Deliverable 9.4 - iPRODUCE services, pilots, OI missions and federated structure

CBS

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Abstract	This Deliverable comes from 3 tasks, namely, T9.3 iPRODUCE innovation services to MMCs, T9.4 Realisation of Local cMDF Pilots and Open Innovation Missions and T9.5 Demonstration of the Federated Network of cMDFs and Business Model Validation. T9.3 aimed to facilitate the implementation of the iPRODUCE pilots, as well as to ensure that the necessary conditions and maturity are established within the MMCs for a successful outcome of the demonstrations. T9.4 implemented the iPRODUCE pilots with emphasis on the execution of the OI challenges/missions. T9.5 focused on the validation of the federated solution of iPRODUCE (that is the network of local cMDFs). In this document, a description of the methods and activities carried out, data collected, analysis and results, and conclusions of the work are presented.

DELIVERABLE HISTORY			
Date	**Version**	**Author / Contributor / Reviewer**	**Summary of main changes**
21/11/2022	Definition of DL ToC	CBS	
27/01/2023	Background/baseline information	CBS	Summary of relevant background information from D7.2
14/02/2023	Methods	CBS	Insertion of methods description
05/06/2023	Methods and Results	CBS, MATERALIA, AIDIMME, VLC	Final content creation - methods and results
06/06/2023	Ready for internal review	CBS, AIDIMME, VLC, MATERALIA	Insertion of introduction, conclusion, and review for cohesion.
14/06/2023	Internal/peer review	TRENTINO SVILUPPO	Return from peer review with feedback
20/06/2023	1.0	CBS	Changes according to feedback and final adjustments

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Executive Summary

This Deliverable is composed of the compilation of 3 tasks, namely, T9.3 iPRODUCE innovation services to MMCs, T9.4 Realisation of Local cMDF Pilots and Open Innovation Missions and T9.5 Demonstration of the Federated Network of cMDFs and Business Model Validation.

T9.3 aimed to facilitate the implementation of the iPRODUCE pilots, as well as to ensure that the necessary conditions and maturity are established within the MMCs for a successful outcome of the demonstrations. In this respect, coaching and support services were provided to the teams working on the OI missions/challenges under the pilots. Such support services were catered to the individualised needs and gaps diagnosed through purposefully created service propositions and meetings with each cMDF. Widely validated approaches, tools and methods with capacity to support the implementation of the OI missions were selected and presented to the partners in coaching sessions. To allow for cross-pollination and to nurture exchange of knowledge inter-cMDFs, a booklet with tools and methods was created and made available to the partners. Given the nature of this task – that is, support - the results achieved often refer to intangible steps taken towards the implementation of the mission. Upon completion of the support services, a survey collected data from the cMDF partners regarding the alignment of the platform to their business needs, generating relevant information to identify improvement opportunities for iPRODUCE and support steps towards business maturity post project.

T9.4 implemented the iPRODUCE pilots with emphasis on the execution of the Open Innovation challenges and mission. In the initial project, it was defined that the demonstration would have to last for at least 6 months per local ecosystem and 3 open innovation missions would have to be carried out per cMDF. For this task, the MMCs worked on consumer product innovation related challenges. Each of the cDMFs ran their project through the OpIS platform and in the physical space of their cMDF, focusing on the consumer goods categories it targeted. Before running these OI missions, each pilot selected the iPRODUCE co-creation tools that it wishes to use during the demonstration. All horizontal tools and functionalities were expected to be tested by each pilot. During the execution of the OI, the users were asked to give feedback about several aspect of the OpIS (overall UX, the relevance of the co-creation methodologies applied, the usefulness of each tool, the value provided by the iPRODUCE framework to each OI mission and the local ecosystem overall).

Following the demonstration of the OpIS at local level (T9.4), T9.5 focused on the validation of the federated solution of iPRODUCE (that is the network of local cMDFs). In this respect, not only the tools and functionalities of the OpIS were piloted, but also the hybrid federated operational model defined in D3.1. Under this task, and through an inter-cMDF Use Case, local ecosystems from iPRODUCE were put to test, allowing us to explore synergies and develop OI challenges to design actual products. Additionally, the iPRODUCE Business Model presented in D7.3 was tested and partially validated.

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List of Abbreviations

cMDF	collaborative Manufacturing Demonstration Facilities
MMCs	Manufactures, Makers and Consumer communities
OI	Open Innovation
OpIS	Open Innovation Space
UC	Use Case
UX	User Experience

1. Introduction

This deliverable describes the work performed in 3 tasks of WP9, namely, T9.3 iPRODUCE innovation services to MMCs, T9.4 Realisation of Local cMDF Pilots and Open Innovation Missions and T9.5 Demonstration of the Federated Network of cMDFs and Business Model Validation.

T9.3 refers to facilitating the implementation of the iPRODUCE pilots and ensuring that the necessary conditions and maturity are established within the MMCs for a successful outcome of the demonstrations. These objectives were met through support services to the cMDFs throughout the implementation of the OI missions. The support services initiated with individualised diagnosis sessions with each cMDF and the development of service propositions for each use case (UC). Based on the data collected, support services were designed to cater to different needs and phases of pilots' implementation. Therefore, results differ among cMDFs in content, objectives and tangibility (e.g., Greek cMDF's in-depth analysis for creating a go-to-market strategy, Spanish cMDF's impact/effort analysis for prioritising use case implementation). One tangible result is the development of a booklet of tools and methods to support the demonstrations with regards to business and marketing (e.g., guidance on how to build a go-to-market strategy). Upon completion of the support services, a survey investigating the alignment between the OpIS and the cMDFs' business needs collected data to further inform the continued development of iPRODUCE post project.

