research results of which LMS is having background and foreground knowledge.
LMS	Industry partners	LMS is a founding member of the Teaching Factory competence center (TF-CC) in which has a number of industrial partners as members. LMS could brief these partners on the outcomes of the ALICIA project and could share with them the results of the Yaghma survey.
MTS	Industry partners	Manufacturing industry companies (Industry like plastics processing, lathing, milling, drilling, gear measuring machines, ductile 3D measuring machines (Zeiss and others), laser welding machines, ovens, bonding machines, adhesive dispensers, etc.).

MTS	Innovators	Bayern Innovativ, REZ, KI Produktionsnetzwerk, OfraCar, BVMW, IHK, VDI.
MTS	End users (practitioners, etc.)	Machine manufacturer like KraussMaffei, Herbert Meyer GmbH and Weber.
MTS	End users (practitioners, etc.)	Keyence Corporation is a Japan-based direct sales organization that develops and manufactures equipment and solutions for factory automation, sensors, measuring instruments, vision systems, barcode readers, laser markers and digital microscopes.
MTS	Innovators	Catena-X / Manufacturing-X
SURPLEX	End users (practitioners, etc.)	Buyers / sellers: Metalworking machinery. (Factory owners, heads of production, engineering, sales and acquisition).
SURPLEX	End users (practitioners, etc.)	Buyers / sellers: Plastics processing. (Factory owners, heads of production, engineering, sales and acquisition).
SURPLEX	End users (practitioners, etc.)	Buyers / sellers: General operating equipment. (Factory owners, heads of production, engineering, sales and acquisition).
TUG	Research Infrastructures	COMET Competence Centers for Excellent Technologies TU Graz participations in COMET Competence Centers: https://www.tugraz.at/en/tu-graz/organisational-structure/service-departments-and-staff-units/shareholdings-and-risk-management/management-of-affiliated-companies/comet-competence-centres.
TUG	Researchers	International Academy for Production Engineering: CIRP College International pour la Recherche en Productique. https://www.cirp.net/ Events: https://www.cirp.net/meetings-conferences/cirp-events-col-301/view-all/year.listevents/2024/01/23/-.html Audience: Science and Industry
TUM	Citizens	LinkedIn community
TUM	Industry partners	iwb e.V.: Former researcher fellows of the iwb who are now working in manufacturing industry or research.
Comau	Industry partners	Industry partners (e.g. components and machinery suppliers, system integrators) involved in production systems business.
Comau	End users (practitioners, etc.)	Customers e.g. belonging to automotive sector which may be interested in new business models for manufacturing systems supply

6. Annex II – List of dissemination activities and planned dissemination activities

Type	Title	Authors	Status
Journal Publication	Use of AI in Assembly Line Design and Worker and Equipment Management: Review and Future Directions	Milad Elyasi, Simon Thevenin, Audrey Cerqueus	Published
Conference Publication	A Robust Optimization Solution for Enhanced Resource and Technician Management in Reconfigurable Assembly Lines: A MILP-Based Approach.	Tourandokht Karimi, Simon Thevenin, Hichem Haddou Benderbal	Published
Conference Publication	Reinforcement Learning methods for preventive maintenance and machine replacement with second-hand equipment.	Chen Xiong, Guillaume Massonnet, Simon Thevenin	Published
Conference Publication	A Mathematical Model Integrating Line Balancing, Equipment Selection, and Workforce Management	Hamidreza Rezaei, Simon Thevenin, Audrey Cerqueus	Published
Conference Presentation	Exploration of socio-technical systems in the context of reuse of assembly lines	Philipp Url, Maximilian Orgler, Wolfgang Vorraber	Presented
Conference Publication	Assembly Lines in Circulation – Towards a Holistic Framework to Enable the Reuse of Assembly Resources	German Bluvstein, Sebastian Kurscheid, Nora Reinbold, Wolfgang Vorraber, Philipp Url, Maximilian Orgler, Shiva Noori, Emad Yaghmaei, Rie B. Larsen, Simon Thevenin, Hamidreza Rezaei, Shamaim Woess Ruediger Daub	Submitted/In Review
Conference Publication	Visualization of social life cycle assessment and ethics audit outcomes in the context of a circular manufacturing ecosystem	Philipp Url, Maximilian Orgler, Wolfgang Vorraber	Accepted
Grey Literature	Developing a framework to assess ELSA design points that contribute towards a Circular Economy in the industrial automotive manufacturing sector: An exploratory research applied to the case of the circular economy project “ALICIA”	Marvin Ikedo	Published
Publication	Adaptive Robust Optimization for Resource Selection Under Uncertain Product Evolution in the Circular Economy Era	T. Karimi, S.E. Hashemi Pertoodi, S. Thevenin	Planned
Journal Publication	Sustainability KPIs and their integration into the ALICIA ontology (working title)	Nora Reinbold	Planned
Press release	Press release about the project from Surplex	Surplex	Published
Journal Publication	Modeling language for platform and innovation ecosystems	Maximilian Orgler, Philipp Url, Wolfgang Vorraber	Planned

