BUTTERFLIES Project

Bio-Polymers & Additive Manufacturing

D8.2 - Plan for Dissemination and Exploitation

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General Information

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Executive Summary

The BUTTERFLIES project (Advanced hyBridised manufactUring Technique for nexT genERation oF bio-intelLIgent componEntS) is a Horizon Europe project developing bio-intelligent manufacturing technologies using chitin and chitosan for sustainable 3D printing applications. This plan outlines strategic approaches to maximise the project's impact through targeted dissemination and exploitation activities. Communication and Dissemination are a core part of the BUTTERFLIES project to ensure that activities, resources, and results reach the relevant stakeholders in a clear, consistent, and effective manner.

The present deliverable report, D8.2, comprises the initial strategy and plan by thoroughly covering the planned aspects of communication, dissemination and exploitation, elucidating the involved target groups and stakeholders. Additionally, it provides detailed descriptions of the communication measures for each anticipated activity, including the tools to be employed and indicative locations and schedules for their organisation. It also highlights the potential connections to other ongoing EC-funded projects and provides a timeline proposal for their establishment.

This document will serve as a reference for project partners when conducting BUTTERFLIES communication and dissemination activities.

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Definitions, Acronyms and Abbreviations

AM	Additive Manufacturing
BJT	Binder jetting
DBP	Digital Biosphere Platform
FTO	Freedom To Operate
GPR	Gaussian Process Regressors
IP	Intellectual Property
ISubC	Innovation Sub-Committee
HRP	Horizon Results Platform
KER	Key Exploitable Results
KOL	Key Opinion Leaders
SHs	Stakeholders
SOP	Standard Operating Procedures
SoTA	State of The Art
TFA	Tech-future analysis
TRL	Technology Readiness Level
WP8	Work Package 8
2PP	Two-photon Polymerisation

Introduction

Project Information

The BUTTERFLIES project aims to accelerate Europe's transition towards sustainability and technological progress by pioneering Bio-intelligent Manufacturing, where biological systems are harnessed to develop innovative production technologies. At its core, the project addresses the barriers hindering the large-scale adoption of bio-polymers in advanced additive manufacturing (AM), focusing on chitin and chitosan, two of the most abundant natural biopolymers. By adapting these biomaterials to binder jetting (BJT) and two-photon polymerisation (2PP) processes, the project will enable environmentally friendly production routes that can replace petroleum-based plastics and synthetic binders with low-temperature, bio-based alternatives.

To achieve these goals, BUTTERFLIES will develop novel biomaterial binders, optimise process design for biopolymer-based 3D printing, and explore scalability through advanced techniques such as laser beam shaping and multi-beam processing. These developments will allow the manufacture of complex, bio-inspired structures with embedded intelligence, mimicking natural systems while maintaining industrial applicability. The outcomes are expected to improve additive manufacturing by enabling bio-intelligent components for biomedical applications, such as orthotic devices and organoid scaffolds, with wider potential across industry and healthcare.

By integrating environmental sustainability, technological innovation, and industrial applicability, BUTTERFLIES contributes to Europe's twin transition towards green and digital manufacturing. Beyond technical advances, the project includes life cycle and cost assessments, social responsibility, and gender considerations to ensure inclusive, ethical, and sustainable impact. Ultimately, the project will not only advance scientific and industrial frontiers but also create pathways for standardisation, skills development, and widespread adoption of bio-intelligent manufacturing technologies

The partners in *Table 1* are part of the BUTTERFLIES consortium:

Table 1: The BUTTERFLIES consortium.

Number[1]	Name	Country	Short name
1(CO)	The Manufacturing Technology Centre Limited	United Kingdom	MTC

[1] CO: Coordinator. AP: Associated Partner.

Number[1]	Name	Country	Short name
2	Fraunhofer Gesellschaft Zur Forderung Der Angewandten Forschung EV	Germany	Fraunhofer
3	Vital3d Technologies, UAB	Lithuania	V3D
5	3 Drivers - Engenharia, Inovacao e Ambiente SA	Portugal	3DR
6	Fundacion Tecnalia Research & Innovation	Spain	TEC
7	Asa Spezialenzyme GmbH	Germany	ASA
8	Valuedata GmbH	Germany	VALUE
9	Iconiq Innovation Ltd	United Kingdom	IIL
10	CONCR3DE B.V.	Netherlands	C3D
11	European Federation for Welding Joining and Cutting	Belgium	EWF
12	Optimus 3d Sl	Spain	OPTI
13 (AP)	Eidgenossische Materialprufungsund Forschungsanstalt	Switzerland	EMPA
14	Experimentica	Lithuania	EXP

Document Scope

This document provides a reference framework for project partners for both the exploitation plan and to guide the communication and dissemination activities of the BUTTERFLIES project. The project started on May 1st, 2025, and will run for a duration of 36 months. Work Package 8 (WP8), dedicated to exploitation, dissemination, and training, is structured into two reporting periods and will remain active throughout the project's lifecycle, transitioning into Work Package 9 (WP9) during the second reporting period. WP8 encompasses several specific tasks, which are outlined in the following scheme:

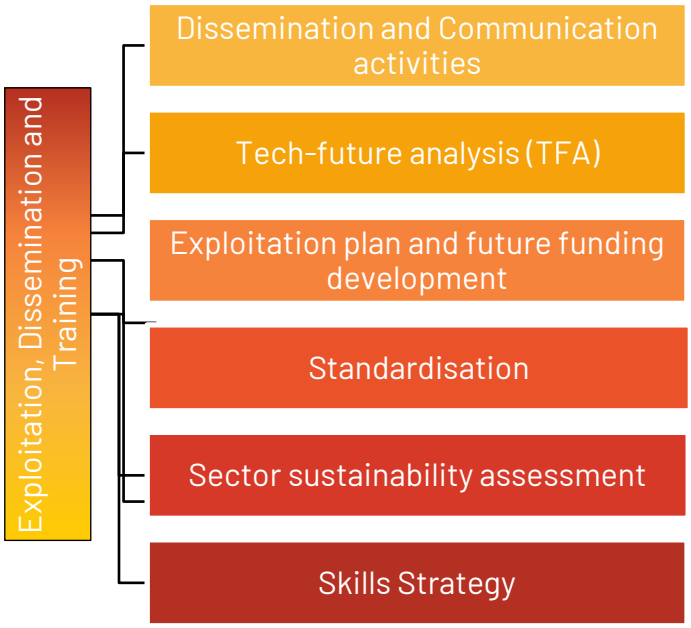

Figure 1: Scheme with the overview of WP8: Exploitation, Dissemination and Training.

Ensuring the sustainability of project results over time is heavily reliant on these activity groups. They are viewed as essential pillars for the project's success and play a pivotal role in securing the long-term viability of its outcomes.

Document Structure

This document comprises the following chapters:

Chapter 1 introduces the project and provides an overview of the document.

Chapter 2 presents the "Strategy for Communication and Dissemination." It sets out a comprehensive plan for engaging with diverse stakeholders. This includes their identification, the selection of communication tools and channels, as well as measures and procedures to ensure effective communication and dissemination. Standard operating procedures for notifications and internal processes are also detailed in this chapter.

Chapter 3 presents the "Exploitation Strategy and Plan". This defines the exploitable assets, highlights other potential barriers, and details the roadmap, plan and process that will be followed to ensure future use of the project results.

Chapter 4 provides the conclusions.

Chapter 5 contains the bibliography.

Appendix A.1 presents the newsletter schedule, **Appendix A.2** concerns the press release schedule.

Strategy for Communication and Dissemination

Communication and dissemination are related concepts, but they have distinct purposes and characteristics, particularly in the context of projects or research initiatives.

Communication is a dynamic and ongoing process, facilitating the exchange of information, ideas, or messages. It serves the broader purpose of promoting understanding, collaboration, and engagement among project team members and relevant stakeholders (SHs). The audience for communication is diverse, including project team members, citizens, the public, and the media. This multifaceted interaction can take various forms, encompassing both one-way communications, such as updates and announcements, and two-way exchanges like discussions and feedback sessions. Communication is a continuous effort, spanning the entire duration of the project, fostering transparency, and contributing to a collaborative environment.

Dissemination, in contrast, is a more focused and strategic aspect of information sharing for a project. The primary purpose of dissemination is to distribute and make accessible the project's results, findings, or outputs, maximising its impact. The audience for dissemination is typically targeted and includes specific groups such as the research community, policymakers, industry stakeholders, or civil society. Unlike communication, dissemination primarily involves one-way exchanges where information is pushed out to the audience through various channels. These channels may include project websites, social media, press releases, scientific magazines, and databases, among others. Dissemination is not limited to a specific project phase; it occurs strategically throughout the project's lifecycle and may extend beyond its completion, ensuring that project results reach and impact the intended audience effectively [1].