T9.4 refers to the realisation of local cMDF pilots and open innovation missions. In this task, three consumer-driven Open Innovation (IO) challenges/missions were carried out per cMDF. The OpIS was thoroughly used in this effort, which allowed for testing the developed tools and collecting feedback from users. Beyond collecting feedback on technical tools, data was collected through user inquiry regarding their perception of tool usefulness, co-creation methodologies, and value provided by iPRODUCE. The goals of T9.4 were fully reached, with successful demonstrations in every cMDF and valuable feedback collected to further inform iPRODUCE exploitation post-project.

T9.5 refers to the demonstration of the federated network of cMDFs and business model validation. In this task, the focus is on identifying, establishing, and developing mechanisms for knowledge extraction, resource and knowledge sharing, security and privacy mechanisms, data/ service interoperability. In addition, T9.5 validates the business models proposed on D7.3. In short, the work performed in T9.5 validates and establishes the necessary administrative and managerial pillars for a successful exploitation of iPRODUCE beyond the project phase.

This document is structured as follows: Section 2 describes the work performed within T9.3 - iPRODUCE innovation services to MMC. It begins with a description of the methods used, followed by a detailed explanation of the work performed with each cMDF. Next, it presents the results from a survey aiming to evaluate the alignment between the OpIS and the partners that compose the federated network. Section 3 refers to T9.4 - Realisation of Local cMDF Pilots and Open Innovation Missions. It begins with a methods section and moves on to present key findings, insights, and recommendations derived from the experimentation with OpIS in real-world contexts. It reports successful case studies and showcases how the OpIS facilitated collaboration, knowledge sharing, and innovation within each selected scenario. Section 4 deals with T9.5 - Demonstration of the Federated Network of cMDFs and Business Model Validation. Here, the iPRODUCE Federated Network is demonstrated and validated through a joint Use Case (UC) executed by two cMDFs, namely, Italian and Spanish cMDFs, followed by the validation of the iPRODUCE business model. Finally, conclusions are presented regarding the three tasks as well as 2 recommendations to be implemented in the initial phases of exploitation.

2. iPRODUCE innovation services to MMCs (T9.3)

Six methods were used in the coaching sessions and support services offered by CBS to the teams that work on the OI missions/challenges under the pilots. In this section, the methods are explained as well as their contribution to the successful launch of the OI missions.

As a starting point, the cMDFs developed service propositions for each case. The analysis of these propositions pointed out gaps in knowledge and development of specific elements of each use case. Coaching sessions were carried out with each cMDF individually to discuss the notes taken from the service proposition analysis and to better understand any points that were missing. Based on the accumulated knowledge from the service propositions and the first coaching sessions, a set of management tools was selected and provided to the project's partners alongside training and/or co-working sessions when needed.

2.1. Methodology

2.1.1. Service Proposition Development

Service propositions are essentially the business proposition, but they take the standpoint of the business and the customer/user. In short, they are a description of a given service that helps people understand what the service is and does, shows the value the service brings to their lives, and explains how people can use the service. The user-focused approach of service propositions is a crucial element in the process of designing innovation services to the MMCs, as they are built on research to find unmet needs or gaps in the market, a new (tech) solution that may disrupt existing models, a way to simplify an existing offer or better fit for fast-paced ever-changing environments[1]. Based on this concept, a template with instructions on how to create a service proposition for each use case was created and made available to the 5 cMDFs. The template contained the following questions, whose answers in paragraph format yield a service proposition.

1. What is the name of the product and service offered?
2. Who are the target consumer groups of the product/service?
3. What are the assets, benefits and/or differentiation offered by iPRODUCE in the making or use of the above-mentioned product/service)
4. How can the consumer acquire/use the product/service? (online, in-person, DYI, previous training required, etc.)
5. What is the value exchange involved in the offering/selling of the product/service?
    a. How much does it cost?
    b. What is included in the price?
    c. Is the price dynamic?
    d. Who owns the product produced?
    e. How is the revenue shared among the partners and iPRODUCE?

All cMDFs filled out the template. The information provided were checked for completeness and consistency across cMDFs and in relation to previous work performed on use cases. Questions,

[1] Polaine, A., Løvlie, L., & Reason, B. (2013). *Service design: From insight to implementation*. Rosenfeld media. pp 110-113.

comments, and recommendations were noted down for further discussion with each cMDF during coaching sessions.

2.1.2. Coaching sessions

The coaching sessions served to provide individual support and cater solutions to each cMDF, as each of them is unique in industry, country, challenges, and capacities, to mention a few. The coaching sessions consisted of free-flowing discussions where the cMDF partners could share the current stage of their service development and any questions or gaps that needed filling. Although unstructured, the discussions were guided to focus on (1) aligning service proposition with cMDFs, (2) aligning service propositions with business models (WP7 feeds into T9.3 and vice-versa), (3) identifying support opportunities (per cMDF) to help use case implementation, (4) supporting cMDFs with tools, methods and ideas, (5) identifying the need for future coaching sessions.

Selected solutions and support provided to a specific cMDF have shown to be applicable beyond the boundaries of that cMDF. With the aim of creating a space for sharing knowledge and scaling the impact of T.9.3 on the roll-out of the pilots and OI missions, a booklet containing relevant tools and methods was created and published in the project's shared directory. The booklet compiles a set of approaches and tools that can be used by the cMDFs as they run their Use Cases (UC) in this final and important stretch of the iPRODUCE project. These methods and tools are described below. The booklet is attached to this deliverable.

