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D6.1 Plan for impact creation, standardisation and exploitation

Deliverable No.	D6.1	**Due Date**	28 February 2023
Description	This deliverable presents the impact creation, standardisation, and exploitation plan of the ALCHIMIA project.		
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Work Package No.	WP6	**Work Package Title**	Exploitation, dissemination and environmental impact
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Abstract

The aim of this document is to identify and outline the impact creation, standardisation and exploitation plan. The ALCHIMIA partners will implement the strategy to assure the project's broad exposure, promotion, sustainable development, and business acceptance. The deliverable provides an overview of the following topics:

- The plan to communicate and disseminate the activities and results of the ALCHIMIA project,
- The initial standardisation plan of the ALCHIMIA project
- The initial exploitation plan and first key exploitable results of the ALCHIMIA project.

The current deliverable will serve as a guide for all consortium members in carrying out their impact creation activities initiatives, since it specifies the target audiences, channels, tools, activities, and key performance metrics. This is a working document that will be updated as necessary in the future.

Statement of Originality

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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Abbreviations and Acronyms

AI – Artificial Intelligence
BFI – Betriebsforschungsinstitut
CAR – Cardiff University
CELSA - Centre d'études littéraires et scientifiques appliquées
CL - Computer Learning
EAF - Electric Arc Furnace
EC – European Commission
EAF - EXUS Analytics Framework
EXAITE - EXUS AI Technologies
ESSA - Electronic Systems Security Assessment
FL - Federated Learning
FDT - Fonderia di Torbole
GT – VET - Greening Technical-Vocational Education and Training
IoT – Internet of Things
ITU - International Telecommunication Union
LCA – Life-Cycle Assessment
MI – Mandat International
MILP - Mixed integer linear programming
MLOps - Machine Learning Operations
RO – Research Organisations
SDGs - Sustainable Development Goals
SDO – Standard Development Organisation
SSSA - Sant'Anna School of Advanced Studies
TC – Technical Committee
UNECE - United Nations Economic Commission for Europe
WP – Work Package
WMO - World Meteorological Organisation

1 Introduction

1.1 Objective of the deliverable

This paper is intended for ALCHIMIA consortium members and aims to build a practical and integrated approach to communication, dissemination, and exploitation in order to contribute to the project's overall objectives.

1.2 Document structure

The document is structured into the following sections:

- Chapter 1 – Introduction
- Chapter 2 – Communication plan
- Chapter 3 – Dissemination plan
- Chapter 4 – Standardisation plan
- Chapter 5 – Exploitation plan
- Chapter 6 – Conclusion
- Annexes

1.3 ALCHIMIA activities timing

To design, plan, organise, and utilise activities and instruments as effectively as feasible for the ALCHIMIA project, a three phased approach was adopted. This will enable the development of a green metallurgy sector within the EU in line up with Grant Agreement, the three-phase method (Figure 1) for industrial development and impact development are:

1.3.1 Phase 1 'Preliminary project promotion phase' (M1-M12)

Defining the strategy for disseminating, communicating and exploiting within target audiences through outlined activities and tools under this phase. Prioritising methods of disseminating and outreach with stakeholders will also be done during this phase.

Outcomes include:

- Partners agreeing on strategy for outreach and activities to plan in the future.
- Spreading initial awareness within communities and markets associated to objectives and scope of the Project.

1.3.2 Phase 2 'Project commercialisation phase' (M13-M24)

Phase 2 for ALCHIMIA will involve the public and target stakeholders to develop interest and demand for outcomes and activities of the project. This will also develop the cohesion and collaboration efforts of partners and related funded projects.

Outcomes include:

- Expand "targeted awareness" related to ALCHIMIA technologies with important groups, industries, businesses, and research partners.
- Share project preliminary results with important groups.
- Notify key markets of the technological benefits created from the ALCHIMIA results

1.3.3 Phase 3 'Business strategy phase' (M25-M36)

The final phase will take place near the completion of the ALCHIMIA project as partners begin to align their exploitation plan efforts. This is to expand awareness of exploits for businesses created by the project while further expanding dissemination of results.

Outcomes include:

- Maximise awareness of the ALCHIMIA ecosystem within target markets and industry.
- Contribute towards project sustainability and total exploitation.

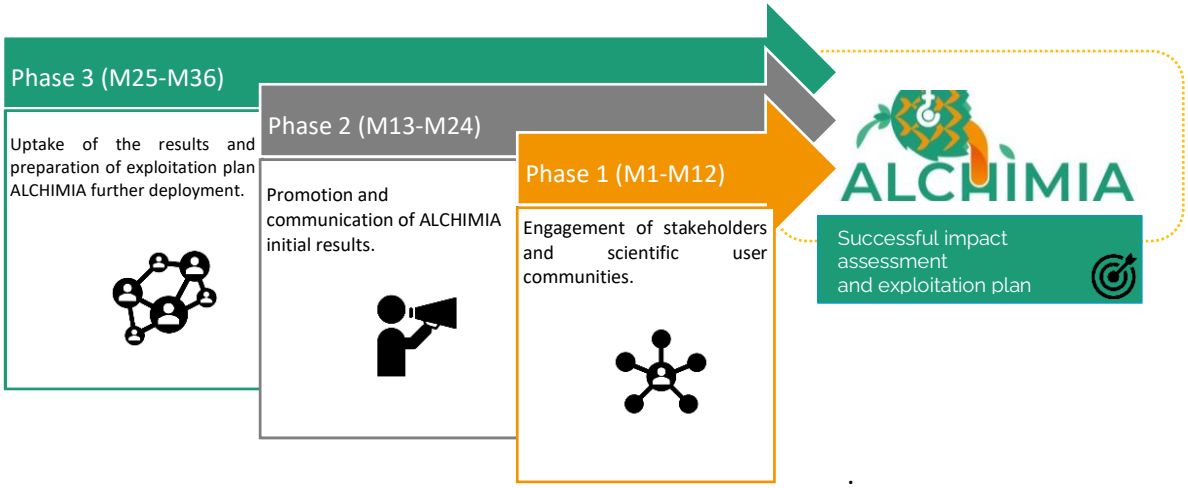

Figure 1: ALCHIMIA activities timing

2 Communication plan

2.1 The scope of communication activities

It is stated by the European Commission that, "Communication on projects is a strategically planned process that starts at the outset of the action and continues throughout its entire lifetime, aimed at promoting the action ad its results. It requires strategic and targeted measures for communicating about (i) the action and (ii) its results to a multitude of audiences, including the media and the public and possibly engaging in a two-way exchange." It is paramount to maintain project communication with target audiences and partners as information on progress and important activities (Figure 2) are frequently updated. For ALCHIMIA, the following aspects of communication were chosen:

- Project website
- Social media presence (Twitter, LinkedIn and YouTube)
- Newsletters
- Blog posts
- Press release
- Traditional media
- Communications materials
- Targeted audience

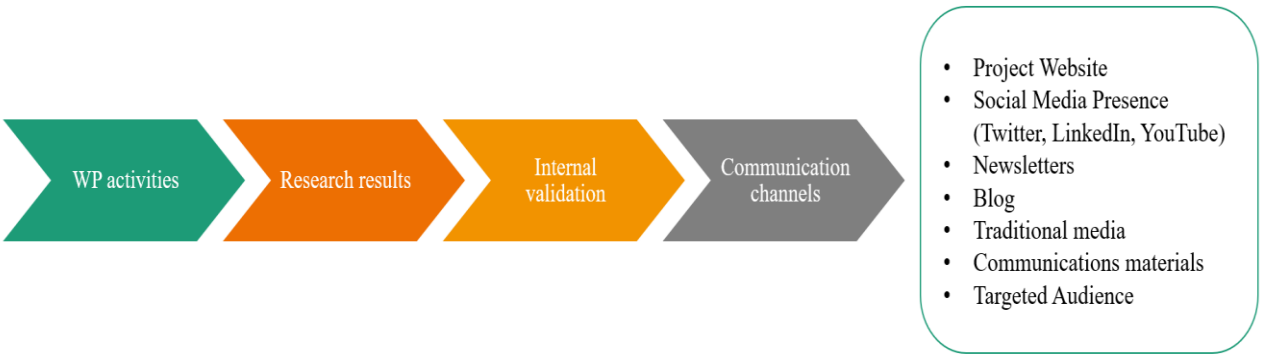

Figure 2: ALCHIMIA Communication Process

2.2 Communication objectives

The communication goal of ALCHIMIA is to identify and plan actions that boost the projects social benefits for the community and the results.

- Maximise the impact by a proper communication, dissemination, standardisation and exploitation strategy.
- Communicate in a clear way to ensure broad stakeholder and public engagement.
- Develop tools for promoting project vision at the public level (website, social media accounts, workshops, interviews and attractive divulgation documentation)

Focus areas that need to be addressed when expanding the communication strategy include:

a) What is the subject of communication?

b) Who is it addressed to (target audiences)?

c) What is the most effective way to reach that audience (tools)?

d) When and by whom will an action be executed to achieve the above (activities)?

2.3 Structure of the communication activities

The communication strategy has been divided into two levels: external and internal, including internet and offline channels. Furthermore, tools and activities that will be used throughout the project have been specified in the Table below:

Table 1: Structure of communication activities

Objectives	Tools and activities	Medium
Maximise the impact by a proper communication, dissemination, standardisation and exploitation strategy.	Social Media	Online
	Website	Online
	Newsletters	Online
	Blog Posts	Online
	Press Release	Online
	Events	Online/Offline
	Targeted Audience	Online/Offline
Communicate in a clear way to ensure broad stakeholder and public engagement.	Social Media	Online
	Website	Online
	Newsletters	Online
	Blog posts	Online
	Press Release	Online
	Participation in External events	Online/Offline
	Communication materials	Online/Offline
Develop tools for promoting project vision at the public level.	Website	Online
	Social media	Online
	Workshops	Offline
	Interviews	Online/Offline
	Attractive divulgation documentation	Online

2.4 Target audience

For optimal impact creation, it is important to identify the target audiences in order to make this a reality. These audiences are made up of diverse persons, organisations, and groups that are important to the project's success. The proposal phase outlined the initial evaluation of the ALCHIMIA stakeholder groups. The relevant stakeholders to the project's communication are presented in the Figure 3 and further presented in the subsequent table along with the specific value and benefit achievable from the project and the communication activities to raise the visibility around ALCHIMIA.

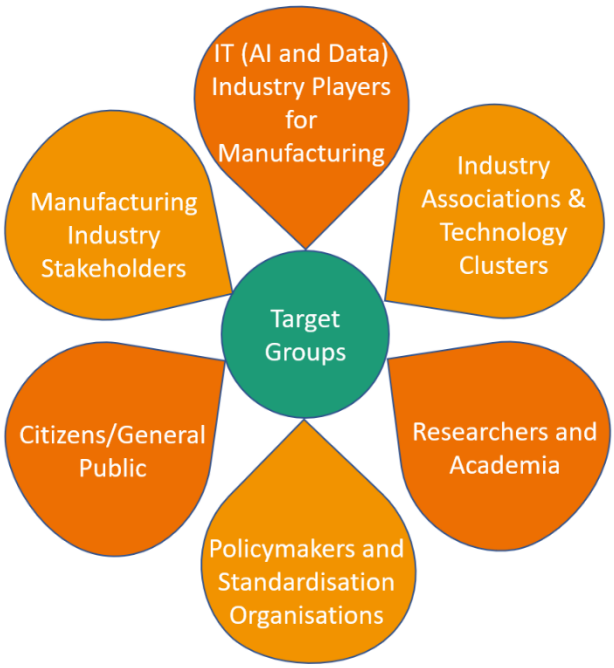

Figure 3: ALCHIMIA target groups

Table 2: Targeted audiences of communication activities

Target group	Communication activities
Manufacturing Industry Stakeholders	Newsletters, social media, blogs, videos (demonstrators and results).
IT (AI and Data) Industry Players for Manufacturing	Newsletters, social media, videos (demonstrators and results).
Industry Associations and Technology Clusters	Social Media campaigns, website, blogs, participation in events, videos, articles.
Researchers and Academia	Website, newsletters, blogs, provision of open data repositories, participation in events.

Target group	Communication activities
Policymakers and standardisation organisations	Social Media campaigns, newsletter, participation in events, videos, articles.
Citizens/General public	Participation in events, website, social media campaigns (benefits of DPP)

2.5 Communication management

2.5.1 Key Performance Indicators (KPIs)

Key Performance Indicators for activities are defined in the proposal and include various project areas like project website, social media presence, blogs, traditional media and communication material. A summary of the communication specific KPIs is presented in the Table 3.

Table 3: Communication monitoring

Impact	KPIs	Means of verification
Project website		
Online information point; communication of news, events and results; liaisons with other initiatives through links; increased awareness.	>2.000 unique visitors, ~2 min average duration of visits, >10.000 Pageviews	In-built website statistics tool
Social media presence (Twitter, LinkedIn, etc.)		
Increased outreach to stakeholders active in social media; attainment of interest of stakeholders; viral marketing by "word of mouth" through the followers; direct communication mechanism with followers.	>500 accumulative followers, >1.000 accumulative posts, >250 interactions	Keeping the profiles on such networks active via regular posting and monitoring
Blog		
Communication of concepts in a catchy and understandable manner	>50 posts	Posted on the ALCHIMIA website
Traditional media		
Communication of project news, events and results; increased awareness	>15 press releases	Reported on the ALCHIMIA social media

Impact	KPIs	Means of verification
Communication material		
Unique branding and visual identity of the project; provision of instant information about the project; creating a unified experience for the audiences targeted; improved communication of results during events	>5 videos, >8 factsheets, >6 newsletters, >6 posts in EC portals, >8 posts in manufacturing industry portals	Reported on the website

2.5.2 Schedule and distributions of responsibilities

Article 17.1 of the Grant Agreement states "the beneficiaries must promote the action and its results by providing targeted information to multiple audiences (including the media and the public), in accordance with Annex 1 and in a strategic, coherent and effective manner." Before engaging in a communication or dissemination activity expected to have a major media impact, the beneficiaries must inform the granting authority." As a result, it is critical to capitalise on each opportunity collaboratively in order to share and promote the project's advantages and impacts through all accessible methods.