In this scope, this document aims to outline the strategy employed in the BUTTERFLIES project for communication and dissemination during its course. The following aspects will be covered to achieve this goal:

- Formulate a plan for communicating and disseminating project results.
- Devise effective communication strategies among beneficiaries to maximise indirect project benefits.
- Facilitate efficient knowledge transfer within the consortium and to external third parties.
- Guarantee the spread of knowledge beyond the project through conferences and publications, amongst others.

- Explore potential events for disseminating project results.

Both communication and dissemination strategies were established from the project's beginning, specifically during the kick-off meeting. In their role as the work package leader, EWF emphasised the significance of these strategies to the entire consortium. The message emphasised that communication entails more than reporting, being a collective effort that should involve all consortium members. EWF highlighted that each partner has the potential to reach a distinct audience, underscoring the importance of a comprehensive and inclusive approach to communication within the project.

Stakeholders and Target Groups

Developing and deploying communication tools tailored to the identified audiences and target groups from a stakeholder analysis is a crucial step in enhancing the project's visibility. The primary objective of these communication activities is to inform and persuade stakeholders, establishing BUTTERFLIES as a reputable and reliable source of sustainable bio-intelligent manufacturing.

Stakeholders are people, entities or groups who are directly or indirectly impacted by an organisation, project, or similar, and thus have an interest in it. They can be both internal and external to the organisation or project and may include individuals, groups, or organisations affected by or affecting the project. At this early stage of the project, the stakeholders are defined as all the participants in the bio-intelligent manufacturing supply chains, e.g., technicians, engineers, managers, end-users, industrial professionals, workers, and other job profiles, but also policymakers involved in relevant legislation. In general, for BUTTERFLIES, we can find the following stakeholders:

Primary Stakeholders:

1. Research Community: Academic institutions in biotechnology, materials science, and 3D printing, European research networks and consortia and peer-reviewed journal communities.
2. Industrial Partners: Additive manufacturing equipment manufacturers (BJT, 2PP systems); Bio-material suppliers and developers; Healthcare device manufacturers; Pharmaceutical companies (drug testing applications); End Users; Medical device companies; Research laboratories; Clinical institutions; Biotech startups. These companies, in particular SMEs and Mid-caps, first need to grasp the abilities and

advantages that remanufacturing, circular economy, and the promised taxes and laws will bring.

3. Policy and Regulatory Bodies: European regulatory agencies (EMA, national health authorities); Standards organisations (ISO, CEN, EN, ASTM communities, and others can use project results to shape strategies for bio-intelligent manufacturing, particularly with chitin- and chitosan-based biopolymers into advanced additive manufacturing processes); Environmental agencies.

Secondary Stakeholders

- General public and patient organisations.
- Investment community and venture capitalists.
- Environmental and sustainability advocates.

In fact, BUTTERFLIES will use the developed business cases to demonstrate the project's abilities in bio-intelligent manufacturing. This will be an opener to engage with further networks, standardisation entities, and demonstrate excellence for further funding opportunities, as well as further collaboration with the involved partners.

The numbering of the target groups will later assist in the connection of the dissemination and communication tools with the target group in the next section.

Dissemination and communication tools and channels

Creating and implementing communication tools with identified target groups in a stakeholder analysis is an important step toward raising the project's awareness. The main aim of communication activities is to inform and convince stakeholders to establish BUTTERFLIES as a credible and trusted source of innovation in bio-intelligent manufacturing, particularly with chitin- and chitosan-based biopolymers into advanced additive manufacturing processes

The standard dissemination and communication tools planned are presented in Table 2, including the identification of the target groups to be involved/reached for each activity.

It is important to mention that the stakeholders will, in general, be affected by the dissemination and communication tools, and as they are assessed in further detail, the tools will be tailored to them.

Table 2: Dissemination & Communication Tools: Stakeholders numbered according to the previous section.

DC Tool	Current Activity Status	Future Plans	SHs		
			1	2	3
Project website	https://butterfliesproject.eu/	Quarterly updates	x	x	x
Standard presentation material Project Flyer PPT presentation General poster Promo roll-up poster	Flyer, poster and roll-up are available on the project website. Presentation in development	Final flyer by the end of the project Final general presentation Final roll-up at the end of the project	x	x	x
Press Releases (PR)	Initial PR published The plan for publication can be found in the annex	Press releases on interim results, activities, and events (M9, M18, M27, M36) Ongoing observation of the media landscape and joint media activities	x	x	
Social media accounts LinkedIn	https://www.linkedin.com/company/butterflies-project/	All partners to include a reference to BUTTERFLIES in the corporate accounts. To be updated regularly (every month)	x	x	x
Community building and networking activities	Bilateral meetings with project coordinators.	Mutual collaboration and synergies. Joint presence at events. Collaboration in white papers.	x	x	x
Newsletters	Plan for publication can be found in the annex	Biannual (6 newsletters)	x	x	x
Standardisation Recommendation Documents	To be planned	To be managed in task 8.4		x	x
Knowledge Transfer Activities Training materials Teaching material	To be planned	To be managed in task 8.6	x	x	

DC Tool	Current Activity Status	Future Plans	SHs		
			1	2	3
Events and Live Communication	Draft plan of activities with fairs and relevant conferences to promote the project can be found in the section below	At least 2 workshops (M15 and M21). 2 joint events with other projects. BUTTERFLIES' presence in at least 6 events organised by other projects.	x	x	
Publications	To be developed	At least 8 scientific and 3 industrial publications regarding the project technologies. At least 2 results-focused online publications.			x
Final Event	-	Final event to be organised in the last month of the project	x	x	x

Branding

Establishing a robust project identity is crucial, as it ensures cohesive alignment across all developed materials. To achieve this, there was a focus on addressing three fundamental questions:

- What's the main aim of the project?
- Who are our target groups?
- What are the benefits the target groups get?

All these inquiries will find their answers in the promotional materials developed, including the flyer, poster, roll-up, and press release.

To visually capture the idea of bio-intelligent manufacturing by integrating chitin- and chitosan-based biopolymers into advanced additive manufacturing processes, given the focus and objectives outlined for the project, which encompass innovation, sustainability, technology, and social impact, the proposed logo is represented in Figure 2.

Figure 2: BUTTERFLIES primary Logotype.

This logo reflects the integration of various symbolisms in a visual representation:

Although the project name suggests a literal butterfly, the final visual identity moves away from obvious symbolism to embrace a more abstract and conceptual approach.

The logo features interlocking, flowing shapes that reflect both the precision of additive manufacturing and the natural, organic evolution of biological materials. The result is a balanced, modern visual that evokes innovation, growth, and intelligent design without relying on clichéd imagery.

Colour Palette Representation: The colour palette is composed of warm, earthy tones. These hues were carefully chosen to align with the project's emphasis on natural materials and environmental responsibility. By avoiding traditional tech colours like green and blue, the palette sets the project apart while subtly referencing the warmth and richness of organic matter. The warmth of the colours also helps convey a sense of vitality and forward momentum, in line with the project's mission of sustainable progress.

Figure 3: Colours chosen for the BUTTERFLIES branding.

The logo is also prepared to be used across a wide set of media, ranging from website icons to a large print format. It exists in multiple formats, including horizontal, vertical, and monochrome versions, to ensure consistent visibility and impact, whether used on a website, social media, print materials, or branded merchandise. Each version of the logo can be chosen depending on the format, space available, and background colour. For use in limited-colour environments or on backgrounds where the primary colour palette may clash, monochrome versions of the logo are available in both black and white. These variants retain the visual strength of the original while offering greater flexibility in application, such as embossing, laser engraving, grayscale printing, and high-contrast media, ensuring the logo remains recognisable and professional across all formats.

Next are shown the various formats of the logo:

Figure 4: BUTTERFLIES logo versions.

BUTTERFLIES Website

A specific website for BUTTERFLIES was developed and acts as a platform to communicate up-to-date information relating to the project during and after its duration. It gives an overview of the project, outlining its main objectives and tasks. It contains contact points for those who want to know more about BUTTERFLIES. The website will also allow the promotion of the partner's involvement in BUTTERFLIES. The link to the project website (https://butterfliesproject.eu/) will also be the link to all the project services/resources.

The structure of the website, as shown in the figure below, is divided into the following tabs:

1. HOME
2. ABOUT

   a. BACKGROUND
   b. IMPACT
   c. IMPLEMENTATION
   d. INNOVATION
3. NEWS
4. DOCUMENTS
   a. MEDIA KIT
   b. PROJECT RESULTS
   c. PROJECT ACTIVITIES
   d. SEMINARS
   e. CONFERENCES
5. PARTNERS
6. CONTACTS

The main page, also identified as home, contains a brief description of the project, its impact, innovation, and the latest news.