2.1.3. Impact vs. Effort Matrix

The Impact Effort Matrix is a prioritisation method that uses two criteria – impact and effort - to visually rank comparable tasks or projects. In short, the effort to implement a certain task and the impact (or value) that its output brings to relevant stakeholders are plotted into a matrix, helping users visualize which tasks or projects should be taken on, put on hold, or dropped. Variations of this tool are used in renowned methodologies such as Six Sigma, design thinking, and Agile.

The matrix can be subdivided into four quadrants:

- **Quick wins** include low-effort, high-impact items that are worth pursuing.
- **Major Projects** include high-effort, high-value items, thus requiring meticulous planning and, if implemented, may function as differentiators in relation to competitors.
- **Forget These** (also referred to as Money Pits) are the endeavours that have low-impact but require high-effort, thus not being attractive for business investment.
- **Fill-ins** require low-effort and low-impact that may or may not be worth the effort. The decision making in these cases may be taken using a value-oriented perspective (e.g., business purpose and strategy-focused)

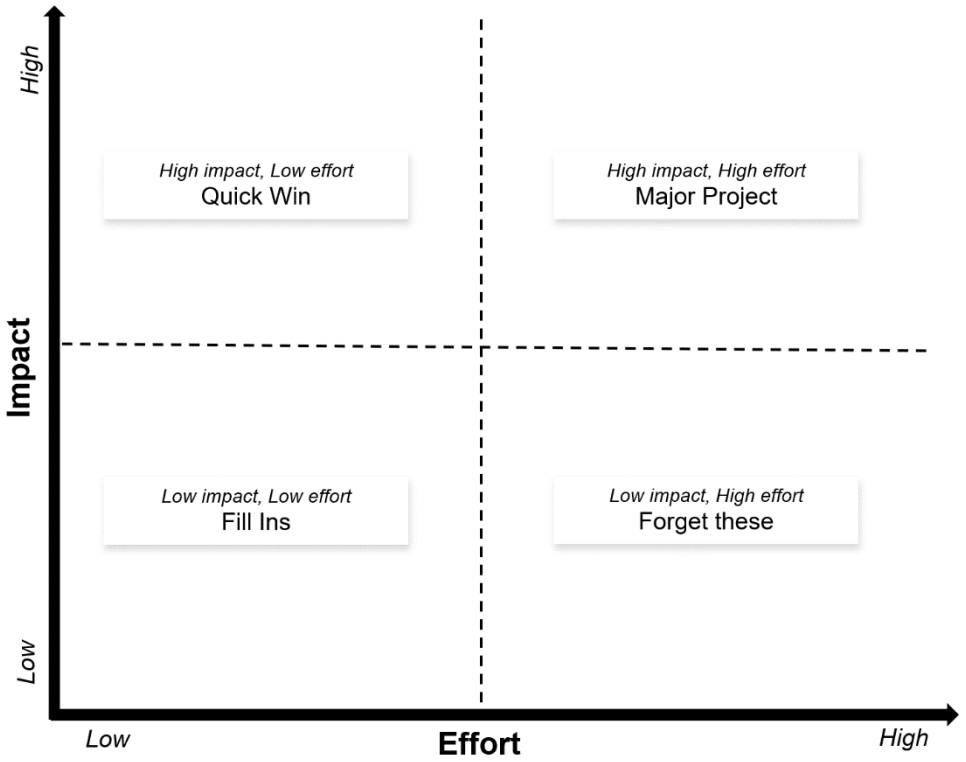


Figure 1. Impact/Effort matrix

2.1.4. Go-to-market Strategy

A go-to-market strategy is "a game plan for reaching and serving the *right* customers in the *right* markets, through the *right* channels, with the *right* products and the *right* value proposition[2]. It aims at establishing a model for the dissemination, marketing and delivery of a product or service to the final customer. A key element of marketing theory is the marketing mix, traditionally referred to as the "4 Ps" – product, price, place, and promotion, that can be adapted to the needs of modern and ever-changing (e-)markets[3]. Product (or service) is the unit of value that is offered to the consumer to satisfy their needs. Price is the value exchange that occurs that allows the consumer to have access to the offering. Promotion refers to the channels and information that reach the consumers so they can be informed about the features, the solution or benefits bought by the product or service. Finally, place refers to the area where the product will be made available (e.g., store, region, online, platform). Based on marketing theory, a roadmap to building a go-to-market strategy that addresses the 4 Ps in a practice-oriented manner was developed. The strategy is composed by 4 elements, namely, Market Research, Target Market, Package and Product Price, and Reach the Audience.

[2] Friedman, L. G. (2002). *Go-to-market strategy: advanced techniques and tools for selling more products, to more customers, more profitably*. Routledge.
[3] Dominici, G. (2009). From marketing mix to e-marketing mix: a literature overview and classification. *International journal of business and management*, *4*(9), 17-24.

2.1.4.1. Market research

Consists of mapping related products/services in the market and collecting information on existing competitors. This can be carried out via desktop research or via hiring a specialised market research consultancy. Understanding the market is crucial for defining the marketing mix. For instance, it gives rich insights into the optimal places for selling or displaying the product/service and the prices that are currently practiced in the market for similar/comparable products.

The market research should answer the following questions:

- Who are my competitors?
- Are they direct or indirect competitors?
    - Indirect competitors offer slightly different products and services but target the same group of customers with the goal of satisfying the same need. Example: Pepsi is a direct competitor to Coca Cola, while a juice shop is an indirect competitor.
- What services (and value) do they offer?
- Is there a gap in the market that I could fill in with my service?

iPRODUCE has performed a comprehensive market research regarding related platforms and services, which is documented in D7.1. All partners were encouraged to review the document and combine this information with their own research to create a customized market overview for the cMDF.