7. Annex III – ALICIA's results

Result ID	Result name	Result description	Result type	Result category
R001	Machine-readable ontology	Machine-readable ontology to describe requirements for second-hand assembly lines	ICT Software Digital solution	Main result
R002	Framework for capturing factory owner requirements	Machine-readable ontology to describe requirements for second-hand assembly lines, tools for factory owner needs mapping (ontology/novel surveying tools)	ICT Software Digital solution	Main result
R003	AI-matchmaking engine	Tool for matching factory owner requirements with production resources with the aim of maximizing the reuse of production resources	ICT Software Digital solution	Main result
R004	Digital Shadow and Digital Twin	Virtual representations of assembly systems including second-hand equipment	ICT Software Digital solution	Result
R005	Plug & Produce Middleware	SW tools enabling easy construction, ramp-up and commissioning of the second-hand lines including a web client that will be used for authorization and connection with AAS Platform, machine connectors and AAS adapter	ICT Software Digital solution	Main result
R006	ALICIA Marketplace	Marketplace for trading second-hand production resources with an automatic production resource selection process including integrated functionalities.	ICT Software Digital solution	Main result
R007	Demo configuration	Demonstration configuration integrating ALICIA tools in relevant industrial cases	Other Intangible Results	Main result
R008	ALICIA Platform Business Model Report	A sustainable business model concept for ALICIA platform based on sustainable business innovation frameworks, e.g., value mapping tool, triple layered business model canvas.	Other Intangible Results	Main result
R009	pre-standard	A pre-standard document could be a result regarding standardization within ALICIA, after the standardization potential workshop has taken place in March, the relation to the WPs can be assigned.	Policy Related Result	Result
R010	Liaison	The establishment of a liaison could be a result regarding standardization within ALICIA, after the standardization potential workshop has taken place in March, the relation to the WPs can be assigned.	Policy Related Result	Result

R011	ALICIA Architecture	The technical architecture of ALICIA	Other Intangible Results	Result
R012	Digital Shadow Framework	DS Framework will be provided as a Digital Tool inside ALICIA Platform and will help ALICIA costumers to reach some procurement decision. Key outcome of WP3.	ICT Software Digital solution	Main result
R013	Digital Twin Framework	A virtual representation or simulation of physical assets, processes, or systems within a manufacturing environment that exists by feeding with real-time production data; It synchronizes with its physical counterpart, receiving constant updates from sensors, actuators, and control systems to reflect the real-time status and behavior of the actual equipment and produced parts regarding their quality; Digital Twins facilitate simulation, experimentation, and optimization of manufacturing processes, enabling predictive maintenance, performance analysis, and scenario planning; By leveraging advanced technologies like IoT, AI, and simulation, Digital Twins empower manufacturers to enhance productivity, quality, and agility while improving quality and reducing rejects, series launch and production costs, warranty risks, downtime and operational costs.	ICT Software Digital solution	Main result
R014	AAS Models	Define and develop the AAS models for the production equipment of the pilot cases.	ICT Software Digital solution	Result
R015	Synthetic Data Generator	SDG is a data application that simulates different production lines scenarios that will be used to for training purposes from AI-matchmaking engine.	ICT Software Digital solution	Result
R016	A Digital Framework for enabling circulation of production lines	Collaborative paper among ALICIA partners.	Scientific or Technological R&D Result including ICT Hardware	Result
R017	A Digital Shadow Framework for supporting the procurement of second-hand production lines	Collaborative paper among ALICIA partners working on WP3.	Scientific or Technological R&D Result including ICT Hardware	Result