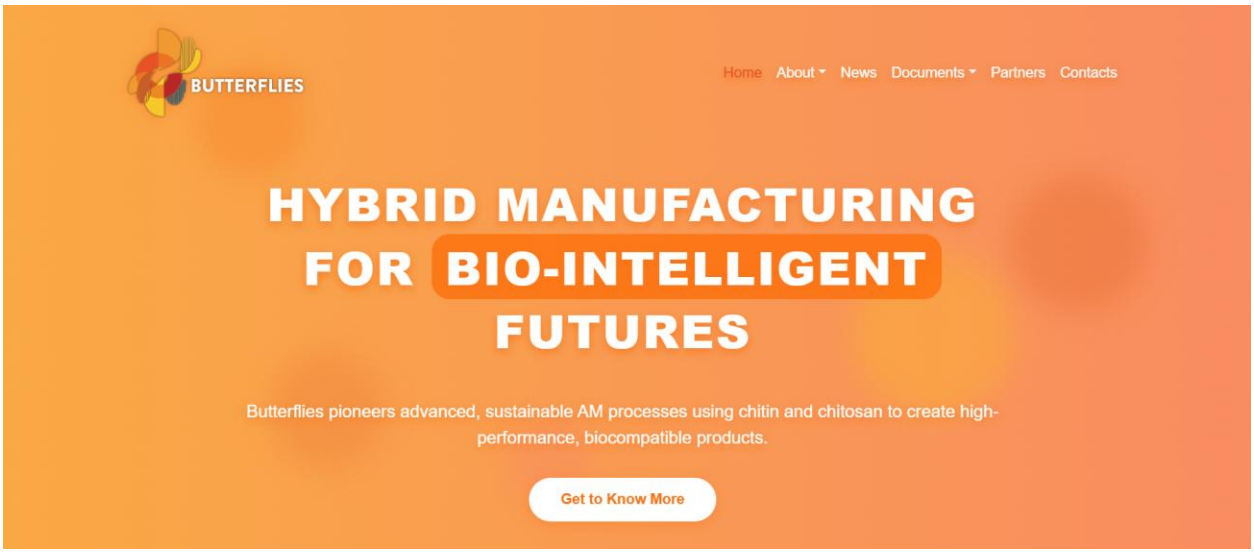

Figure 5: BUTTERFLIES Main webpage.

The website was presented to the partners in July 2025 and is continuously updated throughout the project duration, and is monitored via Google Analytics.

Promotional Materials

Trifold Brochure

The primary purpose of a trifold brochure is to show the most relevant information in a compact, easily accessible format. Due to its portability, a trifold is an effective tool for raising awareness about the project, making it ideal for distribution at conferences or other pertinent events, even on short notice. The design of the trifold should prominently reflect the project's visual identity while maintaining a clear emphasis on content quality, as its visual appeal is crucial in attracting attention and encouraging recipients to engage with the material.

Figure 6 shows the front and the back of the trifold with some of the essential information, such as the key developments, the study cases and the impact. Additionally, the funding acknowledgement with the EU flag and some more details, such as the QR Code directing to the BUTTERFLIES' website, are visible on the back side of the flyer.

Figure 6: Initial trifold developed for the BUTTERFLIES project.

Poster

Regarding the poster, its main objective lies in its ability to visually communicate key information about a project or topic in a concise and impactful manner. Posters serve as effective tools for attracting attention, conveying messages, and engaging viewers, making them valuable assets for disseminating information and enhancing understanding and awareness of the subject matter.

In this scope, the following poster was developed to advertise BUTTERFLIES:

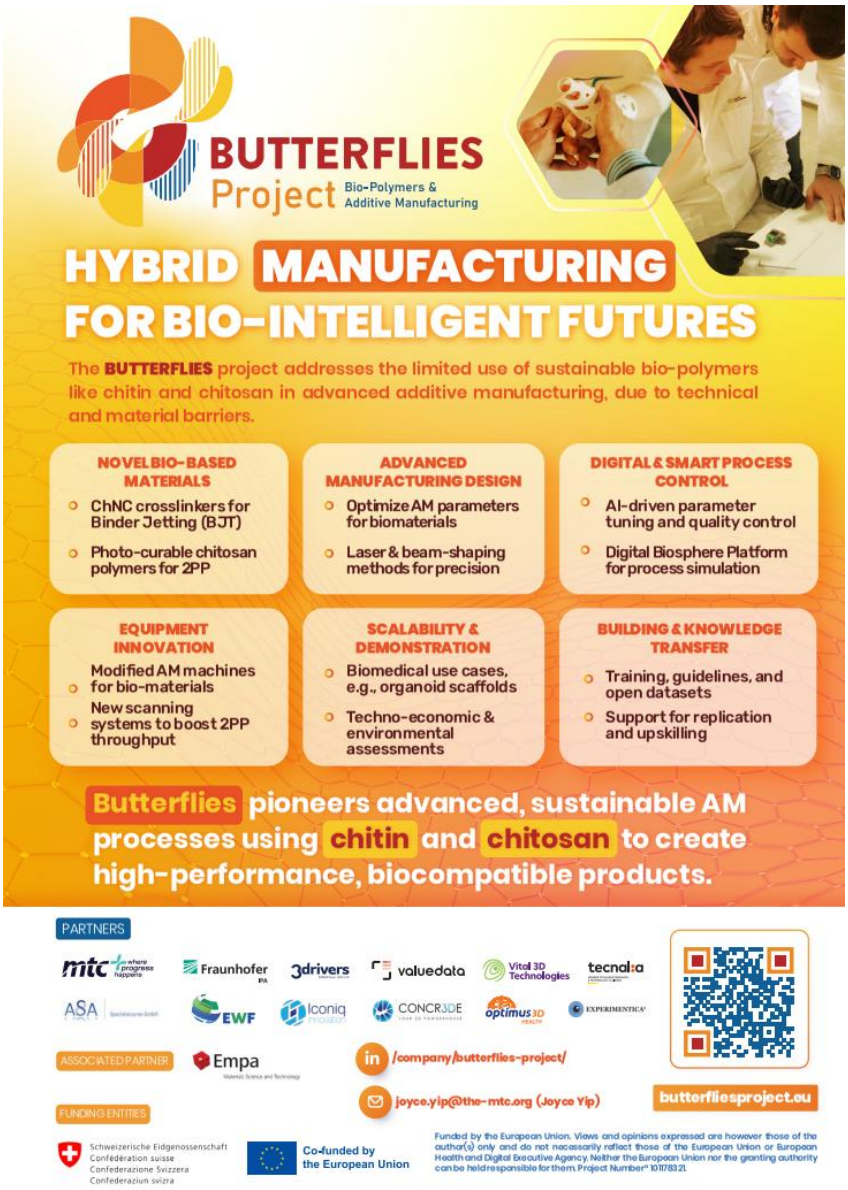

Figure 7: Initial poster developed for the BUTTERFLIES project.

Roll-Ups

Roll-ups, also known as banner or pull-up banners, are vital promotional tools frequently used at events, conferences, and trade shows. They offer a portable and highly visible platform to showcase key project information, branding, and messages. Roll-ups effectively attract the attention of attendees, drawing them to booths or presentation areas and conveying important details that create a lasting impression. Their versatility and ease of setup make them valuable assets for marketing and promoting various initiatives,

products, or services. For the BUTTERFLIES project, the developed roll-up includes information on key technological developments, case studies, and the partners involved.

Figure 8: Roll-Up developed for the BUTTERFLIES project.

Social Media

Regarding the social media for the dissemination of the project, it was discussed with partners and agreed that the most suitable is LinkedIn (Figure 9). Therefore, the LinkedIn profile for the project can be found at https://www.linkedin.com/company/butterflies-project.

The impact of the webpage and social media will be tracked every six months. Tracking visualisations allow for assessing the performance of the content. It provides insight into which pieces of content are resonating with the audience and which ones are not. This data can help to refine the content strategy to focus on creating more engaging and effective content. Additionally, the number of visualisations indicates the level of engagement the audience has with the content. Higher visualisation numbers suggest that the content is being seen by more people and is likely capturing their attention. Monitoring these metrics helps to understand the audience's interests and preferences, allowing us to tailor future content to better meet the audience's needs. Visualisations serve as benchmarks that allow tracking progress over time and set realistic goals for growth. By setting targets for increasing visualisation numbers, you can strive to continuously improve your content quality, reach, and audience engagement. Once the project develops multimedia content, a YouTube account will also be created to disseminate.