MI, as the Work Package 6 Leader, is primarily responsible for the ALCHIMIA Project's dissemination, communication, and engagement initiatives. As agreed, upon with the Project Coordinator, outreach initiatives will be the responsibility of the whole Consortium. As a result, all partners will contribute to the development and adaption of these activities to assist the Work Package 6 Leader as needed (Table 4).

Table 4: Communication schedule and distribution of responsibilities

Communications supports and channels	KPIs	Schedule	Responsible partners
Project website	>2.000 unique visitors, ~2 min average duration of visits, >10.000 Pageviews	Continuous	MI will manage the website. All partners will contribute to respective sections when necessary.
Social media presence (Twitter, LinkedIn, etc.)	>500 accumulative followers, >1.000 accumulative posts,	Continuous updates throughout the duration, Continuous promotion campaigns	MI will administer the social media. All partners will be solicited monthly to relay their inputs for the ALCHIMIA social media channels and to promote the channels.

	>250 interactions		
Blog	>50 posts	1 blog post per month	All partners will contribute to the blog posts, MI will oversee the process.
Traditional media	>15 press releases	Throughout the project duration (increased in the 2nd and 3rd year)	All partners to make one press release about the project; additional press releases published by MI on website, with support of all.
Communication material	>5 videos, >8 factsheets, >6 newsletters, >6 posts in EC portals, >8 posts in manufacturing industry portals	One video in the Y1/Y2 of the project, 3 videos in Y2 and 1 final video in Y3: 1 factsheet in Y1, 3 in Y2 and 3 in Y3 4 posts in Y2 and 4 in Y3	All partners will be involved to meet the targets. Industrial partners will produce a video on-site. MI will produce the newsletters and solicit partners for contributions when necessary. All partners to support the submission of posts to industry and EC portals.

2.5.3 Communication evaluation and monitoring

There are several deliverable reports related to the communication actions for ALCHIMIA to maintain proper monitoring and evaluation. MI will draft the contents of these reports, which will be based on the contributions of all participating partners. These reports will be prepared to discuss project results and meet the KPIs outlined in the Description of Actions. MI will also conduct regular conference calls at the WP6 level to document the progress of communication activities for the partners.

MI will monitor communication activities and notify any problems to the project coordinator. Regardless, each partner is accountable for enhancing ALCHIMIA communication initiatives by resharing material and expanding efforts within their own communication channels. This will include stakeholders and broaden the community.

2.6 Means and activities

2.6.1 Project branding

The development of an easily recognised visual identify for ALCHIMIA is paramount to contribute to the overall value of brand recognition and to achieve the best possible results for communication. The visual tools for ALCHIMIA will have:

- The project logo
- Leaflet
- Poster
- Templates
- Power Point Presentation template
- Grant Agreement number – partners are requested to use the project GA number in all their external communication and dissemination materials, together with the EU emblem and the accompanying text of: "This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101070046."

The main colours of the project are emerald green, orange and grey (Table 5). While emerald green is the main colour, orange and grey are added as secondary colours to give more contrast to the overall appearance to make ALCHIMIA communications highly visible.

Table 5: ALCHIMIA colour branding

	PRIMARY	SECONDARY	SECONDARY	TERTIARY
Colours	Emerald green	Dark orange	Soft orange	Grey
CMYK	81-0-23-39	0-53-99-7	0-39-100-5	0-0-0-50
RGB Office	29-155-119	237-111-2	242-147-0	127-127-127
Web	#1d9b77	#ed6f02	#f29300	#7f7f7f

2.6.1.1 Logo

The ALCHIMIA logo serves as the focal point of the project's visual identity (Figure 4). It is an essential component of the project's branding and communication since it offers ALCHIMIA a distinct identity that distinguishes it from comparable endeavours in its sector. When the project initially started, the ALCHIMIA logo was designed as raw steel melting from a bucket. Aspects of the logo in green and orange colours are related to respecting the environment while maintaining the sustainability in the steel industry, as well as sharing the name of the project.

Figure 4: ALCHIMIA logo

For communicating on ALCHIMIA Social media channels, the smaller version of the logo (Figure 5) (avatar) will be used to better adapt to the thumbnail constraints of these channels.

Figure 5: ALCHIMIA logo (avatar version)

2.6.1.2 Leaflet

Leaflets provide a simple approach to communicate with a wide range of audiences about the project's aims, progress, or findings. Leaflets for this project are meant to be editable and printed by any project partners. This allows them to be readily customised to accommodate different material and languages as needed.

During the initial phase of the project, the ALCHIMIA leaflet was designed to integrate features and information described in the communication strategy. MI designed the leaflet and distributed it within the consortium. The leaflet was designed in double sided and use the ALCHIMIA logo's orange and green colour theme. The front page (Figure 6) is designed to draw attention to the project's mission and goals – *Data and decentralised Artificial Intelligence for a competitive and green European Metallurgy Industry* – while also providing a clear summary of the project and the key focus areas.

The back of the leaflet (Figure 7) provides further information of ALCHIMIA's seven main goals for the project. The leaflet also includes the link of project's website and social media accounts for more information. According to the grant agreement criteria, the EU symbol and the reference of ALCHIMIA grant agreement numbers are located at the bottom of the page. The goal of leaflet distribution during the events is to promote communication and awareness among the targeted stakeholders. The front and back of the leaflet are seen in the different figures below.

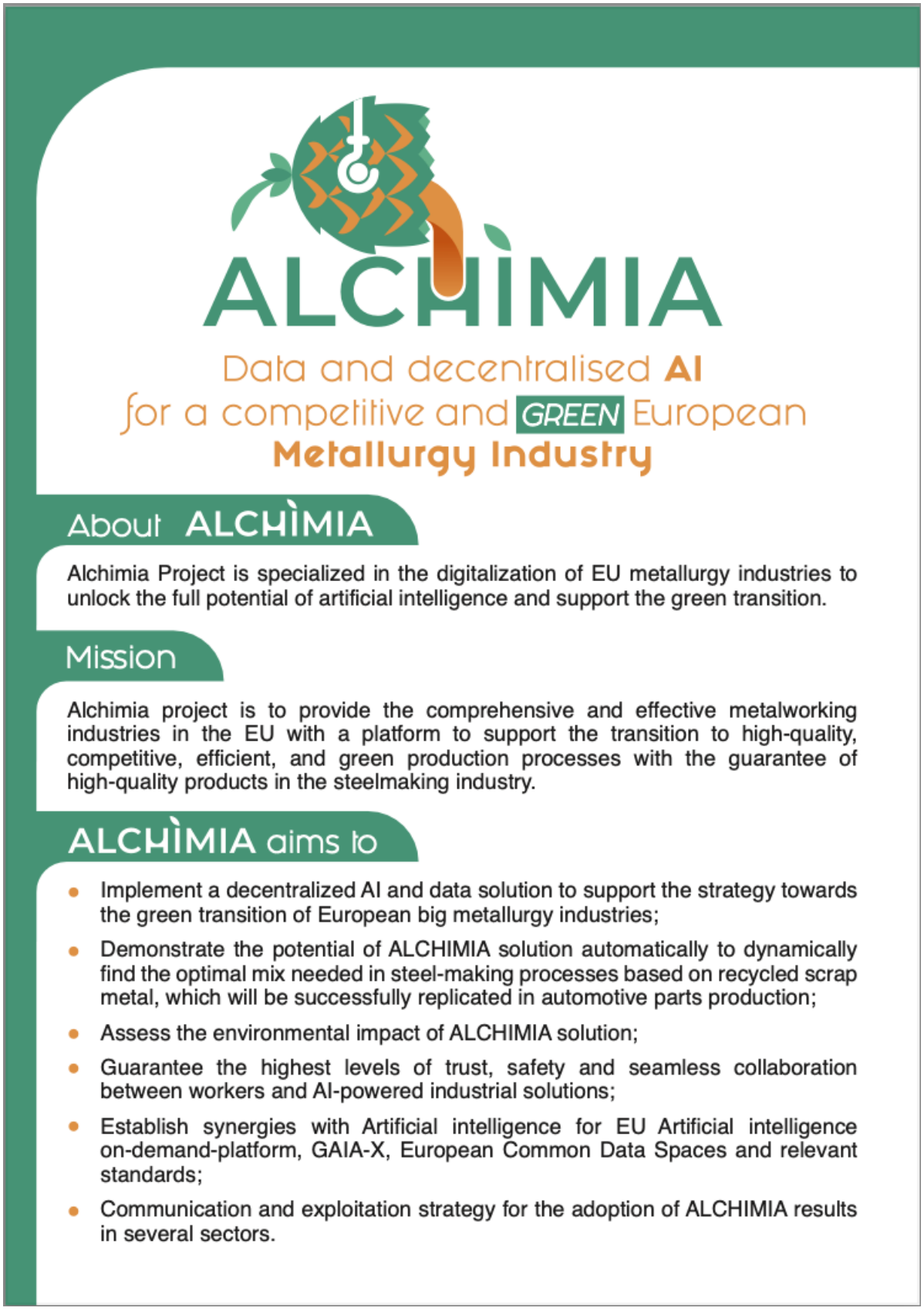

Figure 6: ALCHIMIA leaflet - front

Figure 7: ALCHIMIA leaflet - back

2.6.1.3 Poster

Posters are an essential communication tool that are ideal for any organised event, whether internal or external, such as conferences, symposia, workshops, seminars, or other styles.

The ALCHIMIA poster was designed during the first phase of the project in accordance with KPI and communication strategy. The poster, designed by MI, is designed in 200x85 format (A5 format) and uses a colour scheme based on the ALCHIMIA logo. The poster was created in English (other languages could be accepted if necessary or valued) to stimulate the attention of stakeholders, and other relevant parties, interest in the project using targeted text and graphic content. The green and orange colour scheme was chosen to match the project's identity. The Information on the poster is intended to be brief and to the point. The contents focus on seven important objectives discussed by ALCHIMIA.

To further connect audiences, the poster includes the ALCHIMIA logo, website, and social media information. According to the Grant Agreement criteria, the EU symbol and reference to the Grant Agreement are put at the bottom of the page (Figure 8).

The poster was created to be adjustable to any new demands that the partners may have. There will be hard copy versions of the posters made available on OwnCloud for partners to distribute and utilise at events in which they may participate.

Figure 8: ALCHIMIA poster

2.6.1.4 ALCHIMIA templates

At the beginning of the project, MI, as WP6 leader made available on OwnCloud various templates to be used by the partners. The list includes:

- The ALCHIMIA deliverable template.
- The ALCHIMIA meeting minutes template.
- The ALCHIMIA presentation template.
- The ALCHIMIA webinar template.

Templates with a common look and feel have been created using PowerPoint for partners to use in external and internal events, conferences, meetings, etc.

2.6.1.5 ALCHIMIA project presentation

The ALCHIMIA Project presentation will be used as the base of the Project objectives, activities and the outcomes of the projects done by the project consortium. MI as the leader of the WP6 prepared the ALCHIMIA project presentation (Figure 9) for the project's meetings, conferences, events, interviews which can be used by the project consortium during any events.

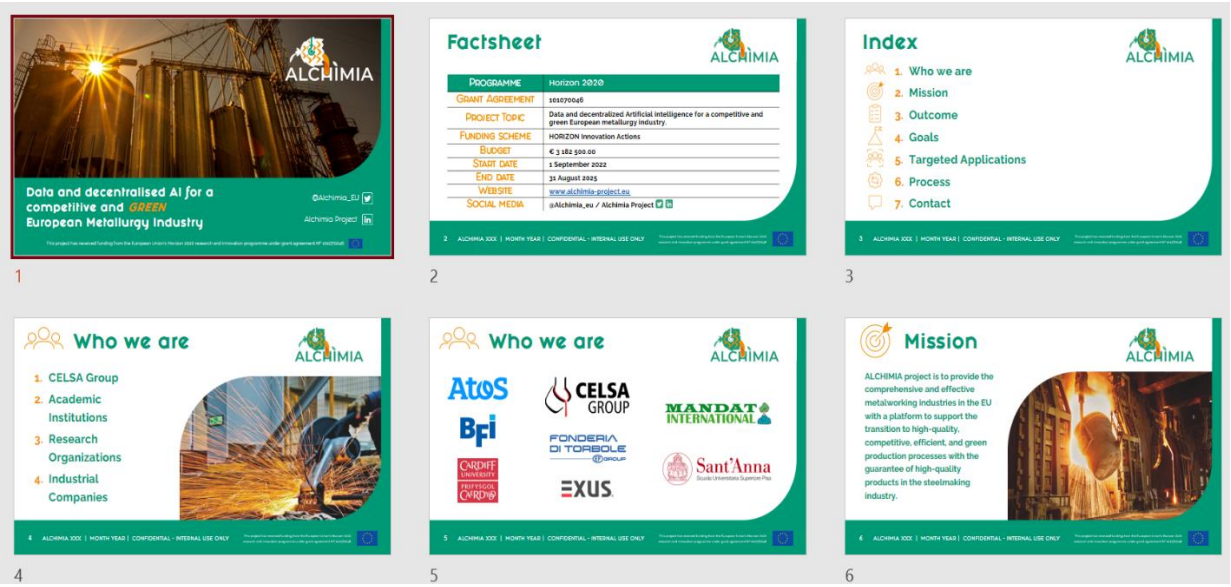

Figure 9: ALCHIMIA project presentation template

2.6.1.6 EU flag

The EU flag will be used with the statement "ALCHIMIA has received funding from the European Union Horizon Europe research and innovation programme under the Grant Agreement No. 10107004" for all website and communication material employed by ALCHIMIA.

2.6.2 Website

The ALCHIMIA website (Figure 10 and Figure 11) is available at www.alchimia-project.eu. The ALCHIMIA website disseminates project objectives, pilot use cases, activities, and outcomes. The use of the website as a primary dissemination form will aid in generating digitalisation in the metallurgy industries in order to create high-quality, competitive, efficient, and green manufacturing processes while providing maximum visibility of the project's key facts, objectives, activities, and findings. This allows for sharing not only with the scientific community, but also with the general public. The website will remain active after the conclusion of the project.