2.1.4.2. Define Target Market

A target market is the group of entities (companies, communities, people, etc.) that are the primary potential customers for a product or service. Identifying the target market is a key part of the decision-making process when a company designs packages and advertises its product. It allows for addressing specific consumer needs, demands and even preferences of a defined audience, driving sales and optimising relationship efforts with customers (Coutinho Sousa & Gaspar, 2019). The target market influences the 4 Ps of the marketing mix as price, product, place and promotion are catered to that specific market. Defining and target market can be carried out via desktop research or via hiring a specialised market research consultancy.

2.1.4.3. Package and Product Price

This step consists of defining a service package and a price catered to the target market and is directly linked to the element “product” of the marketing mix. It can be done by creating a list of services and prices offered by the competitors, comparing them to own offering (how is my service different? What is the value I bring? Why would customers choose mine instead of my competitor’s?) and defining the elements of the service and its average pricing.

Answering the following questions while defining the product package may be helpful:

- Can my target market be subdivided into more specific groups according to their needs?
- How can I tailor my package(s) to these specific groups?
- Do all my potential customers have similar needs? Or do they need tailored solutions?
- Can I offer “slices” of my total range of services to best cater to specific customers?
- What elements of my services are always needed by my customers? And what elements are not always needed?

- Does it make sense to offer packages that progressively contain (1) the core services, (2) the nice-to-haves + the core services, and (3) a “luxury” version where I offer even the more sophisticated services in addition to the core services?
- Can I offer only standardized services? Or would it be better to customize my offer to each customer and their needs?
- What other aspects must I take into consideration while defining my service package(s) beyond the above-mentioned questions?

Once packages that best serve the potential customers are defined, it is time to define prices. The following guiding questions can help in this effort:

- What are the costs I have for providing a given service?
- What are my competitors’ prices for similar or comparable services?
- What is my cost unit? Should I charge by the hour, by the day, by output, by product delivery?
- What other units could I use that would both be attractive (and easy-to-understand) to the customer and ensure the financial viability of the service offer?
- Should I use price ranges or specific pricing?
- What other aspects should I consider when defining prices beyond the above-mentioned questions?

Many of the iPRODUCE services are carried out by multiple partners. This can be confusing to the customer, and they may ask themselves “who is the service provider I am dealing with? Can I trust it/them? What is a cMDF?” and other similar questions. Questions like these may push away potential customers, and therefore it is important that all partners are aligned and use the same communication style, advertising material, language, visual identity, etc. In the end, the goal is to make the customers’ life easier and help them in their innovation journey.

One approach is to create a **shared identity** for a given service. The service should have one name and one description, and all the mentions and advertisements to this service should be done using one specific language and possibly a specific set of colours and logo. The service itself is what reaches the target market, making it easy for the customer to understand the value it brings – instead of creating confusion regarding multiple providers and inconsistent descriptions. Once the shared identity is defined, profiles for the service can be created in relevant media channels.

Before creating a shared identity, however, it is important to note that building a brand for a service can take time, whereas an existing company may already be well known in its respective market. This raises the question of whether creating a shared identity can overcome the benefits of using a renowned brand, and whether it is possible to create a service identity and at the same time take advantage of the company’s brand awareness. There is no one-fits-all in this issue. Each case requires individualised assessment.

2.1.4.4. Reach the Audience

Reaching the audience – also known as promotion - is about making the service known in the community and to the target market through relevant channels. The channels can vary from visits to education institutions (high school and universities for example), participate in hackathons and other challenges, showcase your service in fairs, industry-specific events, magazines and websites, social media (Facebook, TikTok, Google maps, Instagram, etc.), and even well-established media, such as radio, billboards, and other forms of public displays. In this phase, it may be helpful to answers questions such as:

- What media channels does the target market use/read?
- What is the language used?
- What are the costs involved in using these channels?
- Are there alternative channels in this specific market?
- Can my partners and network function as communication channels?

Once these questions are answered the following guiding question can help create a communications plan:

- Should technical language or general language be used?
- What is the relevant information for each channel?
- How much does the potential customer need to know about the service at a first glance?
- Can visuals be used to better deliver the message? Or are texts a better fit for my service?
- How often should the audience be reached?
- What are the costs to advertise on specific channels and for how long?
- What is the budget for each campaign?
- How are campaign and channel effectiveness measured?

2.1.5. Experimentation intra cMDF

Until the iPRODUCE platform is fully developed and services are ready for the market, experimenting and testing are an integral part of the partners' jobs. The cMDFs might aim at testing tools, workflows and communication processes, assess tool integration and ease of use, follow and document the user journey and experience (what works, what does not work, frustrations, possibilities, etc.), implement Use Cases, identify improvement opportunities and report back to IT development, harvest common questions and set a plan to optimize in-platform information and communication, amongst others.

Optimal experimentation depends on the readiness level of the online tools developed by iPRODUCE. Therefore, a first step is to define a timeline for the experimentation considering a realistic forecast for when the tools are ready to be tested. In addition, the experimentation goals must be defined. The following questions are helpful towards defining them:

- When will the tool be ready for testing?
- Which outputs and outcomes are desired with the experimentation?
- Do the goals allow for a comprehensive test of the cMDF pilot? If not, re-evaluate.