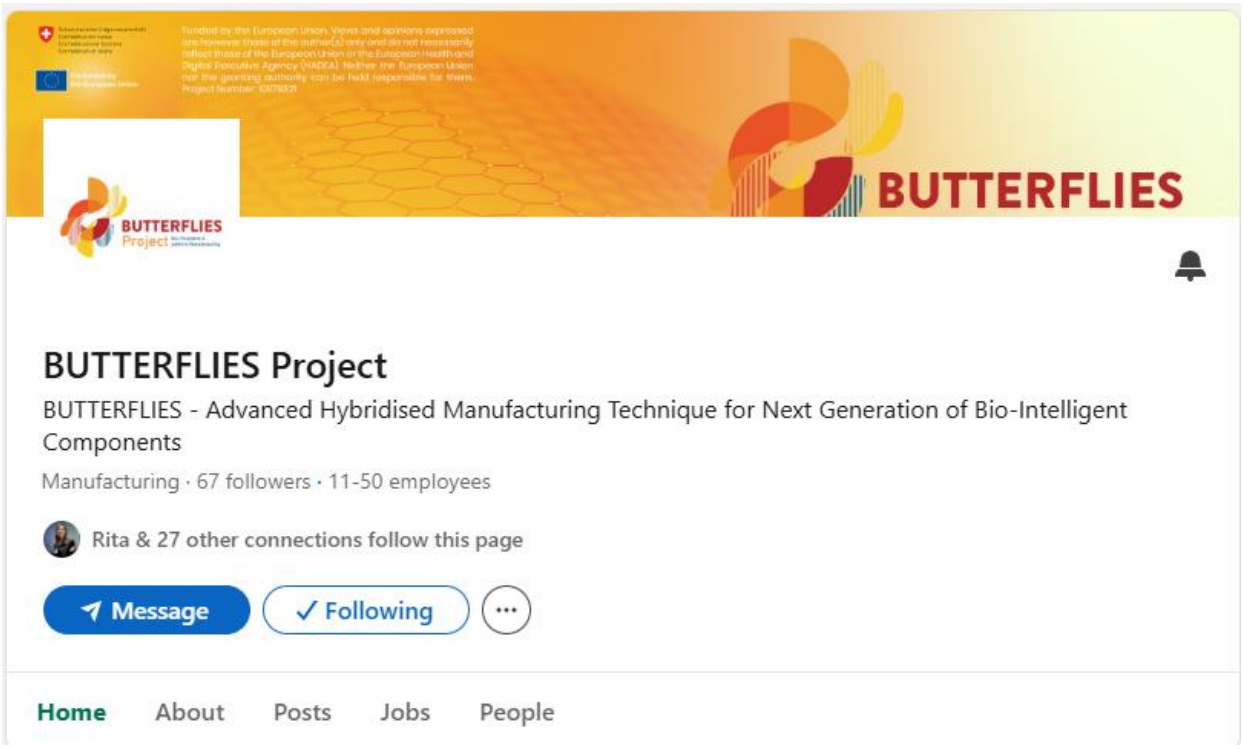

Figure 9: BUTTERFLIES LinkedIn page.

Press Release and Newsletters

The BUTTERFLIES newsletters will be published on the webpage, social media and sent biannually to all stakeholder subscribers. The newsletter will ensure both communication and dissemination at different levels - EU and international – and will keep the stakeholders up to date with the findings of the project, and inform them about other relevant events, publications, key policy developments, and key messages of the project partners. Contributions to the BUTTERFLIES newsletters will be open to all project partners according to the table in "Annex A.2 **Error! Reference source not found.**".

The press release will be published biannually and will contain all relevant updates regarding the overall project development, summarised. Their schedule is possible to see in "Annex A.1 **Error! Reference source not found.**".

Dissemination Activities

Dissemination events play a pivotal role in the development of projects by serving as vital platforms for sharing knowledge, insights, and achievements with relevant stakeholders and the broader community. These events facilitate the exchange of ideas, best practices, and lessons learned, fostering collaboration and synergy among project participants.

International Academic Conferences

Participation in academic conferences is essential to disseminate the developed work, exchange ideas with peers, receive feedback, and stay updated on the latest developments in their fields, ultimately contributing to the advancement of knowledge and fostering professional growth. In the scope of BUTTERFLIES, the following International Academic Conferences were identified for attendance:

CIRP Life Cycle Engineering Conference	LANE Conference (Laser Assisted Net shape Engineering)
International Conference on Additive Manufacturing and 3D Printing	Society for Biomaterials Annual Meeting
Biomaterials International Conference	European Polymer Congress (EPF)

The target for BUTTERFLIES is to participate in at least 8 scientific conferences during the project.

International Trade Shows

Participation in international trade shows is instrumental in expanding market reach, establishing business networks, showcasing products or services, and staying abreast of industry trends and innovations, thereby fostering global business growth and

competitiveness. The following international trade shows, along with the partners that mentioned them, were identified to disseminate the project:

Industry Week 2026	3Drivers	BIEMH Bilbao 2026	Optimus 3D
LCM conf. Palermo 2025/2027	3Drivers	TERMIS 2026	
Formnext Frankfurt 2026	Vital3D, Fraunhofer IPA, MTC	Vital3D	

The target for BUTTERFLIES is to participate in a minimum of 5 events during the project duration.

Workshops

Workshops promote the exchange of ideas, best practices, and lessons learned, resulting in improved efficiency, innovation, and overall impact in project execution. The creation of synergies with other projects is crucial for fostering collaboration, sharing expertise, and optimising resources to tackle common challenges and achieve shared objectives.

It will be necessary to organise 2 interactive workshops to facilitate the exchange of knowledge and identify possible synergies.

Projects identified for possible synergies with BUTTERFLIES are the following:

Table 3: Projects identified for possible synergies with BUTTERFLIES.

Title	Acronym	Project ID	Coordinator
Bio-intelligent products manufacturing 4 sustainable cities	BIOGEMSE	101178022	Instituto Tecnológico de Aragón
Scalable manufacturing of bio-inspired & bio-based Graphene Foam components of extreme performance	Bio.3DGREEN	101174399	Lzh Laserzentrum Hannover Ev
Bio-intelligent manufacturing of multifunctional bio-based polymer systems	BIOMAPS	101177344	Teknologian tutkimuskeskus VTT oy
Organic biological transformation of additive manufacturing processes for the sustainable	ORGANIC	101178127	AIMEN

manufacturing of bio-inspired products			
Controlled Organoids transplantation as enabler for regenerative medicine translation	ORGANTRANS	874586	CSEM

This engagement with sibling projects already started with bilateral meetings and the establishment of synergies. For example, BUTTERFLIES already plans to collaborate on an ORGANIC project white paper.

Figure 10: BUTTERFLIES & Organic Bilateral Meeting.

Publishing Results

Scientific Publications:

The publication of scientific results is crucial for advancing knowledge, fostering transparency, and facilitating peer review, thus ensuring the integrity and credibility of research findings. BUTTERFLIES intends to have scientific results published in peer-reviewed journals. The ones already identified are listed below:

- Biomaterials
- ACS Biomaterials Science & Engineering

- Additive Manufacturing
- Journal of Materials Science: Materials in Medicine
- Materials Science and Engineering: C
- Journal of Biomedical Materials Research Part B
- Biofabrication
- Applied Physics. A.

Industrial Publications:

- 3D Printing and Additive Manufacturing
- Medical Device Technology
- European Pharmaceutical Review
- Fraunhofer DDMC 2027

The target for BUTTERFLIES is to submit a minimum of 8 academic papers and 3 industrial publications over the project duration.

Community Building Strategy

This section offers a comprehensive overview of the community-building strategy, detailing its objectives and the approach to fostering an engaged, supportive community. The BUTTERFLIES project aims to actively participate in diverse events, either as a consortium or individually, with a focus on targeted engagement and knowledge-sharing activities within relevant networks.

The core elements of the Community Building Strategy are:

- Mobilising networks and associations to act as multipliers and facilitators, leveraging cross-lobbying activities with related institutions across the EU.
- Participating in external events and trade fairs.
- Sharing knowledge with community members and participants.
- Establishing clusters and coordinating the co-organisation of events with other EU projects and initiatives.

Community involvement is an ongoing process critical to the project's success and long-term sustainability. Active community participation increases ownership and investment in the outcomes, ensuring that project developments remain aligned with community needs and priorities. The strategy will be significantly reinforced using social media and a dedicated project website, which will be developed as part of the initiative.

Networks and Associations

The BUTTERFLIES project partners bring extensive experience and proactive engagement in both academic and industrial sectors. They plan to leverage their existing connections to mobilise networks and associations, capitalising on some partners' memberships in well-established networks.

The involvement of BUTTERFLIES partners in European and International networks and associations is detailed in **Error! Reference source not found.**. It will be reviewed regularly and is structured in a three-stage plan.

Table 4: Plan for mobilising the network and associations

Stages	Main Objective	Main Action	Activities to be conducted
First year	Raising and engaging members for the network	Generate interest among networks by promoting the results through outreach and dissemination.	•Active start of the Preliminary Stakeholder Analysis & Community Building Strategies. •Review actions will be taken at the WP8/WP9 periodic meetings.
Second year	Boosting the network	Boost and strengthen the network as dynamically as possible through the active participation of the BUTTERFLIES project partners	•Creation of a section on the project website dedicated to the community. •Pitching the project at various events. •Population of a section in the project website dedicated to the community, enabling network members to have visibility on the project's website (e.g., including the organisation's information and relevant information). •Targeted sending of newsletters and notification of project activities to network members (following data protection regulations). •Participate/Organise interactive workshops with the network under development (at least one per year and linked

			with the project's most relevant milestones).
Third year	Consolidate the network	Consolidate the participation of the network members to ensure the sustainable dissemination of results.	•Organise interactive workshops with the network under development (at least one per year) and one final workshop with the engaged community. •Participation in events to disseminate results (fairs, joint synergies with similar European projects, etc). •Assessment by the network of the possibility of exploiting the results for future collaborations.