The ALCHIMIA website outlines the project's goals, with six outcomes detailed from demonstrating the potential for ALCHIMA solutions and understanding their environmental impact to outlining a communication strategy, amongst other goals. The website also outlines the project's goals in a language that both high-information readers and real citizens can consume, outlining the benefits they will feel from a safer, more trustworthy relationship between artificial intelligence and workers in those industries. The website also contains links and resources that can be used to increase understanding of the project.

The ALCHIMIA website has a variety of features. There is a section that allows website visitors to view a summary of the overall project and access to the project's consortium. On top of this, all the results and resources, coupled with related blogs, are available from the website's main page, creating a one-stop experience where visitors can become informed about the goings-on with ALCHIMIA. Finally, information concerning upcoming events and news is available, along with contact details if required. From the website, visitors can find all the partners associated with ALCHIMIA, as well as social media links and additional information about the project's funding.

Figure 10: ALCHIMIA website homepage

Figure 11: Example of ALCHIMIA website

2.6.3 Newsletter

Newsletters are an important tool for keeping stakeholders informed and engaged in research projects. They can be used to share updates on project progress, upcoming events, and important findings. Newsletters can also be used to share resources and tools that are relevant to the project, such as data sets and software. Additionally, newsletters can be used to share information about opportunities for collaboration and participation in the project. By providing regular updates and keeping stakeholders informed, newsletters can help build trust and support for the project among key stakeholders, including funding agencies, partners, and community members. Overall, newsletters can play a critical role in the success of a research project by fostering effective communication and community engagement.

An e-newsletter will be created for the identified stakeholders. There will be six newsletters created as a minimum for the selected stakeholders as stated in the Description of Actions. Provided information in these newsletters will be the project's news, field progress, updates from the pilots, as well as consortium member updates and important events to better inform readers on connecting with project and similar initiatives. Extra information provided by partners will be checked for accuracy. Each newsletter will be published on the project's website. A mailing list will be constructed in addition to allow the e-newsletter to be distributed in mass for informing interested public and stakeholders about the current status of project news, results and planning of events. For those that are interested, a subscribe function will be included within the newsletter recipients' group through an added registration option. An excel spreadsheet is to be filled with the e-mail addresses of interested subscribers that will be distributed by the MI throughout the Consortium. It will be required to request permission from partners to use contact information provided within the spreadsheet.

2.6.4 ALCHIMIA blogs

Blog posts offer an excellent opportunity to share the exciting news, results and future project plans from ALCHIMIA partners, while building stronger connections between the Consortium and the ALCHIMIA target audiences. The ALCHIMIA blog posts intend to provide a platform for the partners to share information on a topic of their choice, including their recent research results, newest technology advances, relevant project activities, or news items connected to the scope of the research. An overview of the ALCHIMIA blog posts is provided in Figure 12. In order to meet the KPIs, MI has proposed to plan the blogs using a dedicated blog post calendar available on Own Cloud. ALCHIMIA partners have filled in the blog post calendar. MI will directly coordinate with the partners to follow up on the status of the blogs. The blogs will be published on the ALCHIMIA website and communicated on the project's social media channels.

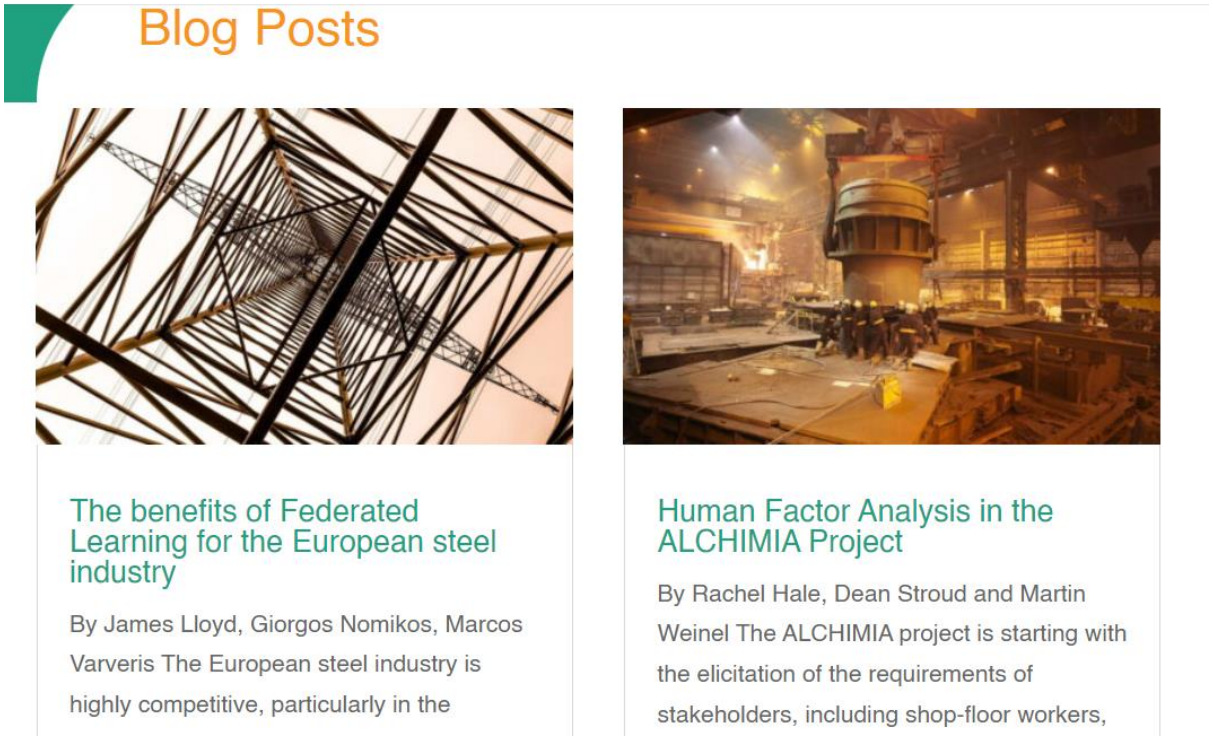

Figure 12: ALCHIMIA blogs

2.6.5 Social networks

Social media has become a crucial tool for communication, networking and gathering information, making it an integral aspect of modern research. ALCHIMIA will leverage social media platforms, specifically Twitter and LinkedIn to engage with the community and gather feedback, insights, and information relevant to the research project.

2.6.5.1 ALCHIMIA twitter

An ALCHIMIA Twitter account was created at the start of the project to increase awareness on key project activities and ALCHIMIA research. MI manages this account at https://twitter.com/alchimiaproject with the following handle of @alchimiaproject. Expanding viewership for from the ALCHIMIA Twitter account (Figure 13) comes through three primary activities:

- Retweets and mentions by ALCHIMIA partners with a larger following and mentions by relevant accounts.
- Effective use of related hashtags and mentions within tweets. The project-specific hashtags are #alchimiaproject and #alchimia. Other hashtags such as #steel #AI #metallurgy #HorizonEurope #GDPR and #EUGreenDeal are encouraged.
- Use of visual elements (pictures, emojis, polls…) to increase the attractiveness of the content and attract more followers.

Figure 13: ALCHIMIA twitter

ALCHIMIA partners are solicited monthly to provide a contribution to the social media accounts through a template that has been made available to them on OwnCloud. This allows for all the consortium to be involved in the project's activities and to communicate with external audiences on important topics of their choice, such as the progress of their research, related activities, events and relevant news in line with the scope of the project.

2.6.5.2 ALCHIMIA LinkedIn

LinkedIn is ideal for professional networking while also allowing for the sharing of news and posts through their website and within other social media accounts. It is a meeting point for experts in targeted fields and will be leveraged to reach external audiences, particularly from the research, public and industrial sector. An ALCHIMIA LinkedIn page has been created for this project by MI at the following label https://www.linkedin.com/company/alchimiaproject (Figure 14). This LinkedIn will be utilised in connecting and networking with experts within related professions and fields. While MI is the main admin, each partner is invited to join and share content on this LinkedIn page. All partners are encouraged to promote within their own channels to increase this page's visibility.

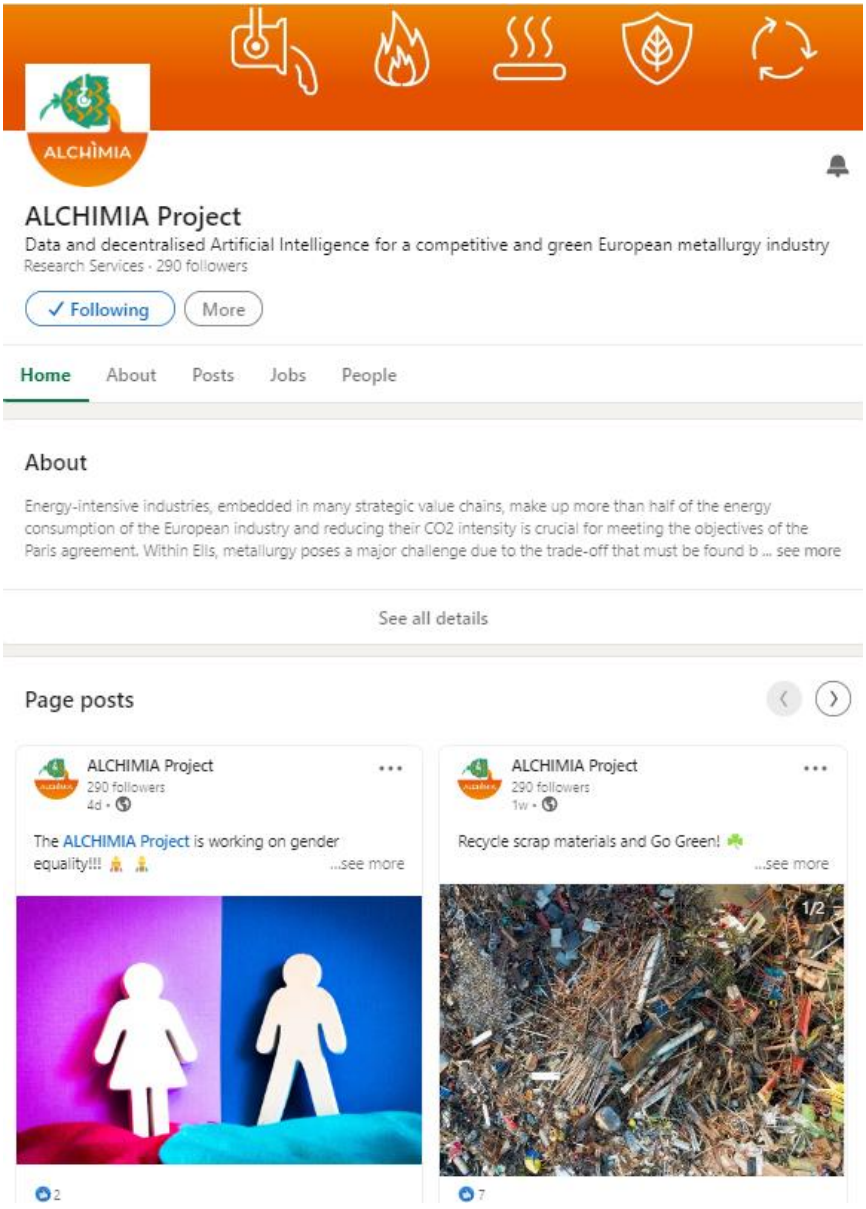

Figure 14: ALCHIMIA LinkedIn

3 Dissemination plan

3.1 The scope of dissemination activities

Dissemination is defined as "the public disclosure of the results by an appropriate means (other than resulting from protecting or exploiting the results), including by scientific publications in any medium".

The European Commission's goal for dissemination is "to transfer the knowledge and results with the aim to enable others to use and take up results, thus maximising the impact of EU-funded research". Information delivery and dissemination is integrated directly into the ALCHIMIA research through the WP activities (Figure 15). Following partners' approval and needed checks, the results from research will be delivered to target audiences. Due to the specialised nature of ALCHIMIA's results and outputs, using the following dissemination channels will be prioritised:

- Scientific publications
- Project events
- Conferences and workshops
- International events
- Collaboration and synergies with other projects
- Internal dissemination in partners' networks
- Standardisation contributions

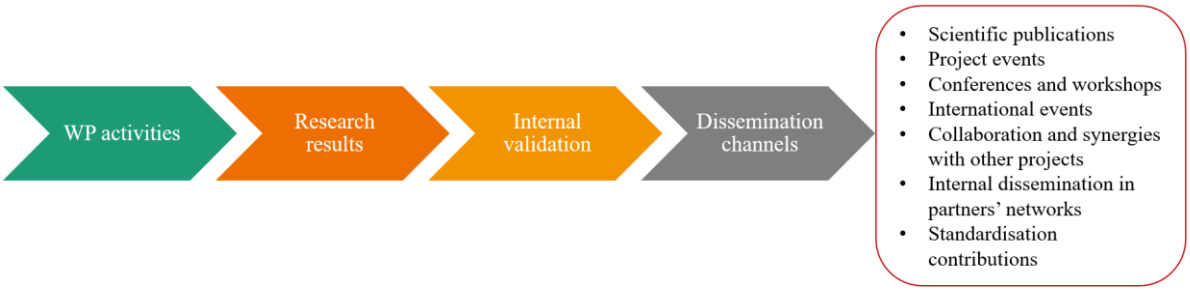

Figure 15: ALCHIMIA dissemination process

3.2 Dissemination strategy

Valuable and practical knowledge sharing with relevant and specialised parties within research communities, public and private sectors, policy makers, and regulatory bodies is an important focus of the ALCHIMIA project. Customising the dissemination strategy is essential to cater individual needs and interests of the target groups. The dissemination strategy for ALCHIMIA is constantly evolving with the following targets:

- Pull clear, easy and precise messages or important conclusions from research data.
- Identify leading 'carriers' of communication.
- Create steady groups of activities to ensure the dissemination strategy succeeds.

Moreover, ALCHIMIA achievements and findings will be shared to key stakeholders as a main focus while integrating feedback into the specification, design, development and evaluation work for the project. In regards to this, ALCHIMIA aims to:

- Publish results in international journals, conferences, and workshops to inform the scientific community about ALCHIMIA, its goals, activities and results and to gather valuable information on related issues and efforts;
- Increase the impact of the project through synergetic activities.