R018	A Digital Shadow framework for assessing production equipment traded in second-hand Marketplaces	A Conference paper which reports LMS work in ALICIA WP3.	Scientific or Technological R&D Result including ICT Hardware	Result
R019	An AAS based framework for the evolution of Digital Shadows to Digital Twins of production lines	A Conference paper which reports LMS work in ALICIA WP4.	Scientific or Technological R&D Result including ICT Hardware	Result
R020	Concept for CME in industry 5.0	Concept for the trading and reusing production resources until their maximum utility to save costs, resources & material, reduce CO_2 footprint, and avoid material and energy consumption to produce new production assets. This will be ensured by smart digital tools for the sustainable human centric and resilient use of production resources.	- Other - Scientific or Technological R&D Result including ICT Hardware	Main result
R021	Concept Industry 5.0	While Industry 4.0 describes the radical improvements of production efficiency and flexibility due to digitalization and AI-driven technologies, the Industry 5.0 concept extends the existing 4.0 system with its technological advances with three purposes beyond growth and job creation, namely: sustainability, human-centrism and resilience.	Other	Result
R022	Product-Service Matrix	The product-service matrix provides an overview of all types of services that are potentially offered via the ALICIA Platform. It also defines which service is available for which type of equipment. The product-service matrix guides future ALICIA platform orchestrators in defining the services that underlie the ALICIA ecosystem value proposition.	Other Intangible Results	Result
R023	Working students	Students are working as assistants in the context of ALICIA, thereby ALICIA is contributing to their professional experience.	Other	Main result
R024	Student thesis	Students write their thesis in the context of ALICIA, thereby ALICIA is contributing to student education.	Other	Main result

R025	Financing PhD students		Other	Result
R026	New research gaps	By advancing in ALICIA's research fields, new research gaps are identified, which will be used to acquire new research projects and fund future research.	Scientific or Technological R&D Result including ICT Hardware	Main result
R027	DS/DT lab demonstrator	Digital descriptions and data resulting from setting up the in-lab demonstrator at iwb.	ICT Software Digital solution	Result
R028	DS/DT API	API to connect DS/DT, marketplace, and AI	ICT Software Digital solution	Result
R029	Training kit for workers	Kit for upskilling workers	Scientific or Technological R&D Result including ICT Hardware	Main result
R0030	User acceptance study	Insight gained by analyzing the responses to the user acceptance study	Scientific or Technological R&D Result including ICT Hardware	Main result
R0031	LCA	Adapted method to carry out LCAs for second-hand equipment	Scientific or Technological R&D Result including ICT Hardware	Main result
R0032	Social LCA	Adapted method to carry out Social LCAs for second-hand equipment	Scientific or Technological R&D Result including ICT Hardware	Main result

8. Annex IV – Mapping of results to communication and dissemination opportunities

DC opportunity	Number of related results	Related results
IEEE CASE 2024	20	R001, R002, R003, R004, R005, R006, R007, R008, R012, R013, R014, R015, R016, R017, R018, R019, R020, R022, R025, R026
LinkedIn	16	R004, R005, R006, R008, R009, R010, R012, R013, R014, R015, R017, R018, R020, R026, R027, R028, R030, R031, R032
Project website	10	R002, R004, R006, R008, R011, R012, R013, R014, R015, R020
EIT Manufacturing events	10	R004, R011, R012, R013, R014, R015, R016, R017, R018, R019
Partner websites	9	R005, R006, R007, R008, R012, R013, R014, R015, R026
EFFRA GA	9	R004, R011, R012, R013, R014, R016, R017, R018, R019
Multiple publications at conferences	9	R004, R012, R013, R014, R016, R017, R018, R019, R028
EFFRA - Manufacturing Partnership Days	10	R004, R008. R012, R013, R014, R016, R017, R018, R019, R022
BIEMH | Bienal Internacional de Máquina-Herramienta | BEC	4	R006, R008, R011, R020
Advanced Machine Tools	4	R006, R008, R011, R020
AMB	4	R006, R008, R011, R020
EMO Hanover	1	R002
Meetings with standardization committees	2	R009, R010