In the first year, stakeholder relations via association networks are being reinforced. EWF is one of the founding and/or active members in high-level groups of several platforms, whose contacts were sought for mutual knowledge exchange and transfer of results, contributing to roadmaps, supporting standardisation issues and discussion, with a strong focus on AM processing capacity in Europe. There are already strong connections between BUTTERFLIES partners and key associations like Manufuture, AM Platform, EFFRA, ADDIMAT, EPIC, as summarised in Table 5.

Table 5: Connection between BUTTERFLIES partners and key associations.

ManuFuture	AM Platform	EFFRA	ADDIMAT	EPIC
MTC EWF Fraunhofer	MTC EWF EMPA OPTIMUS 3D TECNALIA	MTC EWF Fraunhofer Tecnalia Iconiq Innovation EMPA	OPTIMUS 3D Tecnalia	MTC Vital 3D Fraunhofer

A short description of each association goes as follows: ManuFuture is the European Technology Platform for manufacturing, aiming to strengthen Europe's competitiveness in advanced manufacturing. It brings together industry, research organisations, and policymakers to define strategic research agendas and promote innovation in manufacturing technologies. AM Platform is a European network of stakeholders in additive manufacturing. It serves as a hub for knowledge exchange, networking, and collaboration, helping companies, research centres, and institutions advance AM technologies and their industrial adoption. EFFRA represents the private side of the "Factories of the Future" initiative under Horizon Europe. Its mission is to promote research and innovation in advanced production technologies, supporting sustainable, digital, and competitive European manufacturing. ADDIMAT is the Spanish Association of Additive and 3D Manufacturing Technologies. It fosters collaboration between companies, research centres, and public institutions in Spain to promote the adoption and development of additive manufacturing technologies. EPIC is a non-profit industry association that brings together companies and organisations active in photonics across Europe. Its aim is to support innovation, market development, and knowledge exchange in photonics technologies. Additionally, EWF maintains established connections with EIT Manufacturing and aims to explore common areas of interest, such as skills development, digital transformation, and the integration of sustainable manufacturing practices. EIT Manufacturing is a key European initiative aimed at strengthening innovation and competitiveness in the manufacturing sector through collaboration among industry, education, and research. Given its strong alignment with the project's objectives, it represents an important network for dissemination and exploitation activities.

As a result of these connections, BUTTERFLIES has established a presence on the EFFRA portal, as seen in Figure 11.

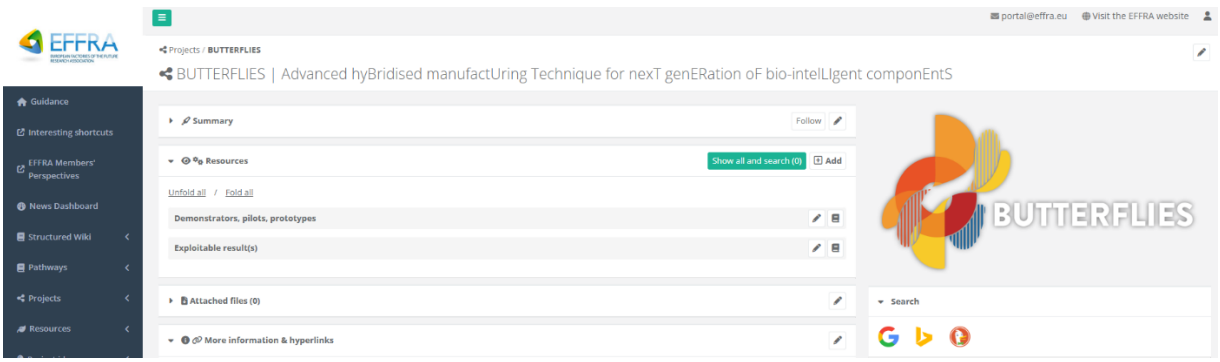

Figure 11: BUTTERFLIES in the EFFRA portal.

Standard Operating Procedures for Dissemination

Standard Operating Procedures (SOP) for dissemination are presented hereafter and will ensure that commercially relevant results are not prematurely disclosed. The SOP is a simplified version of the procedure established in the Consortium Agreement for the notification of dissemination activities, taking into consideration the legitimate interests of the consortium members.

Therefore, during the project and 1 year after its end, partners must notify the consortium members about any dissemination activity and obtain the corresponding members' approval. This is to avoid the unauthorised/premature disclosure of sensitive information (e.g. other partners' background or project results). Nevertheless, partners must cooperate to facilitate the timely submission, examination, publication, and defense of any dissertation or degree thesis, including results or background, subject to confidentiality and publication barriers established in the consortium agreement.

Unauthorised disclosure of sensitive information might undermine the value of the results, causing damage to their owners and blocking the possibility to protect related products or processes under intellectual property rights such as patents, utility models and industrial designs. The non-compliance with the exploitation and dissemination obligations might generate severe consequences according to the Grant or Consortium Agreement, affecting the implementation of the project and the achievement of objectives. Therefore, partners must familiarise themselves with the D&E rules and terms established in the Grant and Consortium Agreements.

According to Article 17.2 of the Grant Agreement, each partner of the BUTTERFLIES project is obliged, if not specified otherwise by the granting authority, to actively promote the action and its outcomes by disseminating tailored information to various stakeholders, encompassing the media and the public. This promotion should be carried out strategically, coherently, and effectively. Before undertaking any communication or dissemination effort likely to have a major media impact on the media, beneficiaries must notify the granting authority.

Unless otherwise agreed with the granting authority, communication activities of the beneficiaries related to the action (including media relations, conferences, seminars, information material, such as brochures, leaflets, posters, presentations, etc., in electronic form, via traditional or social media, etc.), dissemination activities and any infrastructure, equipment, vehicles, supplies or major result funded by the grant must acknowledge the EU support and display the European flag (emblem) and funding statement (translated into local languages, where appropriate):

Figure 12: European emblem and funding statement to include in communication and dissemination actions.

The emblem should maintain its distinctiveness and integrity, without alterations or additions of other visual elements, brands, or text. No other visual identities or logos, aside from the emblem, should be utilised to emphasise EU support. When presented alongside other logos (such as those of beneficiaries or sponsors), the emblem must be showcased with equal prominence and visibility.

Additionally, regarding the dissemination and communication of results, article 17.2 also specifies that any dissemination of results (in any form, including electronic) must display the following disclaimer:

"Funded by the European Union. Views and opinions expressed are, however, those of the author(s) only and do not necessarily reflect those of the European Union or European Health and Digital Executive Agency. Neither the European Union nor the granting authority can be held responsible for them."

After executing dissemination activities, partners are responsible for providing relevant information (i.e. type of event, when and where it was held, target audience and number of attendants, number of dissemination materials handed out, contacts made, photographs from the event, contact lists, etc). Other relevant information, such as videos, photos, agendas, etc., should be uploaded to the relevant folder on the repository for external events. A summary of the past activity must be prepared by the organiser/participant to be published on the BUTTERFLIES website.

Notification Procedure

1. Partners are required to provide sufficient information about the intended dissemination activity and send it to the WP8 leader and the project coordinator, who will forward it to all partners within 45 calendar days before the dissemination activity. (The information should include the type of activity, partners involved, place, date, description, abstract, title and authors, if applicable).
2. Partners may object to the dissemination of the activity or material only within the next 30 calendar days after the receipt of the notice.

3. Partners objecting to a dissemination activity must address it to the project coordinator, to the Party or Parties proposing the dissemination and to the D&C Manager, explaining how the dissemination activity will affect their legitimate interests.
4. Any objection must include a precise request for necessary modification to facilitate the dissemination activity without affecting the legitimate interests of consortium members. Relevant partners may discuss as needed to overcome the grounds for the objection on a timely basis. Particularly, in the case of scientific or academic publications and presentations.
5. The objecting partner can request a delay of the dissemination activity of not more than 90 calendar days from the time it raises such an objection.
6. After 90 calendar days, the dissemination activity is permitted if there is no harm to the legitimate interests of the objecting partner.

Internal Processes

All communication actions will be coordinated by the WP8 leader, respecting the deadlines discussed with consortium partners and the graphic guidelines in all communication activities.

Procedures for Newsletters

1. The WP8 leader is responsible for the distribution of the newsletter content according to the tasks developed in the Gantt chart.
2. The WP8 leader is responsible for sending a reminder to the designated partners two weeks before the deadline for the submission of the contributions from partners.
3. Consortium partners are to submit their contributions by the deadline established.
4. In case any partner wants to add relevant content to the newsletter, it must send an email to the WP8 leader with the information to be added, until the deadline established for the respective newsletter.
5. The WP8 leader will confirm with the coordinator whether the material and information to be shared are relevant and comply with the institution's policy/image.
6. Once published, the newsletter is sent to all subscribers and published on social media and the website.