Testing procedures may involve:

- Plan co-creation activities and design experiment (tools/methods to be applied, tasks to be performed, milestones during experimentation time, periodical meetings to share experiences, shared document for reporting progress, etc.)
- Define timeline (starting and ending date, duration, milestones, output due dates, etc.)
- Send out invitation e-mail to all relevant partners containing detailed plan, activity description and any other relevant information
- Prepare and supply materials (physical and/or online resources).
- Assign roles – if necessary, certain participants may act as facilitations, task leaders, etc.

2.1.6. Workshops with stakeholders

Similar to the intra-cMDF experimentation, workshops with stakeholders serve to test tools and services regarding their level of readiness, but also to gain rich insights into how the stakeholders perceive the service or use the tool. Workshops can be successfully run by following catered guidelines. Detailed guidelines on how to host and lead a successful workshop are described in the booklet attached to this report. In short, they entail pre-, during and post-workshop activities such as setting goals, designing activities, booking location and catering, engaging with stakeholders, setting an agenda, documenting the activities and writing down results, guiding discussions, preparing documentation (materials, consent forms, etc.), and finally, formally thanking participants for their collaboration. Subtitle

2.2. Facilitating the implementation of the iPRODUCE pilots

This session presents (1) the service propositions created by the CMDFs and (2) the analysis and recommendations made by CBS in support of the further development of the pilots and OI missions.

One service proposition was generated to each Use Case, yielding a total of 17 service propositions. The development process followed the guidelines and template mentioned in Section 2.1.1.

The service proposition analysis was performed in 2 steps. First, the service propositions were analysed to identify if all the suggested elements of the service proposition improvement were present. Second, individual coaching sessions were held with the cMDFs to deepen the knowledge of their offering and to offer support the cMDFs (see Section 2.1.2. for details). The coaching sessions took place in the dates shown in Table 2.

cMDF	Session dates
French cMDF	June 2 and August 26 2022
German cMDF	June 27, 2022
Italian cMDF	June 16, 2022
Greek cMDF	June 7 and September 2, 2022
Spanish cMDF	May 25, 2022

Table 1. Coaching sessions dates

Because of the support nature of T9.3, its outcomes and outputs vary according to the needs and opportunities identified in each case. For instance, an in-depth market analysis was created from the coaching sessions with the Greek cMDF, while the coaching session with the Spanish cMDF did not yield a tangible output but instead a consulting service to identify appropriate promotion channels for their services. All in all, most outcomes and outputs relate to marketing, communication and strategy, sustainability, product launch, user experience, and communication.

2.2.1.
2.2.1. Spanish cMDF

The 3 use cases of the Spanish cMDF were translated into service propositions as follows:

2.2.1.1. Smart headboard

The smart headboard co-creation service allows furniture manufacturers and consumers to design the product according to their preferences. The Spanish cMDF's partners take as a basis the idea from the manufacturer, collaborating with the FabLab for the design specifications and AIDIMME in the engineering part for the technical requirements.

Consumers and manufacturers can book the service online and via e-mail or phone call to Oceano Naranja FabLab. The daily rental fee for the FabLab facilities of €2 is payable after use and includes the use of the facilities and the hand tool. Special prices may apply for longer rental periods. The price for technical assistance is 20€/hour with a minimum of one hour. The use of machinery, digital production materials, 3d printing and supervision and instruction by an experienced professional is paid on an hourly basis. Prices vary between €6 and €45 per hour, according to the following table:

	Professional	FabLab	Student
CNC	45	35	30
Laser	30	25	20
3D printing	10	8	6
Other machinery	20	15	-

Table 2. Spanish cMDF pricing list in €/hour

Six-month binding memberships are available for €50 monthly as well as a coworking membership, which provides a workspace equipped with table, chair and chest of drawers and use the facilities (meeting room, workshop etc) and use of machinery at reduced rates. Co-working membership prices are available upon consultation. Additionally, the client can decide if they provide the materials or if they want Oceano Naranja to provide it. In the latter case, the material cost will be added to the final price.

2.2.1.2. Smart adjustable gamer chair

The smart adjustable gamer chair co-creation service allows gamer chair manufacturers and consumers to create a new concept for the chair keeping the actual design aesthetics based on their own specifications and on insights from interviews with gamers and analyses of existing chairs. Unlike any other, this service makes it possible to customise the design of gaming chairs to make it adaptable to the specific needs of each person and allows the user to participate in the process from the beginning (specification design) to the production phase. Consumers and manufacturers can book the service online and via e-mail or phone call to Oceano Naranja FabLab. The daily rental fee for the FabLab facilities of €2 is payable after use and includes the use of the facilities and the hand tool. Special prices may apply for longer rental periods. The price for technical assistance is 20€/hour with a minimum of one hour. The use of machinery, digital production materials, 3d printing and supervision and instruction by an experienced professional is paid on an hourly basis. Prices vary between €6 and €45 per hour, according to Table 1.

Six-month binding memberships are available for €50 monthly as well as a co-working membership, which provides a workspace equipped with table, chair and chest of drawers and use of the facilities (meeting room, workshop etc) and use of machinery at reduced rates. Co-working membership prices are available upon consultation.

Additionally, the client can decide if they provide the materials or if they want Oceano Naranja to provide it. In the latter case, the material cost will be added to the final price.

2.2.1.3. 3D printed components for assembling customized furniture

The 3D printed component for assembling customised furniture is a solution available to manufacturers, makers and designers that allows the production of a component designed and produced through 3D printing that is either designed by us or created using an existing component as mould. It is also possible to produce complete furniture using 3D printed components and other pieces that can be manufactured in the FabLab.