The strategy for dissemination is built around the questions below:

a) What is the subject of dissemination?

b) Who is it addressed to (target audiences)?

c) What is the most effective way to reach that audience (tools, channels)?

d) When, and by whom, will actions be executed in order to achieve the above (activities)?

3.3 Subject of dissemination

The following subjects have been identified within the ALCHIMIA project:

1. ALCHIMIA project (general objectives, expected impacts, progress and activities)
2. Main findings
3. Techniques and methodologies (using cases, scenarios, architecture, piloting, ex ante and post ante evaluation)
4. Technologies and technological approaches (AI, Machine Learning, Federated Learning, Continuous Learning, Algorithms)
5. Human Centric approaches: worker evaluation, skills and training, EDI, AI trustworthiness, ethics.

3.4 Target audiences

One of the main dissemination objectives is to create awareness of the ALCHIMIA project impacts and benefits. Identification of the target audiences is paramount for expanding awareness. The individuals, organisations and groups will be vital to project success. Upon initial review, the ALCHIMIA stakeholder groups have been identified within the initial proposal phase. Key stakeholders involved in the project's communication activities are shown in the Table 6.

Table 6: Target audiences of outreach activities

Target Group	Means
Manufacturing Industry Stakeholders	Publications, blogs, articles/videos, newsletters and access to datasets, networks, DIHs.
IT (AI and Data) Industry Players for Manufacturing	Publications, blogs, articles/videos, newsletters and access to datasets, networks, DIHs.
Industry Associations and Technology Clusters	Newsletters, participation in events/workshops (benefits to end-users, skills development, details on results).
Researchers and Academia	Publications, website, blogs newsletters, provision of open data repositories, participation in events.
Policymakers and standardisation organisations	Publications, blogs, articles/videos, newsletters and access to datasets, networks, DIHs.
Citizens/General public	Events, blogs, website

3.5 Internal dissemination within the ALCHIMIA consortium

It is paramount to the success of the project for ALCHIMIA partners to use adequate means of dissemination. The variety of methods for internal dissemination include websites, seminars, trainings, workshops, conference articles, and scientific publications. Additionally, there have been WP-specific mailing lists created by ATOS to meet the needs for internal dissemination within the consortium. The mailing lists include:

- One for general aspects of the project: alchimia@lists.atosresearch.eu
- One mailing list per WP:
  - Alchimia_wp2@lists.atosresearch.eu
  - Alchimia_wp3@lists.atosresearch.eu
  - Alchimia_wp4@lists.atosresearch.eu
  - Alchimia_wp5@lists.atosresearch.eu
  - Alchimia_wp6@lists.atosresearch.eu
- One for managerial aspects of the project: alchimia-mgmt@lists.atosresearch.eu
- One for the steering committee issues: alchimia_sc@lists.atosresearch.eu

In order to reduce distraction and oversharing, the use of these mailing lists will assist in facilitating and organising discussions between the partners. ATOS will continuously maintain these mailing lists by adding new membership requests with minimal delays. Partners will need to communicate regularly and consistently with WP Leaders on the

current status and unfolding issues of their work. These requests are separate of the EC and internal reports and to be completed in parallel. WP leaders will be offering updates on project activities and issues, being administrative and legal, to the project coordinator if they desire to be informed about these subjects. Finally, ALCHIMIA will use Own Cloud as a collaborative work platform for internal dissemination of documents and other files.

3.6 External dissemination beyond the ALCHIMIA consortium

ALCHIMIA results will be disseminated to expand awareness and knowledge from the project team to groups throughout Europe, project stakeholders, and even the globe. The purpose of this is to reach a wide audience while setting up and adding to a successful exploitation.

3.7 Dissemination management

3.7.1 Dissemination KPIs

The KPIs were originally described in the proposal preparation stage and cover topics such as the organisation of project events, participation in conferences and workshops, scientific publications, community building/engagement with stakeholders, collaboration and synergies with projects, internal dissemination in partners' networks and standardisation contributions. The specific dissemination KPIs from the Grant Agreement's section 2.2.2, "Dissemination and communication measures" have been extracted. The main reference for the monitoring and evaluating the dissemination of ALCHIMIA can be found in the Table 7.

Table 7: Dissemination KPIs

Impact	KPIs
Organisation of Project Events	
Increased collaboration with relevant initiatives; synergies for joint research; information exchange; increased awareness.	4 Workshops; 2 Demo Events coorganised by ALCHIMIA
Participation in Conferences and Workshops	
Ideas' gathering and knowledge exchange with relevant communities and initiatives; information about latest technologies/advancements; liaisons with other initiatives; increased awareness.	Participation to >20 events and >15 events; Demonstration of results in booths in >4 events
Scientific Publications	
Validation of project's concept, findings and advancements; promotion of results to scientific communities; ideas' gathering and knowledge exchange with relevant communities and initiatives.	>8 articles in industry magazines; >10 Academic Conference Publications; >4 Journal Publications, >10 public datasets

Impact	KPIs
Community Building/Engagement with Stakeholders	
Communication of project news, events and results; validation of project's concept, findings and advancements; ideas' gathering and knowledge exchange with relevant communities and initiatives; attraction of potential clients and adopters; increased awareness.	>100 industry contact points and >20 active industry stakeholders; >10 industry communities informed about the project; >2 webinars
Collaboration and synergies with projects	
Knowledge exchange; mutual validation of results; joint dissemination activities; networking for future research collaborations	>15 projects with synergies; >8 joint activities
Internal Dissemination in partner's networks	
Communication of project news, and results; validation of the concept, findings and advancements; ideas' gathering and knowledge exchange with relevant communities and initiatives; increased awareness.	>8 internal partners' events; >15 links to the project's website; >4 pilot training sessions
Standardisation Contributions	
Communication of project results; validation of project's concept, findings and advancements; increased awareness.	Liaison with >2 working groups; presentation of results to >2 standardisation meetings

3.7.2 Schedule and distribution of responsibilities

Article 17 of the EC ALCHIMIA Grant Agreement states that "The beneficiaries must disseminate their results as soon as feasible, in a publicly available format, subject to any restrictions due to the protection of intellectual property, security rules or legitimate interests."

To meet this requirement, ALCHIMIA will use every opportunity to disseminate results, individual or collective, to specialised and general public audiences. Contributions to the dissemination will come from all the partners according to their role and efforts.

3.7.3 Dissemination policy and rules

It is stated in Article 16 of the EC Grant Agreement that the Intellectual Property (IP) rights protection that ALCHIMIA dissemination activities are subject to, Article 17 of the Grant Agreement, indicates the rules of the dissemination activities. These include, but are not limited to, publications and presentations; "A beneficiary that intends to disseminate its results must give at least 15 days advance notice to the other beneficiaries (unless agreed

otherwise), together with sufficient information on the results it will disseminate. Any other beneficiary may object within (unless agreed otherwise) 15 days of receiving notification, if it can show that its legitimate interests in relation to the results or background would be significantly harmed. In such cases, the results may not be disseminated unless appropriate steps are taken to safeguard those interests."

This does not change or replace the following:

- The obligation to protect results (Art 16.2)
- The general confidentiality obligations (Art 13.1, 13.2, 13.3)
- The security-related obligations (Art 13.1, 13.2, 13.3)
- The obligation to protect personal data (Art 15.1, 15.2, 15.3)

Any project results disseminated, in any form, must clearly indicate that the project received funding from the European Union. Additionally, any publication based on the work that the EC funded within ALCHIMIA should indicate its relationship to ALCHIMIA and the EC funding recognition. The partners are hereby required to meet the following Grant Agreement (Art 17.2- 17.3) requirements for result dissemination:

- Display the EU emblem.
- Include the following text: "This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101070046."
- Include the following disclaimer: "The content of this (paper/article/publication/report) is the authors' sole responsibility. The European Commission or its services cannot be held responsible for any use that may be made of the information it contains".

3.7.4 Dissemination evaluation and monitoring

Deliverables for ALCHIMIA will be multiple reports linked to dissemination activities to continue accurate monitoring and reporting. These reporting documents will be provided by MI. The WP6 leader will follow the dissemination efforts and will communicate directly with the project coordinator if problems are discovered. The KPI table will be utilised for accurately evaluating and monitoring of communication activities. Conference calls will be used regularly in order to follow progress with individual communicating activities for partners being organised by MI at the WP6 level. Dissemination and sharing of information with national and local media will be each partner's responsibility. With regards to reporting and monitoring, MI has provided a dedicated Spreadsheet where partners should add previous and future events where they present ALCHIMIA. This spreadsheet will also include relevant articles, publications, and presentations that are created during the project.

Table 8: Dissemination schedule and distribution of responsibilities

Dissemination supports and channels	KPIs	Schedule	Responsible partners
Organisation of Project Events	4 Workshops; 2 Demo Events coorganised by ALCHIMIA	Y2-Y3	All partners are required to participate in the organisation of project events.
Participation in Conferences and Workshops	Participation to >20 events and >15 events; Demonstration of results in booths in >4 events	Throughout the project duration	All partners are expected to support this KPI by participating and presenting ALCHIMIA in events.
Scientific Publications	>8 articles in industry magazines; >10 Academic Conference Publications; >4 Journal Publications, >10 public datasets	Throughout the project duration	All partners are encouraged and solicited to write articles and proceedings, and to participate to meet the quantitative KPIs for publications.
Community Building/ Engagement with Stakeholders	>100 industry contact points and >20 active industry stakeholders; >10 industry communities informed about the project; >2 webinars	Throughout the project duration	Industrial partners to actively support. CELSA to help
Collaboration and synergies with projects	>15 projects with synergies; >8 joint activities	Throughout the project duration	All partners to support. ATOS, CELSA, MI to help.
Internal Dissemination in partner's networks	>8 internal partners' events;	Throughout the project duration,	All partners to participate.

Dissemination supports and channels	KPIs	Schedule	Responsible partners
	>15 links to the project's website; >4 pilot training sessions		
Standardisation contributions	Liaison with >2 working groups; presentation of results to >2 standardisation meetings	Throughout the project duration.	BFI will be responsible for managing this activity.

3.8 Dissemination channels

Maintaining sensitive data and information secure is a priority when it comes to dissemination of project outcomes. The goal is to share information to strengthen connections between partners and external stakeholders, while fostering community building. The involvement of audiences to obtain feedback will be critical for improving design, development, deployment, and validation of solutions. Using bidirectional channels of communication (contact email address, social media, etc.) paired with organisation of dissemination activities, discussed in later subsection, will define important channels of dissemination for ALCHIMIA.

3.8.1 Scientific publications

Part of the ALCHIMIA produced research is expected to be published in peer reviewed scientific journals and conferences in order to further disseminate the project outcomes. ALCHIMIA partners are strongly encouraged to collaborate and deliver related publications. Use of Open Access (OA) scientific journals and conferences is encouraged for publishing to achieve requirements of the European Commission. The presented table below includes journals and international peer-reviewed conferences which could be valuable to ALCHIMIA.

Table 9: Journals and international peer-reviewed conferences

Journals	Sensors Journal, Journal of Intelligent Manufacturing, Journal of Manufacturing Systems, Journal of Machine Learning Research, Applied Computing and Machine Intelligence (ACMI), International Journal of Production Research, New Technology, Work and Employment; Economic and Industrial Democracy; Journal of Education and Work; Journal of Industrial Relations; Journal of Workplace Learning; Big Data and Society; Metals, Steel Research International, Sustainability, Sustainable Metallurgy, Journal of Cleaner Production, Steel and Technology, MDPI Metals, MDPI Processes, IFAC Journal on Control Engineering Practice, Matériaux & Techniques.
Peer reviewed conferences	European Conference on Artificial Intelligence ECAI (https://ecai2023.eu/) ; International Conference on Artificial Intelligence Applications and Innovations (https://ifipaiai.org/2023) ; IFIP International Conference on Advances in Production Management Systems (https://www.apms-conference.org); International Conference on Advanced Information Systems Engineering (https://caise23.svit.usj.es); International Labour Process Conference (https://www.ilpc.org.uk/); Work, Employment and Society Conference (https://www.britsoc.co.uk/); BUIRA Conference (https://www.buira.net/conferences/); AsSIST-UK (https://assistuk.org/home-2/conference/); STS Conf Graz (https://www.tugraz.at/arbeitsgruppen/sts/sts-conference-graz); European Symposium of Artificial Neural Networks ESANN (https://www.esann.org), International Conference on Artificial Intelligence Applications and Innovations (https://ifipaiai.org), International Work Conference on Artificial Neural Networks IWANN (http://iwann.uma.es) , IEEE Conference on Artificial Intelligence IEEE-CAI (http://cai.ieee.org); European Steel and Technology Application Days - ESTAD 2025 and 2027; European Electric Steelmaking Conference - EEC 2025; European Academic Symposium on EAF Steelmaking - EASES 2025; IFAC Workshop on Control of Complex Systems; 20th IFAC Symposium on Control, Optimisation and Automation in Mining, Mineral and Metal Processing

MI has developed an Excel sheet template shared on Own Cloud to allow partners to meet reporting articles, papers, standardisation contributions, publications, keynotes, and scientific presentation requirements. There are two sheets within this Excel document for tracking and reporting of project articles and publications:

- 'Articles, papers and publications' is the first sheet containing a table for the partners to fill in the following fields:
    - Document title
    - Document type
    - Publication date
    - Conference/journal/publisher
    - Estimated percentage of relevance to ALCHIMIA project

- Name(s) of responsible consortium partner(s)

- 'Standardisation contributions' is the second sheet and is intended for contributions to Standard Developing Organisations. The reporting table includes the following:
  - Document type
  - Submission date
  - Organisation
  - Estimated percentage of relevance to ALCHIMIA project
  - Name(s) of responsible consortium partner(s)

3.8.2 International events

Beyond the previously discussed conferences, industrial and regulatory conferences are essential for ALCHIMIA presentations since they create an efficient platform to share technical aspects and interim results. Key stakeholder groups from the research and industrial sector attends these events. To expand project visibility and dissemination, ALCHIMIA will be discussed and valued at multiple events. Important venues and events are listed in the Table 10:

Table 10: International events and industrial conferences

Events	BDVA events (EBDVF, Data Week); FIWARE Summit; ADRA / DAIRO events; IoT Week by IoT Forum; ITU Green Standards Week; Digital Around the World; European Steel and Application Days (ESTAD), Events of the Italian Association of Metallurgy (AIM), Events organised by the European Steel Technology Platform (ESTEP), Society and Materials Conference (SAM), AISTech Conference, European Electric Steelmaking Conference, METEC International Metallurgical Trade Fair 2027, Futhersteel Conference 2024/2025

4 Standardisation plan

The standardisation plan in the ALCHIMIA project is part of task T6.2, which has three activities: (1) direct monitoring of ICT standardisation on manufacturing (ISO TC184), IoT and digital twins (ISO JTC1/SC41) or AI (ISO JTC1/SC42), (2) clustering activities with other projects (support actions such as StandICT or research projects), and (3) promotion of ALCHIMIA results to standardisation. The first two ensure that ALCHIMIA is aligned with the state of the art. The last activity ensures that ALCHIMIA creates an impact: candidates for building blocks to promote can be use cases, concepts, architecture, methods or solutions. T6.2 proposes a standardisation plan in this D6.1 and reports on the standardisation achievements by the end of the project.