Procedures for other dissemination material:

1. Other dissemination material, such as press releases, flyers, and posters, will be developed by EWF periodically, according to the project's needs.
2. The developed material will be shared among partners to receive feedback in due time.
3. The materials will be adapted according to the comments provided.
4. The materials will be made available on the webpage.
5. Additionally, some of the dissemination material, such as posters, may be adapted to specific contexts or events.

Exploitation Strategy

Introduction

Exploitation is "the use of results in developing, creating and marketing a product or process, in creating and providing a service, or in standardisation activities" [2]. The key components of that statement are:

- Making use of project results
- Ensuring ongoing value and impact of those results after the project.

There are 4 main types of exploitation ("Exploitation Pillars") that are typically considered for results of EU projects:

- Financial – creating products or services using the results that you can sell directly or indirectly
- Scientific – using the results in further research activities
- Societal – actions with wider societal benefits such as environmental improvements, educational materials, better work conditions. The UN Sustainable Development Goals are good sources of inspiration for these actions [3}.
- Political – contributing to policy, legislation or standardisation.

Exploitation of results is a contractual requirement within the grant agreement – for up to 4 years after the project, beneficiaries should make their best efforts to exploit the project results, either directly themselves, or indirectly via licensing or selling. If this cannot be achieved, the results should be released to allow other entities to attempt exploitation if they wish. This sharing and publication can be achieved using the Horizon Results Platform (HRP) or through other routes.

The core aim of exploitation planning is to ensure the future use of results generated by the project, whether that is through commercial, societal or political purposes. By carrying out these activities we can deliver the expected outcomes of the call topic and maximise the impact of this project.

The commercial exploitation goals are achieved through developing the business case, business model and business plan for each of the Key Exploitable Results (KERs). Other types of exploitation may also be relevant for this project. The preliminary business case

was presented in the proposal and is discussed further in this report, but will be further developed as the project proceeds and the actual results become clear. Due to the normal uncertainty associated with research projects, we will need to be flexible to cope with potential technological changes to the concept as the project progresses. Additionally, market changes throughout the 3 years of the project may alter the external environment such that the original business case needs to be adjusted. Therefore, we expect that the exploitation plan development will follow a somewhat iterative process and reviews of some of the Period 1 activities will be needed during Period 2 to ensure that key assumptions have not changed.

The exploitation plan development will follow the widely used MOSAIC framework for business planning (Figure 13):

- Mapping
    - To understand the conditions surrounding the innovation. This will include market dynamics, competition analysis, intellectual property (IP) reviews, and an understanding of the value chain and stakeholders.
- Objectives
    - To understand what we want to achieve through the exploitation, such as immediate commercialisation, or future research. Although this framework is usually used for commercial business modelling and planning, we can also introduce alternative "objectives" based around societal or political purposes.
- Strategy
    - Determine the best way to meet our objectives. For commercial exploitation, this is done through Business Model Canvas development and assessment of potential routes to market. Risk analysis will be carried out at this stage so that action planning can take mitigations into account.
- Action planning
    - Work out how to deliver the strategy. For commercial exploitation this will include activities such as financial (including future funding), supply chain, IP and scale-up planning.
- Implementation
    - Post-project delivery of the commercialisation action plan.
- Controls
    - Post-project measures and performance indicators to monitor how the implementation is proceeding.

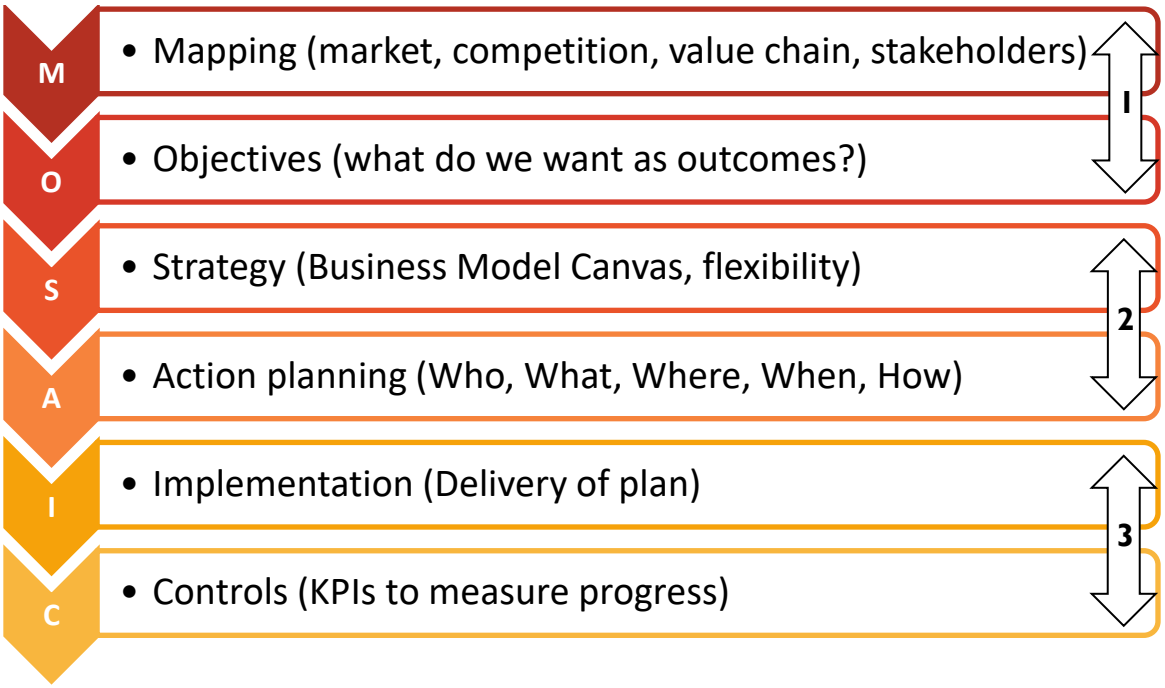

Figure 13: Schematic of the MOSAIC framework for business planning and how the project periods will align with the different activities. Period 1 activities will focus on Mapping and Objectives. Period 2 activities will focus on Strategy and Action Planning. Period 3 (post-project) activities will focus on Implementation of the Strategy and monitoring of Controls [4].

The objective of exploitation planning will, to some extent, depend on the Technology Readiness Level (TRL) reached for each part of the technology development.

Preliminary Exploitation Plan

Exploitation planning was carried out at a basic level during the proposal development for the project. These plans will undergo further development and expansion in future stages of this planning process. This public version of the preliminary exploitation plan is an abridged version of the fuller plan available to consortium partners [5].

Exploitation Pillars

Different ways in which exploitation of project results could be achieved include:

1. Financial:
    a. New bio-materials for sale
    b. Bio-intelligent AM processes ready for market entry
    c. New medical devices for sale (subject to regulatory approval).
2. Scientific:
    a. Various aspects of the project will influence future R&D, including:
        i. New biomaterials availability
        ii. New research tools availability
    b. Throughout the project, we will consider the balance of whether we publish openly for the benefit of open science (and wider exploitation) or protect for commercial exploitation of each result.
3. Societal:
    a. Improved manufacturing efficiency/productivity
    b. Improved process sustainability
    c. Products that improve lives
    d. Reduced environmental effects of industrial processes
    e. Training materials to fill skills gaps for AM of biomaterials.
4. Political/legislative
    a. Demos and data useful for future regulation or standard development
    b. Standardisation gap analysis and recommendations.

This list will be reviewed and updated throughout the project in consultation with all the partners.

Exploitable Assets & Their Technological Maturity

The KERs expected to arise from this project (and the responsible partners) are shown in Table 6. Progress against these will be monitored throughout the project to ensure we target appropriate exploitation objectives depending on final technology maturity (e.g. future R&D funding at some level or more directly into commercial exploitation). At TRL6, innovation action-type funding could be appropriate, or private funding could be sought. Future funding options will be examined more closely as the project progresses and technology developments become crystallised.

Table 6: BUTTERFLIES KERs, the associated exploiting partners for each and their technological maturity.

	KER No	Description	Owner(s)	Partners	Starting TRL	Planned End TRL
Materials Development	1	High performance chitin-based binders	EMPA, ASA	TEC, V3D	4	6
	2	Production process for chitin nanocrystals (ChNC)	EMPA, ASA	TEC, V3D	4	6
	3	Optimised ChNC and bio-crosslinker infused bio-ink with superior properties	EMPA, ASA	TEC, V3D	4	6
Process development	4	BJT printing technology for chitin – including orthosis use case	C3D, TEC	FHG, OPTI, ASA	4	6
	5	2PP printing technology for modified chitosan – including organoid use case	V3D, MTC	EXP, EMPA	4	6
	6	Digital biosphere platform – AI driven platform for enhanced ChNC and chitosan printing	VAL	FHG, EMPA	5	6

KER 1 to 3 – Commercial Exploitation of Raw Materials

Following successful material development activities, follow-up work post-project will be focused on scale-up and commercialisation, with materials sales as a priority outcome.