Consumers and manufacturers can book the service online and via e-mail or phone call to Oceano Naranja FabLab. The daily rental fee for the FabLab facilities of €2 is payable after use and includes the use of the facilities and the hand tool. Special prices may apply for longer rental periods. The price for technical assistance is 20€/hour with a minimum of one hour. The use of machinery, digital production materials, 3d printing and supervision and instruction by an experienced professional is paid on an hourly basis. Prices vary between €6 and €45 per hour, according to Table 1.

Six-month binding memberships are available for €50 monthly as well as a co-working membership, which provides a workspace equipped with table, chair and chest of drawers and use of the facilities (meeting room, workshop etc.) and use of machinery at reduced rates. Co-working membership prices are available upon consultation. Additionally, the client can decide if they provide the materials or if they want Oceano Naranja to provide it. In the latter case, the material cost will be added to the final price.

2.2.1.1. Service Proposition Analysis and Coaching Session

The service propositions relating to the Spanish Use Cases are thoroughly developed, making it clear to the customer base that these services offer customisation opportunities tailored to their specific needs, how to reach and use the services and how much it will cost. The following values can be identified from the descriptions:

1. Smart headboard - support towards product development design & customisation. Value created through converging technology, design and requirements.
2. Smart Adjustable gamer chair – minimise customers' sacrifice through offering customisation opportunities in furniture design.
3. 3D printed components for assembling customised furniture - minimise customers' sacrifice through offering customised solutions (moulds) for mass furniture fabrication

The high level of maturity seen in the 3 Use Cases mirrors the Spanish cMDF partners' extensive experience in their industries and markets (AIDIMME, for instance, has been in activity since the 80's). Opportunities to support this cMDF in the further development of their offerings lie in the go-to-market strategy, with particular focus on developing a promotion strategy that targets appropriate communication channels. The coaching session, therefore, focused on exploring promotion opportunities and the strategic communication opportunities. Main communications channels were pre-selected, aiming to reach specific target groups. These channels are influencers in the furniture industry,

the iPRODUCE platform and network, social media, face-to-face interactions, specialised media, participation in industry fairs, and the partner's own websites.

The coaching session with the Spanish cMDF took place simultaneously with the second Business Model workshop (T7.2). As the Business Model discussions began, the facilitators quickly identified the need analyse and prioritise the implementation of Use Cases to rationalise the use of resources and carry on with successful implementations.

To do so, the Impact vs. Effort Matrix was used. The matrix assisted the cMDF partners in prioritising Use Case testing and implementation by ranking the 3 UCs (and their corresponding attributes) according to their level of impact (or value) and the effort taken to test and implement them (see section 2.1.3 for more details on the method). In this manner, and as stated in D7.3, the workshop and related activities, including the identification and support for Use Cases for Task 9.3, helped towards streamlining and identifying which of the use cases and service offers that would have both a higher market value due to its uniqueness, and contribute to further strengthening the collaboration among the cMDF partners. In smaller groups, the workshop participants named the main attributes of each Use Case and placed them onto the matrix. They presented their work to the large group, and together they defined a final configuration for the matrix (Figure 2)

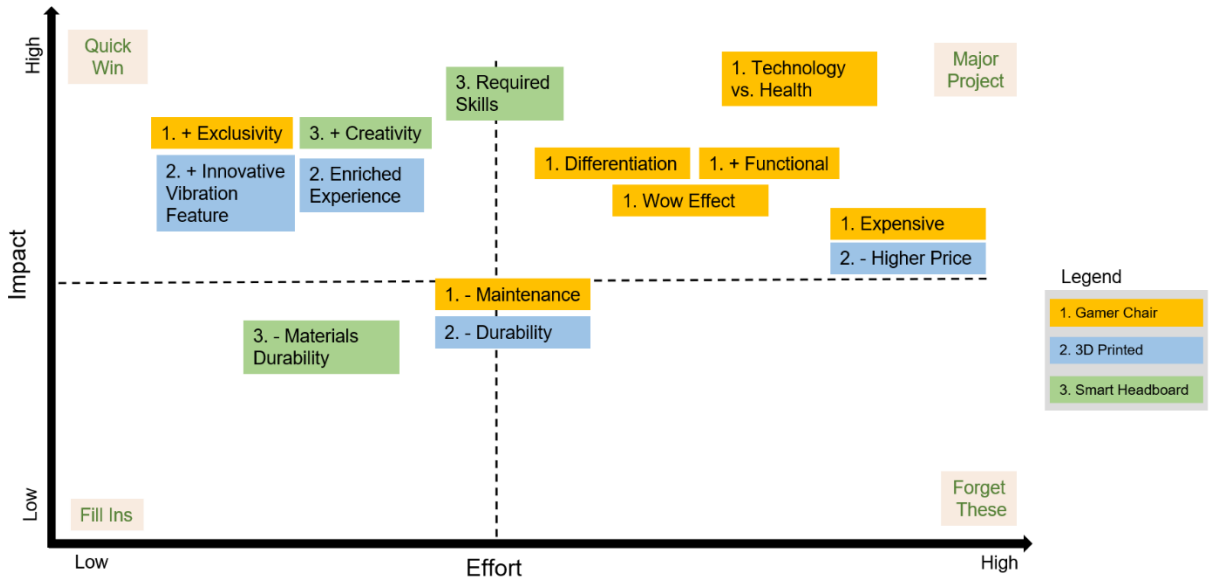


Figure 2. Spanish cMDF Impact vs. Effort Matrix

The attributes of the 3 UCs are identified in the matrix using 3 different colours – yellow for the Gamer Chair, blue for the 3D printed components, and green for the Smart Headboard.