4.1 Overall methodology and strategy for standardisation design approach

The following section presents the methodology behind the Initial Standardisation Strategy. In order to elaborate the Standardisation Plan, task T6.2 has adopted the following methodology:

1. The deliverable presents and describes the currently identified ALCHIMIA results for standardisation (WHAT) (section 4.2)
2. The deliverable studies the relevant Standards Developing Organisations (SDOs) (WHERE), with a special focus on CEN, CENELEC, IEEE and ISO/IEC, where the ALCHIMIA partners could perform standardisation activities on matters that are connected to the ALCHIMIA project. (section 4.3)
3. The deliverable identifies ALCHIMIA lead partners in standardisation (WHO) (section 4.4)
4. The deliverable presents an initial plan and timeline for standardisation (section 4.5)
5. Finally, the conclusion provides a synthesis of the identified fora of high relevance to the ALCHIMIA project (section **Error! Reference source not found.**)

The following sub-sections first describe the survey process that will be used for the continuous identification of relevant standardisation results during the project. A first survey has been conducted and will be used to update and extend the standardisation process. Additionally, the target outcomes and KPIs for standardisation in ALCHIMIA are summarised in sub-section 4.1.2.

4.1.1 Internal survey and review of the ALCHIMIA potential for standardisation

A formal survey has been elaborated to capture potential ALCHIMIA research results relevant for standardisation. The survey was based on the "three Ws questions" below:

A. WHAT topics need to be monitored and have the potential to be submitted to standardisation?

B. WHERE (which SDOs and fora) will be most relevant and deliver the best impact?

C. WHO can lead and support the standardisation effort in the project?

The survey included both closed and open questions about future standardisation and exploitation plans of each partner and was sent to all ALCHIMIA partners to be completed. The results will be evaluated during M6-M9 of the project. The part A of the questionnaire was entitled "Partner perspective" and discusses exploitable results from ALCHIMIA, their value proposition, intellectual property strategy and possible partnerships. The part B "Partner's standardisation activities" required the partners to indicate any standardisation activities that they are involved in, express their views on the standardisation processes that ALCHIMIA should focus on, propose key elements that the project should push to standardisation, and provide specific standardisation information regarding their organisation. The detailed survey used for collecting inputs from the partners is shown in Appendix A1.

Due to the early stage of the project, partners could not necessarily identify all upcoming research results relevant for standardisation, but the most important actions could already be identified. Task T6.2 will of course keep continuously monitoring and identifying potential complementary research results to be certified in parallel to the research activities.

4.1.2 Target outcomes and KPIs

In order to monitor the progress of the T6.2, the following KPIs have been defined for standardisation according to the ALCHIMIA proposal:

Table 11: KPI and targets

KPI	Target
Number of contributions to SDOs	> 2
Communication of project results; validation of project's concept, findings and advancements; increased awareness.	Liaison with >2 working groups; Presentation of results to > 2 standardisation meetings

It is worth specifying that the 'contributions to SDOs' not only allude to new draft recommendations and contributions to existing standards but also **include other forms of collaborations with SDOs including presentations, demos, tutorials and participations in target events.**

4.2 ALCHIMIA results for standardisation (WHAT)

The initial standardisation topics declared in the ALCHIMIA proposal can be classified into five categories: ALCHIMIA reference architecture, interoperability enablers, Life Cycle Assessment (LCA), Human-centric design and Data protection, security and GDPR compliance. The following sub-sections provide a description of each of them.

4.2.1 ALCHIMIA Reference Architecture

ALCHIMIA will reuse and extend the European AI-on-demand platform (AI4EU), leveraging and extending the already existing assets and know-how. Also, the ALCHIMIA components (i.e., Federated Learning, Continual Learning) and resources (i.e., datasets, models) will be integrated or published in the AI4EU catalogue. The ALCHIMIA system will be compliant with the reference architectures of most prominent European initiatives for the design of sovereign and interoperable data platforms like GAIA-X, International Data Spaces (IDSA), BDVA reference model or FIWARE. The solution will be compliant with existing industrial standards such as communication over PLCBUS or OPC-UA. Moreover, AI solutions for production machines need to comply with additional requirements, from security and data protection to real-time operation (time guarantees) and high reliability (fault-tolerance, robustness) for safety reasons (regulations and standard), including very large bandwidth capacity to collect and process high volumes of data in motion.

Requirements and functionalities will be described employing IEC 62559 standard for use case definition. The 4+1 architectural view model design pattern will be applied to translate the requirements into a complete set of diagrams covering the needs and views of multiple stakeholders. A product backlog will be then generated, dividing the implementation of the ALCHIMIA system into smaller tasks.

4.2.2 Interoperability enablers

The components for the integration with the sensing and control mechanisms will be based on FIWARE open-source components and CEF building blocks. Communication protocols like OPC-UA, HTTP and MQTT will be used to enable the data flow. They will also include mechanisms for the transformation and pre-processing of the data using streaming analytics engines so that potential errors or inconsistencies can be detected and repaired. Data from different sources will be fused in an integrated database, which can then be used for a) extracting information in the form of statistics about the production process, and b) perform correlation analysis to determine the links between basic parameters and outputs, or between different outputs. The information will be harmonised into a common representation to ensure interoperability using open standards like ETSI Common Information Model (CIM), Platform Industry 4.0 Asset Administration Shell (AAS), FIWARE NGSI-LD and others.

4.2.3 Life Cycle Assessment

LCA method (standards ISO 14040:2006 and ISO 14044:2021) offers a structured approach for assessing processes as well as systems and quantifying their potential environmental impacts. This method will be implemented for the assessment of the environmental footprint of each considered optimisation decision and contributing to define models that reduce energy consumption and waste production.

4.2.4 Human-Centric Design & Trustworthy AI

A human-centric philosophy will guide the design of the ALCHIMIA system, ensuring that workers' capacities and skills are augmented by the envisioned AI system instead of trying to achieve a completely automated production process. The Ethics guidelines for trustworthy AI proposed by the High-level Expert Group on Artificial Intelligence (AI HLEG)

and the requirements introduced by the Proposal for a regulation of the European Parliament and the council, laying down harmonised rules on artificial intelligence (artificial intelligence act) and amending certain union legislative acts will be considered as the core references to ensure delivering a trustworthy and safe AI-powered system, including appropriate technical mechanisms for human agency and oversight.

In addition, the project will devote considerable effort to understanding organisational and employment implications (e.g., work organisation, safety), including emerging skills and training needs, to be derived from AI and Big Data technologies, which will serve as key requirements for the whole project. Finally, a training programme to facilitate workers' acceptance and optimal usage of the ALCHIMIA system will be conceived and implemented.

4.2.5 Data protection, security and GDPR

ALCHIMIA will give utmost attention to the appropriate management of data during the project execution, considering both personal and industrial information. The tasks related to data, ethics and compliance are handled in more detail in task T1.5. The project will deliver a data management plan (D1.2) in month 6 of the project that will be continuously updated until the end. A comprehensive impact assessment will be done covering privacy, ethical, social and legal issues (PIA+) of the developed framework.

All partners will adhere to relevant national and international laws, guidelines and policies, including:

Legislation and recommendation on human rights, dignity and integrity of the user

- Universal Declaration of Human Rights (United Nations)
- Regulation No 45/2001 of the European Parliament and of the Council of 18 December 2000 on the protection of individuals
- Charter of Fundamental Rights of the European Union (2010/C83/02).
- Convention for the Protection of Human Rights and Fundamental Freedoms (Council of Europe)

Legislation and recommendations on personal data

- EU General Data Protection Regulation (GDPR) on the protection of individuals concerning the processing of personal data and the free movement of such data and was designed to harmonise data privacy laws across Europe, to protect and empower all EU citizens data privacy and to reshape the way organisations across the region approach data privacy. The new General Data Protection Regulation No 2016/679 applies from 25 May 2018.
- Article 29 Working Group 05/2014 Opinion on Anonymisation Techniques.
- Handbook on European data protection law by the European Union Agency for Fundamental Rights and the Council of Europe (2013).

4.3 Relevant EU Frameworks for ALCHIMIA standardisation (WHERE)

The following section provides an overview of the relevant SDOs and fora identified for ALCHIMIA standardisation. **Note that this is a preliminary list that will be extended according to the survey results** (see section 4.1.1).

4.3.1 International Organisation for Standardisation (ISO)

The International Organisation for Standardisation (ISO) is an independent, non-governmental international organisation involving 164 national standards bodies. The SDO facilitates knowledge sharing and seeks to present voluntary, consensus-based, and competitive international standards supporting innovation and responding to global challenges. ISO's work is carried out by technical committees. In the scope of ALCHIMIA, multiple technical committees have been identified.

Table 12: Relevant Technical Committees at ISO/IEC

Technical Committee	Relevance
ISO/TC 184/SC 4: Industrial data	High
ISO/IEC JTC 1/SC 27: Information security, cybersecurity and privacy protection	High
ISO/IEC JTC 1/SC 41: Internet of things and digital twin	High
ISO/IEC JTC 1/SC 42: Artificial intelligence	High
ISO/ICS 13: Environment. Health protection. Safety	High

In particular, the AI Ecosystem Approach formulated by ISO/IEC JTC1/SC42 shows great relevance to the ALCHIMIA project:

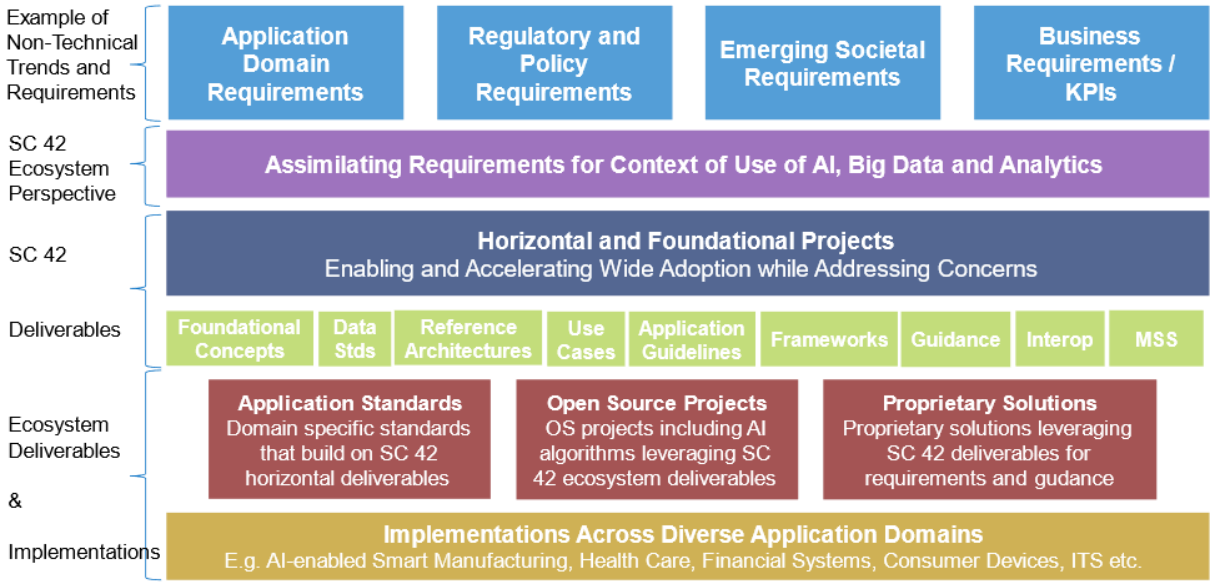

Figure 16: ISO/IEC JTC 1/SC 42's AI Ecosystem Approach

4.3.2 European Committee for Standardisation (CEN) and the European Committee for Electrotechnical Standardisation (CENELEC)

The European Committee for Standardisation (CEN) and the European Committee for Electrotechnical Standardisation (CENELEC) are European standardisation organisations. CEN and CENELEC provide a platform for the development of European Standards and other technical specifications across a variety of sectors. Both collaborate with the European Commission to guarantee that standards follow EU legislation.

In the context of the ALCHIMIA project, the following technical committees for standardisation have been identified.

Table 13: Relevant Technical Committees at CEN

Technical Committee	Relevance
CEN-CENELEC JTC 21: Artificial Intelligence	High
CEN/CLC/TC 8: Privacy management in products and services	High

4.3.3 IEEE Standards Association (IEEE SA)

IEEE Standards Association (IEEE SA) is a leading consensus building organisation that nurtures, develops and advances global technologies, through IEEE.

In the context of the ALCHIMIA project, the following relevant standards have been identified.

Table 14: Relevant Standards at IEEE SA

Standard	Relevance
IEEE 3652.1-2020: IEEE Guide for Architectural Framework and Application of Federated Machine Learning	High
P2841/D2.1, Jun 2022 - IEEE Approved Draft Framework and Process for Deep Learning Evaluation	High

4.4 ALCHIMIA lead partners in standardisation (WHO)

The contribution to standardisation activities often necessitates a membership or official affiliation to a SDO as a pre-requirement. The survey (see section 4.1.1) is being conducted to identify partners that are already involved in standardisation and have relations to SDOs in order to facilitate the process of contribution to standardisation. Based on the survey results, the following table will be completed.