Prior to exploitation, the ChNC-based binder will need to go through a certification process. This will involve working closely with industry regulatory bodies to ensure the resin meets the required standards and safety regulations for industry applications. Third-party experts will be engaged to validate the materials' performance and safety through rigorous testing and analysis.

KER 4 to 6 – Commercial Exploitation of Printing and Digital Technologies

KER 4: BJT Chitin Printing Technology – binder jet 3D printer technology for bio-polymer applications, incl. orthosis use case

KER 5: 2PP Chitosan Printing Technology - advanced 2-photon polymerisation technology for fast and scalable organoid scaffold bioprinting

Several potential routes exist for commercial exploitation of KERs 4 and 5, including equipment sales, equipment design licences, component sales and licensing, and printing-as-a-service.

A broader range of industry applications can be developed by validating new use case studies, and secondary industries with relevant end-users and research partners (e.g. pharmaceuticals, automotive). They will then exploit the IP developed through the BUTTERFLIES project by either selling AM machines or licensing their technology to makers of AM machines.

KER 6: Digital Biosphere Platform (DBP) - AI/ML-driven digital platform for enhanced nanocrystal processing and chitin/chitosan printing

Commercial exploitation of the DBP is likely to be via licensing to machine and component manufacturers, generating revenue streams both from use of the platform as well as consulting potential customers for platform enhancements and extensions.

Barriers to Exploitation

The BUTTERFLIES project aims to progress technologies to TRL 6. Therefore, there will be additional post-project activities to fully commercialise the BUTTERFLIES technologies, requiring additional research and development and associated funding. Launching new

materials into additive manufacturing can be challenging. There are several major potential barriers that could impede this adoption:

- **Cost**: Often, one of the most significant barriers to the adoption of new materials and equipment is the significant investment in research, development, and manufacturing processes. This could potentially make the BUTTERFLIES technologies less competitive in the market, especially in the early stages.

- **Competition**: There are many 3D printers and related platforms currently being developed. However, the BUTTERFLIES innovations position bio-based AM technology at the forefront of the industry. For the competition, it will be difficult to challenge our technology because of the complex knowledge involved: from material and production development to routes to market. This is the result of the consortium synergy, SME's expertise and IP being developed through this project.

- **Regulatory**: For their intended use within clinical and research applications, there are various regulatory and safety considerations specific to chitosan-based scaffolds that need to be considered. As a naturally derived, biodegradable material, chitosan is generally considered safe for biomedical use, but its clinical application still requires thorough testing to provide evidence of conforming to regulatory standards, like those outlined by ISO 10993.

- **Market Acceptance**: The dissemination and communication strategy outlines plans for publications in high-impact journals and engagement with the scientific community and KOLs (Key Opinion Leaders) during and after BUTTERFLIES. We will seek to work with contacts linked to our consortium partners.

- **Supply Chain and Availability**: Availability and stability of the supply chain for the new materials are crucial. The supply chain will need to be developed as part of the BUTTERFLIES project and beyond, to eliminate uncertainties in material sourcing, availability, and cost fluctuations. These factors could all impact the overall production schedule, project timelines and market penetration. While the consortium represents an early end-to-end supply chain, we will dedicate activities in this project towards ensuring that we plan and undertake early assessment for the creation of the conditions necessary to promote and establish a full industrial end-to-end supply chain with appropriate risk mitigation.

To overcome these barriers, it is essential that the BUTTERFLIES consortium partners continue to engage and build strong relationships with manufacturers and policymakers to address the challenges and explore the benefits of introducing new bio-intelligent manufacturing enabling materials. Collaboration, further research funding, and incentives

for innovation will play a significant role in accelerating the adoption of our promising technologies in high-value AM applications.

Roadmap for Exploitation Strategy Development

As already introduced in the aims section of this report, IIL intend to use the MOSAIC framework to assist with the development of the BUTTERFLIES exploitation strategy for each KER, with Mapping and Objectives being the focus of project period 1, and Strategy and Action Planning being the focus of period 2. We will introduce the Implementation and Control phases of the framework towards the end of the project, for partners to use in support of their post-project exploitation activities. Figure 14 shows the provisional timeline of activities and how they relate to key project technical milestones and deliverables. While this is the approach we currently intend to use, we may need to be flexible as the project proceeds and results become available, so specific activities and their timing may be adjusted as we proceed through the project.

This section of the M6 exploitation plan signposts the main tools and activities that will be used in the coming 12 months, with a greater focus on those to be used in the next 6 months of the project. The focus of activities in the remainder of period 1 is on gathering information that will be used in the Business Model Canvas development in period 2. Further detail of the tools and activities to be used in the project can be found in the full M6 Exploitation Plan available to consortium partners [5].

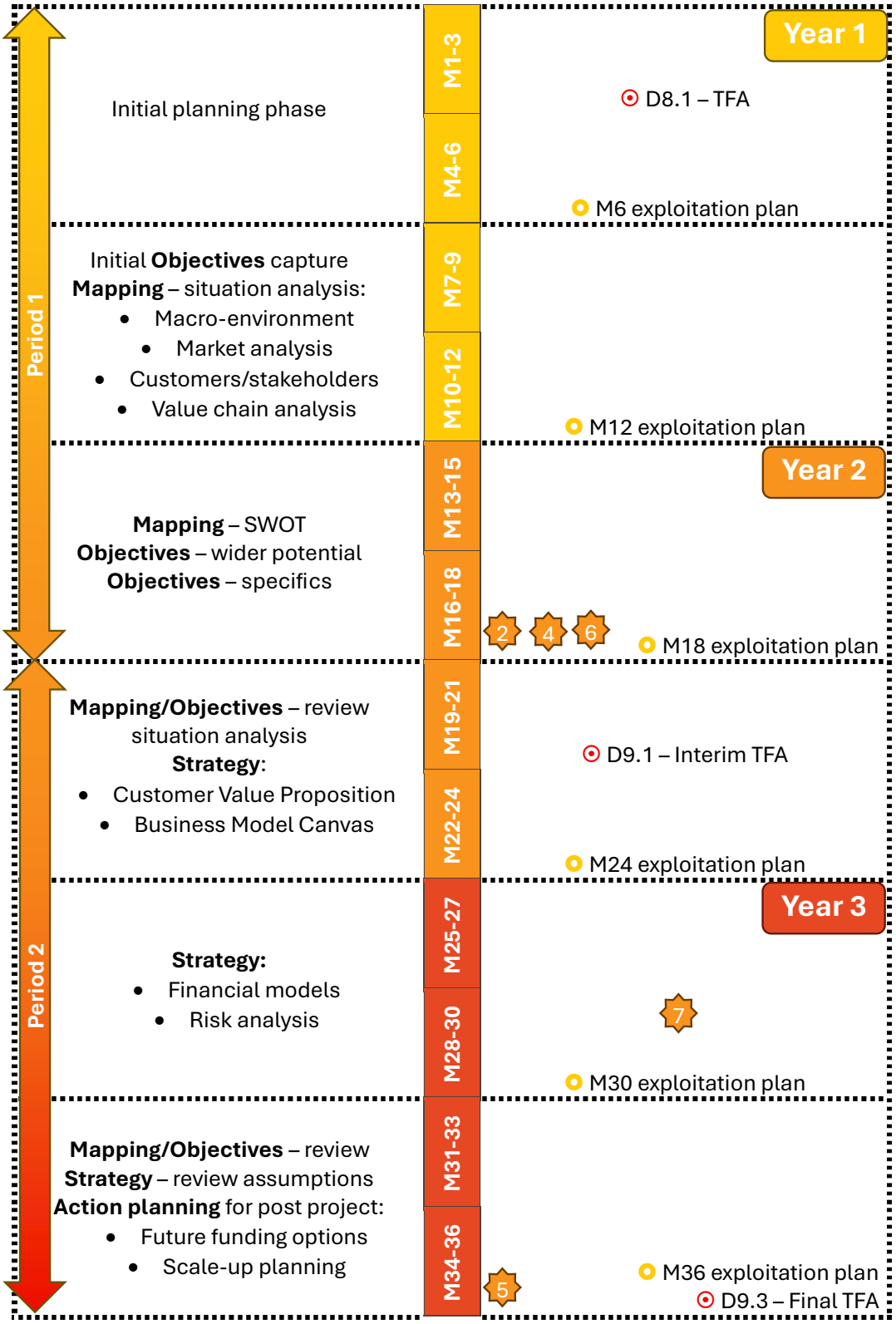

Figure 14: Provisional roadmap of exploitation plan development activities for the BUTTERFLIES project. Showing project technical milestones (✸), project deliverables (⊙), and exploitation plan reports (O).