A quick look at the matrix - using the colours as a guide - indicates that the gamer chair (yellow) is a "major project" that requires high efforts to deliver high impact. This is mainly driven by the high level of differentiation, functionality and exclusivity offered by the possibility of customising a gamer chair, but also for the high costs involved in the development of a fully customizable product design which does not allow for gaining the economy of scale inherent to mass production products.

On the other hand, the main attributes of the Use Case for 3D printed components for assembling customised furniture falls mostly on the "Quick win" quadrant. It contains a high impact potential due to the enriched experience of producing tailored parts locally using innovative technology. Yet, higher

prices involved in the development of the Use Case and its products may counterbalance the impact potential by limiting market opportunities.

Similarly, the Smart Headboard Use Case presents a high impact potential by offering room for creativity in the hospitality furniture segment and unique skills and product development tools to allow for such customised production. Differently from the other UCs, however, the Smart Headboard does not have attributes that incur in high effort for implementation.

Given the analysis above, the workshop participants agreed to first focus on testing and implementing the Smart Headboard, which could be done in a speedy manner with the least effort. Later, and based on the lessons learned from the Smart Headboard, they would move on to the other 2 UCs simultaneously.

As planned, the Smart Headboard was developed to contain a series of functionalities such as light intensity and temperature regulator, multimedia package with Bluetooth connection, air quality (CO2) assessment packaged with integrated sound and visual alarm, integrated speakers, LED tactile screen, and integrated display for messaging. The Spanish cMDF used a selection of iPRODUCE tools for the design (Figure 3) and manufacturing of the prototype, which was showcased at the Feria Hábitat[4] in September 2022 in Spain (Figure 4)

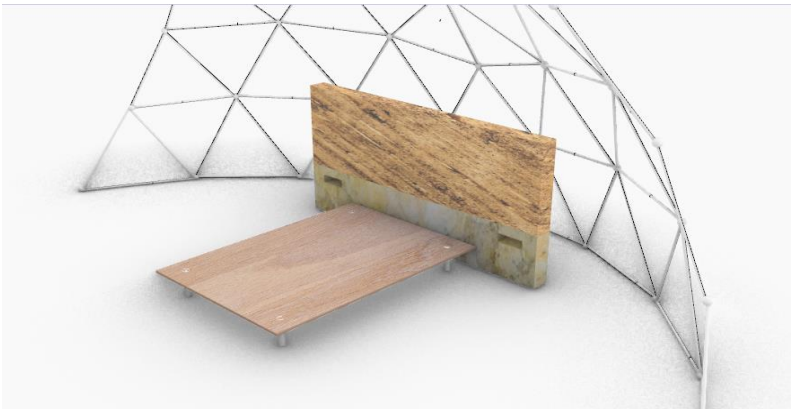


Figure 3. Design of the Smart Headboard - iPRODUCE Platform

[4] Feria Hábitat Valencia (*https://www.feriahabitatvalencia.com/en/*) is the main international showcase for the Spanish habitat industry with a wide range of furniture, lighting, decoration and upholstery. Every year it brings together more than 600 national and international firms and in its last edition it welcomed more than 48,000 professional visitors from 70 countries.

Figure 4. Smart Headboard prototype display at Feria Hábitat

Beyond displaying the prototype headboard, AIDIMME highlighted (including presentation to more than 100 participants - Figure 5) the collaboration with Lagrama and Oceano Naranja via the iPRODUCE Platform, raising awareness about iPRODUCE and the potential B2B collaborations with the cMDF partners in connection with the platform.

Figure 5. Presentation at Feria Hábitat

2.2.2. Greek cMDF

The 6 use cases of the Greek cMDF were translated into service propositions as follows:

2.2.1.4. IoT-based Orthopaedic back brace

The iPRODUCE platform enables collaboration among brace manufacturers, patients, and doctors in the fabrication of IoT-based Orthopaedic back braces. By doing so, the partners can reduce the product development´s cost, improve the adequacy and effectiveness of the idea from its original state due to the focus group feedback, raise co-creation practices between the industry and users and boost demand-driven sharing economy business models in the medical sector. Consumers can acquire the product by ordering it via OpIS Platform or Authorised resellers across the EU. The price is calculated according to the specification and customisation of each product, and it includes a fully functional product to assist patients during their treatment. AidPlex owns the Intellectual Property (IP) and the

buyer owns the product. AidPlex is responsible for the decision of the manufacturing of the product and the share of the revenues. In case 2 or more entities share the effort, they will share the revenues upon agreement. The split is laid out before offering.

The smart brace is especially attractive for children (game interface), making it easier to undergo treatment and to monitor progress and results (product + service/hardware collects data).

3 products/services compose this proposition:

1. Hardware - sold to families. AidPlex manufacturers the braces now, but in the future the manufacturing will be mostly done by other manufacturers.
2. Gamified data collection service (mobile App) - subscription fee to doctors and manufacturers. Currently investigating feasible fees. Market validation for software solution was in august 2022[5].
3. Data collection for doctors for best possible treatment - constant monitoring, quantitative data available to doctors, informed decision on how to progress with the treatment.

2.2.1.5. Splints for fractures

Manufacturers, patients and doctors can collaborate in the production of splints for fractures through the iPRODUCE platform. By doing so, they can expect reduced product development costs and improved adequacy and effectiveness of the idea from its original state due to the focus group feedback. They will also raise co-creation practices between the industry and users and boost customer-driven product manufacture and demand-driven sharing economy business models in the medical sector.