Table 15: Identified partners for standardisation work

Partners involved in standardisation	SDO	Focal point
Mandat International	ITU	Anna Brékine
… will be extended according to survey results	… will be extended according to survey results	… will be extended according to survey results

Further, the leading partners for ALCHIMIA results subject to standardisation are identified as follows according to the proposal:

Table 16: ALCHIMIA result and responsible partner

ALCHIMIA result	Leading partner(s)	Related Tasks
ALCHIMIA reference architecture	ATOS	Task 2.1, 2.4, 5.1
Interoperability enablers	EXUS	Task 3.1, 3.2, 3.3, 4.1, 4.2, 4.4
Life Cycle Assessment	SSSA	Task 4.3, 5.4
Human-centric design and Trustworthy AI	CAR	Task 2.3, 2.5, 5.3
Data protection, security and GDPR	SSSA	Task 1.5, 2.4

4.5 Initial standardisation plan and timeline

Standardisation requires a continuous effort and contributions over time. Consequently, for a standardisation strategy to be successful determining the priority fora to be considered in the project is indispensable. Additionally, having a clear overview of the effort distribution is also essential to have effective impact.

On the basis of the survey results, the research results to be standardised, the partners' memberships and capability to contribute to SDOs, as well as the relevance of the SDOs, will be identified and summarised to form an initial standardisation plan. The plan will be updated and extended as the project moves forward; a preliminary draft is shown in the table below.

Table 17: Summary initial standardisation plan

WHAT	WHO		WHERE	
Research result subject to standardisation	**Lead expertise / contributors**	**Lead SDO facilitator**	**SDO**	**Working Group**
ALCHIMIA reference architecture	ATOS	Tbd (survey)	Tbd (survey)	Tbd (survey)
Interoperability enablers	EXUS	Tbd (survey)	Tbd (survey)	Tbd (survey)
Life Cycle Assessment	SSSA	Tbd (survey)	Tbd (survey)	Tbd (survey)
Human-centric design and Trustworthy AI	CAR	Tbd (survey)	Tbd (survey)	Tbd (survey)
Data protection, security and GDPR	SSSA	Tbd (survey)	Tbd (survey)	Tbd (survey)

The overall timeline for standardisation in ALCHIMIA is kept simple and comprises three main elements:

- Standardisation Landscape (M6-M9): Based on the survey results, the tables shown in this deliverable will be completed and extended, prioritisation according to relevance to the project will take place, and the initial standardisation plan will be fixed.
- Contribution to Standardisation (M10-M36): Contact with SDOs and corresponding TCs will be established and forms of contribution to ongoing standardisation activities will be analysed; progress will be evaluated based on the KPIs defined in section 4.1.2. More details on the envisioned ALCHIMIA activities in this period are highlighted in Figure 18.
- Final report with achievements regarding standardisation (M36)

Figure 17: Timeline for ALCHIMIA standardisation plan

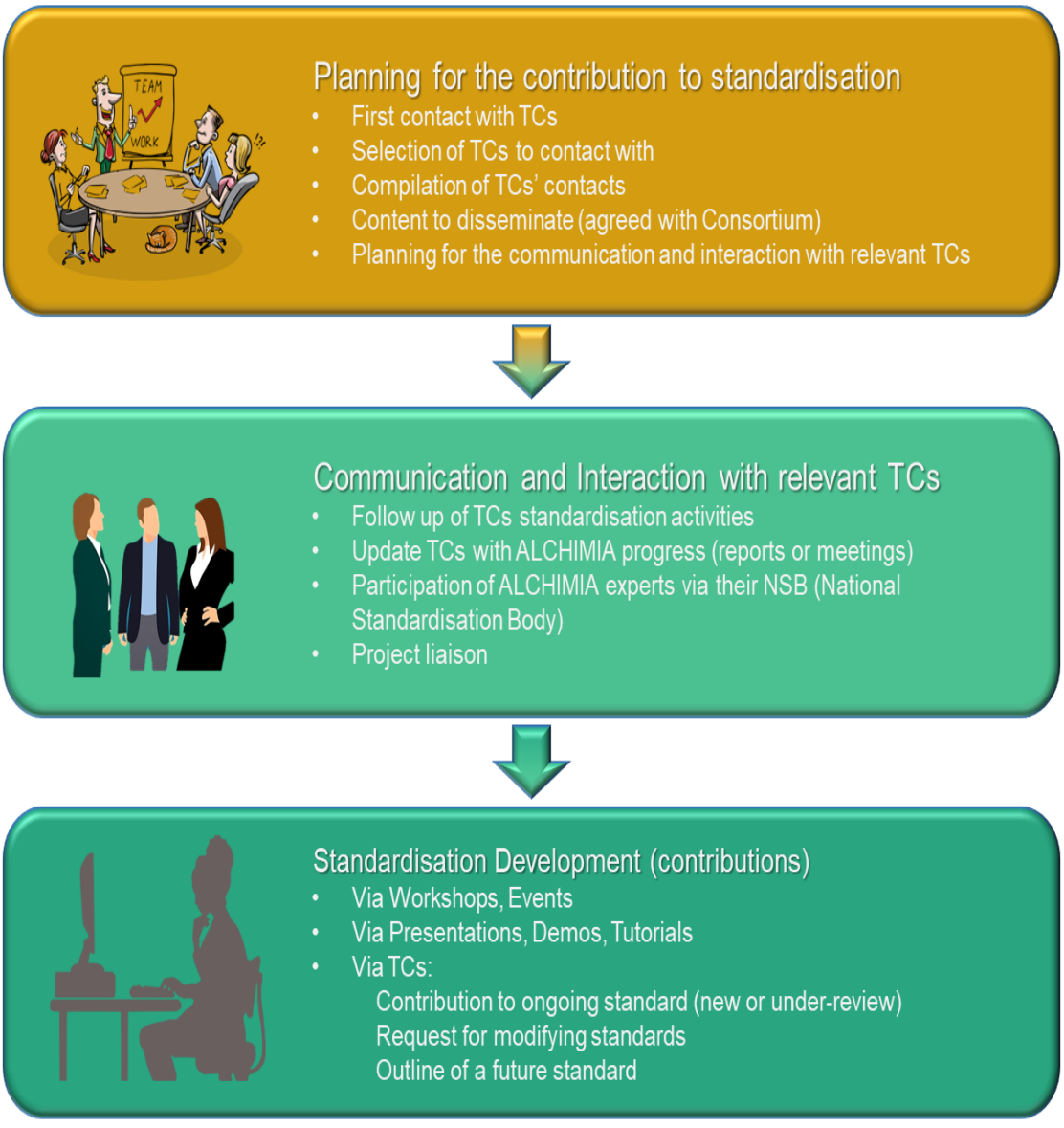

Figure 18: ALCHIMIA standardisation contribution strategy

5 Exploitation plan

5.1 Exploitation strategy

The purpose of the exploitation strategy is to ensure that the research results are effectively translated into real-world applications, such as new technologies or processes that can support the sustainable transformation of the metallurgical industry. The strategy should also consider how the research can be used to create economic and societal benefits, such as job creation, increased efficiency, and reduced environmental impact. The exploitation strategy is designed to align with the needs and goals of all partners involved. It will be regularly reviewed and updated to incorporate new developments, current trends, and developments from competitors, among other factors.

The ALCHIMIA project's exploitation strategy is divided into two main phases: an analytic phase in the early stage of the project, and a strategic and business-oriented phase in the second half of the project.

- The first phase focuses on the definition of the exploitation plan, identification of the market opportunities, target groups and competitors, leading to the development of the first list of exploitable assets, and preliminary completion of a SWOT analysis.
- The second phase focuses on the definition and implementation of the sustainability strategy, including the sustainability model and commercialisation strategy, value chain, and specific partner role for the sustainability of the ALCHIMIA outputs.

The main elements of the overall strategy for the ALCHIMIA project include:

1. **Identifying the exploitable assets of the ALCHIMIA project:** The first step in the strategy for the ALCHIMIA project is to identify which outcomes from the project can be exploited, either jointly or individually. This will be determined through an analysis of results throughout the project's duration. This information will be used to create a well-designed exploitation strategy and relevant sustainability plans. The initial commercial potential of the project is outlined in a table for reference.
2. **Identifying potential target groups early on through market research** that considers regional and industry factors, as well as insights gained from use cases implemented in the project, to determine the most appropriate monetisation model for all project outcomes.
3. **Developing a sustainability plan that guarantees the long-term success of the project's outcomes, as well as creating business opportunities for the partners and communities involved.** The project will explore collaborations for commercialising the project's results and complementary services such as training, consulting, and integration support.
4. **Creating a detailed individual exploitation plan**, outlining which assets they plan to use in line with their business and research strategy.
5. **Using the project's use-cases to demonstrate the project's developments and assess their commercial potential.** The exploitation team will explore opportunities for adopting the proposed solutions in operational environments.

5.1.1 Market analysis and value proposition

The European steel industry is projected to see substantial growth in the market for data-driven and decentralised AI solutions in the near future. Market research company Technavio predicts a compounded yearly growth rate (CAGR) of more than 20% from 2020 to 2025 for this market segment.[1] The surge in growth is due to various factors such as the rising demand for environmentally friendly production techniques and the growth in AI technology. By utilising AI, steel companies can modernise their production processes, enhance efficiency and decrease their carbon footprint, enabling them to remain competitive in an ever-evolving market.

A recent study by Accenture found that on average, companies that have incorporated AI into their manufacturing procedures have achieved a 20% decrease in energy usage. Given such substantial advantages, it is not surprising that the European steel industry's demand for data-driven and decentralised AI solutions is expected to keep growing in the upcoming years.[2]

At the European level, the European Union produces a significant amount of steel and castings each year, with 500 steel production sites and 1,900 foundry facilities[3]. The demand for both steel and scrap are expected to grow in the future, with scrap demand increasing at a faster rate due to the increasing popularity of electric arc furnace route. In order to meet this demand, it is necessary for these industries to adopt resource efficiency solutions. It is projected that 15 steel plants and 45 foundries will adopt ALCHIMIA's solutions within three years of the project's completion.

Additionally, it is estimated that 10% of the 2 million manufacturing companies in Europe will successfully adopt AI solutions by 2030, and out of those, 1% are expected to adopt high-tech, innovative AI solutions such as federated learning by 2025. ALCHIMIA aims to target 10% of these companies, or about 20 factories from other sectors, to adopt its solutions by the end of the project.

ALCHIMIA will also create Key Exploitable Results (KERs), that will enable a market penetration of 1% (~1,7 million € by 2028) of the global federated learning solutions market size that is expected to grow from USD 100,95 million € in 2023 to 173.43 million € by 2028 (1,7 million €), at a Compound Annual Growth Rate (CAGR) of 11.4%[4].

[1] "Global Steel Industry Market 2020-2024", Technavio, 2020

[2] "Data-Driven Steel Production: Opportunities and Challenges", Accenture, 2021

[3] Eurofer. (2020). European Steel in Figures 2020. [PDF]. Available from https://www.eurofer.eu/assets/Uploads/European-Steel-in-Figures-2020.pdf.

[4] MarketsandMarkets. (2021). Federated Learning Solutions Market. Retrieved from https://www.marketsandmarkets.com/Market-Reports/federated-learning-solutions-market-151896843.html

5.2 Exploitation plan

The ALCHIMIA exploitation strategy has been established and will be further refined and evaluated throughout the project with the full involvement and commitment of all partners. This strategy will be communicated to potential external stakeholders. The following actions will be taken as part of the ALCHIMIA exploitation strategy:

- Assessment of ALCHIMIA results to identify key outcomes;
- Characterisation of key exploitable results;
- Development of individual exploitation plans that align with each partner's role and internal strategy;
- Definition and consideration of intellectual property rights;
- Discussions with other stakeholders, e.g., at events where ALCHIMIA is represented, to validate the value of the results and proposed business models.

As a result, the plan for exploiting the outcomes produced by the ALCHIMIA project will be crafted while taking into consideration several key factors:

- Given that the project involves stakeholders from different sectors, the exploitation strategy must be developed in accordance with the guidelines set forth by the European Commission to guarantee that all parties involved have their interests considered in the exploitation of the project's outcomes.
- The exploitation strategy must be established well ahead of the availability of the project results. This will require a more flexible and iterative approach as the consortium explores the best exploitation paths.

5.3 Approach

The ALCHIMIA exploitation plan has been structured as follows:

- Initial Key Exploitable Results (KER) identification
- Definition of target groups and exploitation models
- Initial description of KERs
- Initial characterisation of KER

5.3.1 Initial identification of key exploitable results

The ALCHIMIA project is still in its early stages and at present, only individual exploitation plans have been identified. To move forward, further research, development and maturity of solutions is necessary. The table below summarises the currently identified key exploitable results, the assigned ownership, expected exploitation form and target groups.

Table 18: Key initial individual exploitable results

Exploitable result	Ownership	Exploitation form	Target group
Platform for Federated Learning, Continual Learning and Transfer Learning	ATOS	Service (consulting) Software as a service Licencing	ATOS data scientists developing AI software, AI companies that acquire ATOS computing solutions (e.g., edge servers, HPC infrastructure) including AI platforms
Dynamic EAF process model	BFI	Service (consulting)	Steel industry
Scrap mix characterisation and optimisation		Service (training)	Steel industry, process industry
Industry 5.0 Tool Kit for human-centric technology development and insertion	CAR	Service (training)	Steel industry, foundries, ROs
Easily replicable and optimised steelmaking process	CELSA		Steel industry (melt shop/steel mill)
Easily replicable and optimised steelmaking process	EXUS	Service (training)	Creditors in the financial sector who would benefit from EXUS' improved ability in the field of AI
Optimised and Green automotive parts production in foundries	FDT	Process improvement	Steel companies, foundries, ROs
Models' portfolio and optimisation framework	SSSA	Service, Academia	Steel companies, foundries, process industry, ROs
IAM4SDG methodology	MI	Service (consulting), certification	Research sector, project managers, policy makers, private sector, project evaluators, international organisations

In order to progress towards a joint exploitation plan, a dedicated exploitation workshop will be held during the second plenary physical meeting in Dusseldorf in March 2023. At this workshop, partners will have the opportunity to present their individual solutions in a five-minute pitch, receive feedback from other partners, and engage in a discussion regarding a joint exploitation plan for the ALCHIMIA project as a whole.