MAPPING - Intellectual Property Management

To understand the potential markets fully and maximise exploitation, it is important to understand the current State of the Art (SoTA) situation and ensure any technological advancements through the project are formally protected ahead of wider communication. An IPR strategy will be designed to ensure capture of any background IP, management of foreground IP and support for protection strategies to maximise exploitation.

BUTTERFLIES will follow a defined **RAPID** process:

- **R**ecorded – documented within the BUTTERFLIES IPR portfolio
- **A**ssessed – understand the potential exploitation strategies, and wider context
- **P**rotected – registered and certified
- **I**mplemented – exploitation of each output
- **D**isseminated – wider communications on the new IP and applications

The IPR register will detail both existing background IP and foreground IP developed through the project. It can be used to capture all types of IP, including Patents, Copyright and related rights, Trademarks, Know-how, Trade secrets, Designs, Drawings, Reports, Data, etc.

The default position for IP ownership will follow the Horizon Europe rules; each beneficiary owns the results it generates; joint ownership only if results are jointly generated and it is impossible to determine the respective share of the work or to separate results for protection purposes. Any protection strategies will be the responsibility of the respective beneficiaries, along with exploitation. Beneficiaries will be expected to commence exploitation of the project results within the first-year post-project.

To ensure visibility and timely action, IP will be formally reviewed at each consortium meeting. Project partners will be given fair and reasonable access to foreground IP to enable further development and progression of project outcomes. In addition, an Innovation Sub-Committee (ISubC) has been established to focus discussions on any new technology advancements, and the chair of this committee (Innovation Manager) will maintain the IP register between consortium meetings.

An iterative Technology Futures Analysis (TFA) activity is being undertaken as part of the BUTTERFLIES project to continue checking any new IP being generated against similar materials, technologies, manufacturing processes and applications. This will ensure the SoTA is known throughout the project, and a risk assessment against the continued Freedom To Operate (FTO) can be conducted. This could steer the BUTTERFLIES project to a new research direction or a new end-user application, if competitive research shows too

much overlap with ours, or towards dissemination instead of direct commercial exploitation. The first iteration of this report is already available to project partners.

Alongside the IPR strategy, development of the exploitation plan will include understanding the market landscape, potential competitors and identifying market opportunities. This will help determine how any new IP can be leveraged to create revenue streams.

STRATEGY Look Ahead - Business Model Canvas

Although this tool will not be used until period 2 of the project, it is helpful to introduce it here, as the exploitation planning tools used in period 1 will build towards collecting the information needed to complete this later activity.

To ensure the BUTTERFLIES project delivers innovation and significant impact to the EU, the results and technologies must be fully exploited through real-world applications. Traditionally, this includes commercialisation of the technologies and findings through product and service sales, but the wider scientific, societal and political impacts can also be maximised. A business model canvas tool can help to develop this detailed plan of transforming results into tangible outputs [6].

A standard business model canvas (Figure 15) considers the following factors:

- Key partnerships
- Key activities
- Key resources
- Value propositions
- Customer relationships
- Channels
- Customer segments
- Cost structure
- Revenue streams.

A business model canvas for the project was drafted as part of the BUTTERFLIES proposal. This initial model covered all activities and intended outcomes through the project and beyond. However, as the exploitation plan develops, business model canvases will be completed for each KER (from M18 onwards).

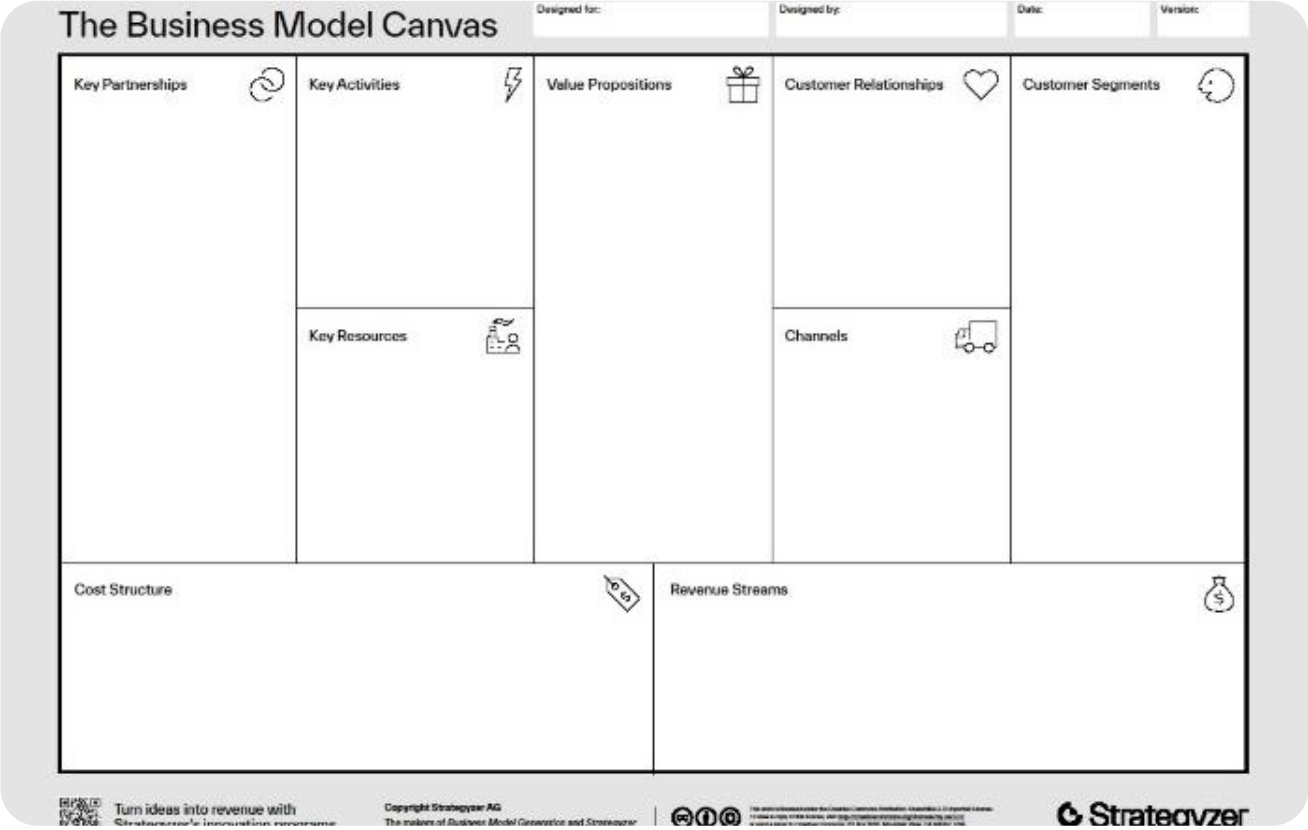

Figure 15. The Business Model Canvas template [7].

Conclusion

This plan positions BUTTERFLIES to achieve maximum impact through strategic dissemination and exploitation activities. By targeting key stakeholders with tailored messages and focusing on commercially viable exploitation pathways, the project will successfully transition bio-intelligent manufacturing technologies from research to market implementation, contributing significantly to Europe's green and digital transition goals. Additionally, the current state of the exploitation plan has been reviewed, and the most important elements have been captured in this report.

The success of this plan depends on coordinated execution by all consortium partners, with EWF leading dissemination activities and IIL managing exploitation strategies, supported by the technical expertise of MTC, EMPA, V3D, C3D, and other consortium members.

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Annex A

A.I. Press Releases Schedule

Year	PR #	Release Date	Date to be shared with partners for approval	Deadline for feedback from partners
2025	1	4th August	28th July	4th August
2026	2	16th February	2nd February	9th February
	3	13th July	29th June	6th July
2027	4	18th January	4th January	11th January
	5	19th July	12th July	5th July
2028	6	24th January	17th January	10th January

A.2 Bi-annual Newsletters Schedule

Year	Newsletter #	Release Date	Articles	Tasks Associated	Contributors	Deadline for Info.
2025	1	17th November	1	1.1 & 1.3	MTC	3rd November
			2	1.2	VAL	
			3	2.1	EMPA	
			4	3.1	FHG	
2026	2	18th May	1	2.5	TEC	4th May
			2	5.1	VAL	
			3	6.1	3DR	
			4	8.3	IIL	
	3	16th November	1	4.1	V3D	2nd November
			2	4.2	MTC	
			3	8.4	EWF	
			4	8.5	3DR	
2027	4	17th May	1	2.6	ASA	3rd May
			2	3.3	FHG	

			3	5.2	VAL	
			4	6.2 & 6.3	3DR	
	5	19th October	1	2.2 &2.4	EMPA	5th October
			2	3.2	FHG	
			3	4.3	MTC	
			4	4.4	V3D	
2028	6	20th March	1	2.3	EMPA	6th March
			2	3.4 & 3.5	C3D	
			3	4.5 & 4.6	V3D	
			4	5.3	FHG	
			5	6.4	3DR	
			6	7.2	EXP	
			7	7.3	OPTI	