5.3.2 Target groups

The following section will focus on outlining the various target groups for ALCHIMIA. These groups include representatives from the manufacturing industry, stakeholders, players in the IT (AI and Data) industry for manufacturing, industry associations and technology clusters, researchers and academia, policymakers and standardisation organisations, and the general public. Each of these target groups play a critical role in the success and adoption of ALCHIMIA, and understanding their specific needs and challenges will be essential in achieving our objectives.

Table 19: ALCHIMIA target groups for exploitation

Target group	Value, benefit delivered
Manufacturing Industry Stakeholders	Tool for an optimised production resulting in economical savings, reduced energy consumption, reduced carbon footprint, reduced waste.
IT (AI and Data) Industry Players for Manufacturing	The developed software tool is a highly transferable product that allows ad-hoc extensions and customisation for single companies. The tool, together with the related know-how, represents an asset for the IT players that can also favour new collaborations with different types of industry.
Industry Associations and Technology Clusters	The realised common platform represents a share-point for industries. Industry associations can improve the economic and environmental performance of associate companies by offering support for the deployment of the platform. Furthermore, the federated learning approach can push within industry clusters the improvement of the platform itself that represents an asset for industry associations.
Researchers and Academia	The platform is a testbed for the adopted technologies and the project is the ideal meeting point with industries for collaborations. The synergy will lead to technological improvements and advances in the research.
Policymakers, international organisations and standardisation organisations	The platform, that includes and exploits different technologies, can be used for standardisation purpose and as test-environment for policies.
Citizens/General public	The project has a noticeable environmental impact. Besides it, plant productivity will be improved with a positive economic impact on society. Finally, the developed system will favour the workers' upskilling especially as far as digital technologies are concerned.

5.3.3 Characterisation of the exploitable results

A SWOT analysis is an important tool that can be used in the development of an exploitation plan. It is a strategic planning method that helps to identify the strengths, weaknesses, opportunities, and threats of a project or business. By conducting a SWOT analysis, the stakeholders can gain a deeper understanding of the internal and external factors that may impact the project's success. It can help to identify the areas of the project that are most likely to be successful, as well as the areas that may need more attention or resources. Additionally, SWOT analysis can help to identify potential new opportunities, such as new markets or partnerships, and to develop strategies to mitigate risks and capitalise on strengths. Overall, it helps to create a more comprehensive and well-rounded exploitation plan.

5.3.4 KER analysis

In the next iteration of the deliverable, the ALCHIMIA partners will be required to further assess their key exploitable results and evaluate the risks of the exploitation activities associated with them. The analysis will be based on the following factors:

- The novelty solution: A description of the result, the level of innovation compared to existing products/services, and its unique selling point (competitive advantages).
- Market: The size of the product/service market, market trends and public acceptance, product/service positioning, competition, and potential customers.
- External factors: Legal, normative, or ethical requirements (such as the need for authorisations and compliance with standards).
- Go-to-market considerations: The cost of implementation, time to market, estimated product/service price, adequacy of consortium staff, and external experts/partners to be involved.
- Intellectual property rights: The background and foreground of IP ownership and types.
- Exploitation strategy: Forms of exploitation (such as direct industrial use, patenting, technology transfer, license agreement, publications, and standards), contributions from partners (in terms of know-how and patents), partner expectations, and sources of financing after the end of the project (such as venture capital, loans, or grants).

5.4 Individual exploitation plans

The following section will present a detailed overview of the key exploitable assets and plans identified by each of the project partners. Each ALCHMIA partner has been asked to provide a thorough description of their key exploitable result, along with information such as partner(s) with background for this result, partner(s) with foreground for this result, partner(s) interested in exploitation, target group competitors, nature of exploitation, form of exploitation, about the possible exploitation forms that could be used to bring the results to market. Additionally, each partner has performed a SWOT analysis to evaluate the strengths, weaknesses, opportunities, and threats associated with their exploitable assets.

ATOS: Project Coordination, leader of WP3 for the implementation of the Federated Learning Infrastructure.

ATOS – Platform for Federated Learning, Continual Learning and Transfer Learning	
The platform for Federated Learning, Continual Learning and Transfer Learning developed within the ALCHIMIA project will allow developing and deploying trustworthy Machine Learning models without having to centralise in a single location datasets produced by different sources or actors, enforcing the preservation and protection of confidential or sensitive data. Currently, Atos plans to exploit this platform in several ways: • Using the platform to increase the capabilities of the different products that are part of the company AI software portfolio, e.g., Atos Computer Vision Platform, Outcome-driven AI platform' (ODAP), Quality Inspector. Thus, these AI-based products will be able to continuously improve the accuracy of their ML models, resulting in better services for the company customers. This will be of paramount importance in verticals exploiting data that must be protected according to regulations like GDPR. • Integrating the platform with ThinkAI Fast Machine Learning Engine (FMLE), a toolkit to reduce the complexity to train ML models in High Performance Computing Infrastructures (HPC). While the usage of FL paradigm may not be relevant for this product, the roadmap of this product envisions hybrid HPC clusters in which a subset of the nodes is managed by Kubernetes and support the deployment of MLOps components to provide features to manage the complete life cycle of ML Models and including Continual Learning and Transfer Learning. • As a complementary software solution to be executed with Atos edge computing servers.	
Partner(s) with background for this result	ATOS
Partner(s) with foreground for this result	ATOS
Partner(s) interested in exploitation	ATOS
Nature of exploitation	Service (consulting) Software as a service Licencing
Form of exploitation	Internally
Target group	ATOS data scientists developing AI software, AI companies that acquire ATOS computing solutions (e.g., edge servers, HPC infrastructure) including AI platforms
Competitors	NVIDIA (FLARE, CLARA), IBM Federated Learning, Sherpa.ai

	Strengths	Weaknesses
Internal	• Modular and flexible solution designed to easily address multiple scenarios and to integrate different privacy-preserving algorithms. • Solution designed according to the requirements of two relevant Industry4.0 use-cases and validated in real-world facilities. • Decentralised and distributed nature leads to privacy and security benefits • Collaboration among multiple organisations can lead to higher quality models • Large amounts of data can be processed, leading to improved accuracy • No data sharing or central repository required	• Need for high computational resources and infrastructure, • Network latency and communication overhead • Model convergence can be challenging • Trust and regulatory issues when dealing with sensitive data
	Opportunities	**Threats**
External	• Support new use-cases that require confidential or sensitive data • Leverage the positioning of ATOS in the AI hardware edge market • Emerging market for Industry 4.0 solutions • Emerging market for AI at the edge solutions • High costs of energy impose the need to optimise production processes of intensive industries • Presence of two potential customers in the consortium, i.e., Celsa and FDT	• Existence of open-source solutions as part well-known frameworks, e.g., Tensorflow Federated, FATE, OpenFL • Lack of connectivity in some use-cases, e.g., security & surveillance • Cybersecurity vulnerabilities due to the possible impersonation of the central server or the introduction of malware clients • Certain level of uncertainty with respect to the impact of the emerging European AI Act • Competition from centralised AI solutions • Limited standardisation and interoperability among platforms

BFI: Technical coordination of the project. Main contributions in WP3 where first principal models will be supported by the FL framework and WP4 leading the development of the models.

BFI – Dynamic EAF process model	
The dynamic EAF process model of BFI is an innovative physics-based model that has been developed in European research projects and was deployed in multiple EAF steelmaking plants as a monitoring and decision support tool. ALCHIMIA will extend the model's robustness and long-term reliability through Continual Learning and facilitate its deployment through Transfer Learning and standardised interfaces in future.	
Partner(s) with background for this result	BFI
Partner(s) with foreground for this result	BFI
Partner(s) interested in exploitation	CELSA
Nature of exploitation	Service (consulting), Advertising supported software
Form of exploitation	Internally, Research program
Target group	Steel industry
Competitors	Universities, ROs, Consultancies

	Strengths	**Weaknesses**
Internal	• Innovative physics-based model • Developed in European research projects • Deployed in multiple EAF steelmaking plants • Can be used as a monitoring and decision support tool • Continual Learning will improve robustness and long-term reliability	• Needs the supply of several cyclic and acyclic process data in real-time and time resolution • May not be suitable for all types of electric steelmaking plants • May require specialised training to be used effectively • May not be able to adapt to new technologies or processes without significant modification

	Opportunities	Threats
External	• Can be extended and adapted for use in other industries • Can be deployed through Transfer Learning and standardised interfaces for increased ease of use • Continual Learning can improve the model's performance over time	• Competition from other suppliers of dynamic process models • Resistance to application from steelmaking plant operators • Dependence on funding for research and development regarding significant modifications

BFI – Scrap mix characterisation and optimisation	
The BFI scrap mix characterisation and optimisation is a statistical tool that derives important scrap properties based on historical production data. This information is then used to propose optimised scrap mixes regarding target steel quality parameters considering boundary conditions and scrap availability. In ALCHIMIA the characterisation part of this tool will be improved by incorporating AI methods to find hidden relationships between input and output information that are not captured by conventional methods.	
Partner(s) with background for this result	BFI
Partner(s) with foreground for this result	BFI
Partner(s) interested in exploitation	CELSA
Nature of exploitation	Service (consulting), Advertising supported software
Form of exploitation	Internally, Research program
Target group	Steel industry, process industry
Competitors	Universities, ROs, Consultancies

	Strengths	Weaknesses
Internal	• Utilises historical production data to derive important scrap properties • Proposes optimised scrap mixes based on target steel quality parameters and scrap availability • Incorporates AI methods to find hidden relationships between input and output information	• Reliance on historical production data may not account for changes in scrap availability or market conditions • Incorporation of AI methods may increase complexity and require additional resources
	Opportunities	**Threats**
External	• Can be applied to other process industries using secondary raw materials • Can improve the efficiency and effectiveness of scrap mix selection • Can help to identify new sources of scrap or alternative materials	• Competition from suppliers of other scrap mix characterisation and optimisation tools • Potential for inaccuracies in the analysis if data is not properly collected or maintained

CAR: Cardiff University is the leader of WP2 that will guide ALCHIMIA design according to a human-centric vision. Execution of ex- antes and ex-post evaluations to assess human and social impacts. Definition of ALCHIMIA training programme for upskilling operators.

CAR – Industry 5.0 Tool Kit for human-centric technology development and insertion	
Cardiff University's exploitation plan is focused on an Industry 5.0-based toolkit, including skills development strategy, and training and education action plan. Specifically, the development of training recommendations and products for transitioning to the routine use of the new technologies within the use case sites and for roll-out across the metals sector, including insights and foresight recommendations for human-centric technology development and insertion, for the optimal (and trustworthy) insertion of the new technology within the case scenario context, particularly focused on digital skills. The training programme will help to facilitate worker acceptance and optimal use of federated-learning based AI and big-data based technologies within the case scenario context. A theoretical model of green technological effects and acceptance will be produced. This will inform the final recommendations for the design and implementation of the technology and training products, based on good practice templates.	
Partner(s) with background for this result	CAR, SSSA

Partner(s) with foreground for this result	CAR, SSSA
Partner(s) interested in exploitation	CELSA, FdT
Nature of exploitation	Service (training)
Form of exploitation	Internally, externally
Target group	Steel industry, foundries, ROs
Competitors	Universities, ROs, consultancy companies

	Strengths	**Weaknesses**
Internal	• Social sciences expertise which is key for a human-centric design and for defining training programmes for workers • Expertise in skills needs analysis and training development (e.g., GT-VET, ESSA), particularly within the steel sector • Training recommendations based on good practices and existing courses • ALCHIMIA will exploit analyses and training tools developed within ESSA for developing targeted training and upskilling measures for the considered use cases and to favour a wide deployment of the developed system through the EU steel sector	• High complexity of the systems to be implemented • Necessity of standardisation across the 3 CELSA sites • The human-centric design depends on partners to provide sufficient information on the use-cases • The human-centric design depends on availability and quality of survey and interview data from workers at the 4 sites
	Opportunities	**Threats**
External	• We can utilise the networks and expertise built through ESSA to inform the 'training course design' and to reach potential audiences • The project intends to produce an Industry 5.0-based toolkit for addressing social aspects in dealing with technological innovation. This includes: recommendations for human-centric technology development and insertion; identifying training	• Lack of worker engagement with company strategy • Lack of trust in the end-users (workers) • Different points of view from each of the 3 CELSA plants and FdT • Failure by use case companies to adhere to principles of human-centric approach to technology design and implementation

	opportunities; and, developing a potential training programme to meet emerging skill needs in the workplace • These products are scalable and transferrable to other contexts • Networks to exploit the training module include steelHub	

CELSA Group: Three pilots will be executed in the steelmaking in three melt shops at Celsa Group (Spain, France, Poland) and production of automotive parts in three factories Fonderia di Torbole. They will consist of a set of iterative deployments starting from specific exercises to result in a final complex demonstrator.

CELSA – Easily replicable and optimised steelmaking process	
The ALCHIMIA solution will allow CELSA to obtain an optimised steelmaking process that will be easily replicable in other melt shops. The project will demonstrate the solution in 3 industrial plants of CELSA Group. In total, CELSA Group owns 7 steelworks in Europe and will there replicate the project results in its other plants. The optimised steelmaking process will be used to produce high-quality steel products that CELSA will Associated with document Ref. Ares (2022)4323368 - 11/06/2022 [101070046] [ALCHIMIA] – Part B – [27] commercialise. As CELSA is a truly diversified multinational, including different production processes (such as scrap processing or final steel bars transformation plants), they will also ALCHIMIA to optimise them.	
Partner(s) with background for this result	BFI, SSSA, ATOS
Partner(s) with foreground for this result	BFI, SSSA, ATOS
Partner(s) interested in exploitation	CELSA
Nature of exploitation	Sofware as a service, Service (training)
Form of exploitation	Internally
Target group	Steel industry (melt shop/steel mill)
Competitors	Other steel industries.

	Strengths	Weaknesses
Internal	• Outstanding opportunity to share knowledge with data privacy. • Optimisation of our industrial processes; reduction of CO2 footprint and increment of circularity ratio.	• High complexity of the systems to be implemented. • Necessity of standardisation.
	Opportunities	**Threats**
External	• Increased opportunities to improve our global performance as CELSA Group, integrating all the plants.	• Different points of view for each CELSA plant. Hard to manage 3 plants at the same time.

EXUS: Lead for T4.1 Data collection, fusion and curation. Strong contribution to models' development in order to apply explainable and trustworthy AI techniques. Important role in WP3.

EXUS – EAF EXAITE	
EXUS will exploit the results of the project by means of enhancing its portfolio of data analytics and AI solutions, by adding tools and methodologies for FL, Transfer and Continual Learning. Additionally, the developed framework for data management can be offered as an off-the-self solution for Data Operations, targeting the edge-computing niche customer segment for IoT devices. Its leading activities in AI and Data analytics activities are also part of the implementation roadmap of EXUS Analytics Framework (EAF) and the EXUS AI Technologies (EXAITE) Suite, which is a major mid-term commercial milestone that will ensure its greater scaling-up and financial viability. EXUS foresees to commercialise mature technologies via its sales network in 35 countries worldwide, following the ALCHIMIA participatory approach with end-user codesigning and acceptance. Finally, the results of ALCHIMIA will be combined with other EXUS ICT projects enabling the company to establish a strong presence in the niche field of AI.	
Partner(s) with background for this result	EXUS
Partner(s) interested in exploitation	EXUS
Partner(s) with foreground for this result	EXUS

Nature of exploitation	Service (training)
Form of exploitation	Internally
Target group	Creditors in the financial sector who would benefit from EXUS' improved ability in the field of AI
Competitors	Other debt collection software companies

	Strengths	**Weaknesses**
Internal	• Active participant in many other EU projects and experience in EU projects generally. • General experience in the field of data analysis and machine learning • Willingness and ability to experiment with new tools and approaches	• Change in domain from finance to steel industry will require some initial learning • Little existing knowledge specifically in Federated Learning, which will be gained during the project
	Opportunities	**Threats**
External	• Opportunity to gain experience working with Federated Learning and Continual Learning, which will certainly be valuable in both internal projects and future EU projects • Opportunity to get more experience in optimisation-type machine learning problems, such as recommending the optimal scrap steel recipe in the CELSA use case	• Implementation of solutions remotely can be difficult • Managing a project with two use cases an many moving parts will be complex and must be managed accordingly

FDT: FDT provides a real-world industrial use case for manufacturing automotive parts.

FDT – Optimised and Green automotive parts production in foundries	
The ALCHIMIA solution will allow FDT to preserve the qualitative standards of its own production while minimising environmental impacts and costs by reducing inefficiencies and wastes of energy and material. Moreover, it will allow full exploitation of the information conveyed by the data stored in the company's databases to improve process control and optimisation and increase knowledge. The project will demonstrate the solution in one foundry, but the group owns two further foundries in Italy, which produce different products. Therefore, an investigation will be pursued to apply FL and CL for replicating the modelling and optimisation framework in the other two foundries.	
Partner(s) with background for this result	SSSA, BFI, ATOS
Partner(s) with foreground for this result	SSSA, BFI, ATOS
Partner(s) interested in exploitation	FDT
Nature of exploitation	Process improvement
Form of exploitation	Internally
Target group	Cast iron foundry
Competitors	Other foundry

	Strengths	**Weaknesses**
Internal	• Optimisation of the industrial smelting process, reduction of waste, reduction of emissions and energy saving	• High complexity (so much process data to be correlated)

	Opportunities	Threats
External	• Introduce the knowledge and working methods of artificial intelligence into the group of FDT foundries	• Resistance to application IA from plant operators

SSSA: Responsible for data, ethics and compliance. Leader of WP for modelling and optimisation, driving the LCA framework.

SSSA – Models' portfolio and optimisation framework	
SSSA assets include a wide set of models for process simulation for the iron- and steel-making chain. Such models exploit and combine different technologies: standard mathematical approaches, ML methods, flowsheeting tools. In ALCHIMIA, SSSA modelling portfolio will be extended with new computationally efficient models for the simulation of the handled processes and will include new characteristics to exploit the capabilities of the FL framework of the project. Moreover, SSSA manages several platforms for process and production optimisation that can interface with process models of different types. Within these frameworks, a number of optimisation algorithms are adopted that include standard mathematical techniques (i.e., MILP) and AI-based ones (i.e., GA, PSO) including multi-objective (MOO) approaches. In ALCHIMIA these technologies will be adapted to cope with the new FL capabilities and will hierarchically integrate both single processes and a global LCA model within a MOO problem. The knowledge acquired thanks to ALCHIMIA project will be exploited in future projects and in dissemination activities.	
Partner(s) with background for this result	SSSA
Partner(s) with foreground for this result	SSSA, CELSA, FdT
Partner(s) interested in exploitation	SSSA, CELSA, FdT
Nature of exploitation	Academia Service
Form of exploitation	Internal, Research program
Target group	Steel companies, foundries, process industries, ROs

Competitors	Other Universities, ROs, consultancy companies

	Strengths	**Weaknesses**
Internal	• Flexibility • Modularity • Easy customisation to specific demands of companies • AI models are capable to find hidden and highly non-linear relationships between input and output variables • Approaches and models already validated in the steel field. • Evolutionary approaches fit well multi-objective optimisation problems with complex non-linear constraints, which are frequently found in industry • Integration of LCA-based indexes in process optimisation	• The results depend on data availability and quality • Flowsheet models require specialised competencies for the design and a licensed software to be purchased by companies if they want to run and develop them autonomously • Significant process modifications require consistent adaptations to be performed by developers or proficient users • Some approaches may require considerable computational resources for model training and optimisation tasks
	Opportunities	**Threats**
External	• Partial transferability to similar facilities and other industrial sectors • Continual learning will improve robustness, accuracy and reliability in the long term • AI and Federated learning help preserving company's know-how conveyed by data • Cost-effective way to decrease energy and environmental impacts and production costs • Supply chain collaboration related to the implementation of an LCA study	• Lack of trust in the end-users (workers) • Requires some specialised training and upskilling programs to be exploited in its full potential • Competition from other suppliers of models and optimisation tools • Flowsheet models depend on the stability and reliability of the software used for their development • Difficulties in the integration of LCA output in process optimisation

MI: Mandat International is the leader of WP6 Exploitation, dissemination and environmental impact with a remarkable contribution with respect to the environmental impact assessment.

MI – IAM4SDG Methodology	
MI will further optimise and promote its IAM4SDGs Methodology for identifying both the potential negative and positive impacts of a project on the SDGs and translating the results into a practical action plan to better align their activities with the SDGs and the EU Green Deal. It will leverage the feedback and knowledge acquired in ALCHIMIA to enhance the tool, propose new features and digital functionalities, and continue its promotion to the research community, as well as the private and public sector. MI will seek to raise awareness and find collaboration paths with the international community, through cooperation with the ITU, WMO and UNECE to promote its use and adoption by relevant parties.	
Partner(s) with background for this result	MI
Partner(s) with foreground for this result	MI
Partner(s) interested in exploitation	MI
Nature of exploitation	Service (consulting), certification
Form of exploitation	Internally, externally
Target group	Research sector, project managers, policy makers, private sector, project evaluators, international organisations
Competitors	A couple SDG impact assessment tools (SDSN, SDG Impact Tool)

	Strengths	**Weaknesses**
Internal	• Focuses both on the risks and opportunities a project or initiative on sustainable development goals (SDGs). • Provides a comprehensive view of the potential for the project to contribute to the achievement of the SDGs. • Can help to identify the areas where the project has the greatest potential for impact.	• May not consider other factors that could affect the project's ability to deliver positive impact, such as political, economic, or social factors. • May not consider the potential trade-offs between different SDGs, and the impact that pursuing one goal may have on the achievement of others. • May require significant resources and expertise to implement effectively.

	• Can help to build support for the project by demonstrating its positive impact on sustainable development. • Can help to prioritise and allocate resources effectively by focusing on the areas where the project has the greatest potential for impact.	
	Opportunities	**Threats**
External	• Provides a framework for making informed decisions about the allocation of resources. • Can help to increase the visibility of the project and its positive impact on sustainable development. • Can help to secure additional funding or support for the project by demonstrating its positive impact on the SDGs. • Can help to foster collaboration and partnerships by identifying areas where different organisations can work together to achieve shared goals.	• May not be widely accepted or understood by stakeholders. • May not be seen as relevant or necessary by some organisations. • May be subject to political or economic pressures that could undermine its implementation or effectiveness.

6 Conclusion

Deliverable 6.1 presented the first ALCHIMIA Plan for impact creation, standardisation and exploitation. It serves as a reference document for all outreach, standardisation and exploitation activities that will boost the promotion of the project's activities, findings, standardisation items, and key results that can be exploited.

In the 'Preliminary Project Promotion phase' M1-M12, the strategy for dissemination, communication and exploration was established; throughout this phase, the dissemination and stakeholder outreach methods will also be prioritised. In Phase 2, M13-24, the public and target stakeholders will be involved in developing interest and demand for the project's outcomes. These outcomes include; expanding targeted awareness related to ALCHIMIA, sharing preliminary results, and notifying critical markets of the benefits created by ALCHIMIA. Finally, in the third phase, which will focus on business strategy, awareness of the exploits for business within the project will be expanded. These outcomes will include maximising awareness of the ALCHIMIA ecosystem and contributing towards project sustainability; this phase will take place in M25-36.

Communication efforts and dissemination activities are crucial throughout the project's lifespan and integrated into all work packages. The impact creation plan serves as a roadmap for the consortium members to effectively communicate and promote the project's outcomes by identifying the target audiences, communication channels, tools, activities, and key performance indicators. As a result, the plan succinctly explains the motivations behind the strategy and outlines the actions, tools, and assigned roles to communicate and disseminate ALCHIMIA effectively. This deliverable serves as a guide for consortium members to carry out their outreach activities.

Deliverable 6.1 also marked a significant milestone for the ALCHIMIA project as it introduced the standardisation plan for the project. The standardisation plan plays a crucial role in ensuring that the project's activities are carried out in a cohesive and harmonious manner, thereby achieving its objectives effectively. The standardisation activities will be guided by the key performance indicators for standardisation defined in the proposal. A standardisation survey has been conducted and will be used to finalise the standardisation plan according to the priority of the consortium members identifying potential partners and tasks in the projects that can support the standardisation activities for the relevant research topics. After definition and prioritisation of the standardisation landscape, contact to relevant TCs will be established and contributions to standardisation via different channels will be pursued.

Further, the deliverable also helps the project achieve effective visibility along with a viable exploitation strategy. This provides a series of major benefits for all ALCHIMIA partners, and was done through the initial identification of critical results that can be exploited along with the identification of individual exploitation expectations. Deliverable 6.1 is just the beginning of the efforts carried out in the early stages of the project and will continue until the end, supporting consortium partners in adopting profitable business models, defining their market position, and enhancing their business offerings. Focusing on the exploitation plan, this document has sought to outline the main elements of the overall strategy for the ALCHIMIA project. These elements include a desire to best identify the project's exploitable assets and potential targets via market research, develop a sustainability plan, create a detailed exploitation plan, and demonstrate the commercial growth potential.

This prior-outlined statement of originality covers the contents of this document; it is also currently a live document and subject to change.

7 References

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A.1 Standardisation Survey

Alchimia Standardisation Survey (T6.2.)

Survey on standardization potential to be returned by ALL partners before February 17th 2023

The Alchimia Standardization Survey is a way for the project partners to provide input on their plans for standardization and exploitation of the results from the Alchimia project. The survey is divided into two parts, Part A and Part B.

In Part A, partners are asked to specify which exploitable results they are planning to get from the project, and their perspective on the value proposition of the project. There are several categories to choose from: Open-source technology enablers, Proprietary technology enablers, Products, Online services, Consulting service and/or technology transfer, and Other. Partners are asked to select all applicable categories and provide a clear description.

In Part B, partners are asked a series of questions related to standardization activities. Specifically, they are asked to indicate any standardization activities they are currently involved in, what standardization process the project should focus on, what key elements should be pushed to standardization, what target SDOs the project should focus on, whether or not they are members of an SDO, if they are aware of any standards that they would need for their work, if they are interested in making a joint contribution to standardization with another Alchimia partner, and if they are not a member of an SDO, if they would be interested in collaborating with a partner who already has a membership and making a joint contribution.

Partners are also asked to fill in a table with relevant standardization information about their organization, including a name of the lead, email, and information about SDOs and existing work items. Additionally, there is a section for any other remarks partners may have.

It is important that the survey is returned to the email address provided (andreas.wolff@bfi.de) before February 17th 2023. The results of this survey will be used to analyse and report on the standardization strategy.

Partner name:

Person of contact name:

Person of contact email:

Person of contact phone number:

Part A – Partner perspective

1. Please specify which exploitable results your organization is planning to get from ALCHIMIA? (Please fill in multiple categories if applicable and provide a clear description)

Open-source technology enablers:
Proprietary technology enablers:
Products:
Online services:
Consulting service and/or technology transfer:
Other (please specify):

2. What is, according to you, the value proposition of what we are developing in Alchimia?

Part B - Partner's Standardization Activities

1. **Would you please indicate any standardization activities that your organization is involved in? (organization and working group/study group):**

Organization	Working Group / Study Group	Topic	Relevance to ALCHIMIA (High – Low)	Status

2. **What standardization process should the project focus on?**

3. **What key elements (standardizable assets, research outputs, knowledge) should the project push to standardization?**

4. **What target Standards Developing Organizations (SDOs) should Alchimia focus on? (Please be as detailed as possible: name of organization and, if possible, working group, question/subcommittee. This will help us build the standardization plan)**

5. **Are you a member of a Standards Developing Organization? Please specify.**

6. **Are you aware of any standards that you would need for your work?**

7. **Are you interested in making a joint contribution to standardization with another ALCHIMIA partner?**

8. **If you are not a member of a Standards Developing Organization, would you be interested in collaborating with a partner who already has a membership and making a joint contribution?**

9. **Please fill in the following table with the relevant standardization information about your organization. Please identify a focal point in your organization that we can contact to follow up with an update on the standardization activities.**

Partner	Name of lead(s)	E-mail(s)	Ready to lead new (yes/no)	Ready to collaborate (yes/no)	SDO(s)	Existing work items

10. **Other remarks**

Thank you for your answers!