Consumers can acquire the product by ordering it via OpIS Platform or Authorised resellers across the EU. To calculate the exact price tag, consumers must request a quotation for the aforementioned product, due to the customised elements of these products. The price includes a fully functional product, which will assist patients during their treatment. The Intellectual Property is owned by AidPlex while the product ownership belongs to the buyer. and the buyer owns the product. AidPlex is responsible for the decision of the manufacturing of the product and the share of the revenues. In case 2 or more entities share the effort, they will share the revenues upon agreement. The split is laid out before offering.

2.2.1.6. Splints for pets

Manufacturers, pet owners and veterinarians can collaborate in the production of splints for pets through the iPRODUCE platform. This service aims at producing with reduced development costs and may improve adequacy and effectiveness as the development counts on group feedback. By using the iPRODUCE platform. They will also raise co-creation practices between the industry and users and boost customer-driven product manufactured in cMDF (AidPlex) and demand-driven sharing economy business models in the medical sector. Consumers can acquire the product by ordering it via OpIS Platform or Authorised resellers across the EU. To calculate the exact price tag, consumers must request a quotation for the aforementioned product, due to the customised elements of these products. AidPlex owns the IP and the consumer owns the manufactured product. AidPlex is responsible for the decision of the manufacturing of the product and the share of the revenues. In case 2 or more entities share the effort, they will share the revenues upon agreement. The split is laid out before offering.

[5] Several tests (approximately 15) were run with patients in the market validation. A technical file for receiving the CE Mark was developed.

2.2.1.7. Customised face shields

Manufacturers, healthcare practitioners, the public and civil society can collaborate in the production of customised face shields through the iPRODUCE platform. The collaborative process aims at increasing adequacy and effectives, while the service is designed to reduce development costs. They will also raise co-creation practices between the industry and users and boost customer-driven product manufactured in cMDF (AidPlex) and demand-driven sharing economy business models in the medical sector.

Consumers can acquire the product by ordering it via OpIS Platform or Authorised resellers across the EU. To calculate the exact price tag, consumers must request a quotation for the aforementioned product, due to the customised elements of these products. The price includes a fully functional product.

Like the case of splints for fracture, AidPlex owns the Intellectual Property, and the consumer owns the manufactured product. AidPlex is responsible for the decision of the manufacturing of the product and the share of the revenues. In case 2 or more entities share the effort, they will share the revenues upon agreement. The split is laid out before offering.

2.2.1.8. 3D printed smart luminous artefacts

Manufacturers, students, teachers, parents and guardians' association, makers, gamers, electronic engineers can collaborate in the production of 3D printed smart luminous artefacts through the iPRODUCE platform. Consumers can acquire the product by ordering it via OpIS Platform or Authorised resellers across the EU. To calculate the exact price tag, consumers must request a quotation for the aforementioned product, due to the customised elements of these products. The price includes a fully functional product. CERTH owns the IP, and the consumer owns the product. CERTH is responsible for the decision of the manufacturing of the product and the share of the revenues. In case 2 or more entities share the effort, they will share the revenues upon agreement. The split is laid out before offering.

2.2.1.9. 3D printed (bio) scaffolds

Manufacturers, researchers (in medicine, pharmacy etc.), biologists, doctors, clinicians, surgeons, and orthopaedists can collaborate in the production of 3D printed (bio) scaffolds through the iPRODUCE platform. By doing so, consumers will have access to quick prototyping cycles and know-how transfer for implants and organoids. Consumers can acquire the product by ordering it via OpIS Platform or Authorised resellers across the EU. To calculate the exact price tag, consumers have to request a quotation for the aforementioned product, due to the customised elements of these products. The price includes a fully functional product, which will assist patients during their treatment. CERTH owns the Intellectual Property and consumers own the product.

CERTH is responsible for the decision of the manufacturing of the product and the share of the revenues. In case 2 or more entities share the effort, they will share the revenues upon agreement. The split is laid out before offering

2.2.2.1. Service Proposition Analysis and Coaching Session

The service propositions relating to the Greek Use Cases are thoroughly developed. From the descriptions, it is possible to identify that the first 3 Use Cases offer the same value, while the others are differentiated:

1. IoT-based Orthopaedic back brace, Splints for fractures, and Splints for pets - support patients, health and manufacturing professionals towards developing customised medical equipment.

2. Customised face shields - support patients, health and manufacturing professionals towards developing ‘off-the-shelf” medical equipment.
3. 3D printed smart luminous artefacts - Offer the possibility for customisation for ‘off-the-shelf” light objects
4. 3D printed (bio) scaffolds - support health and manufacturing professionals towards developing 3D printed medical organs and implants for training

The Greek Use Cases are highly innovative for bringing Internet of Things (IoT) and customised 3D printed devices into orthopaedic treatment. These service-integrated products have potential to disrupt a well-established, fast-paced and competitive market by allowing for real-time data collection and sharing, and customer-tailored devices. One characteristic that can support sales is the circular design inherent to these products and services, which allows for repurposing and recycling of materials once the treatments are completed. This is aligned with current (and ever growing) market sustainability requirements and can bring a strategic advantage to the Greek cMDF. Yet, there are restrictive regulations in the medical sector that hinder closed-loop-material-cycles in the medical industry.

Regarding launch, the novelty of these service-embedded products can act as barriers. Therefore, the Greek partners must develop a robust launch strategy that builds trust and allows for market penetration. In terms of experience, the Greek partners bring extensive research and tech development expertise, but limited market experience (AidPlex, for instance, is a Startup). This is the area where most support opportunities within T9.3 arise, especially regarding assessing market opportunities and sustainability.

In support of the further development of the Greek cMDF offerings, it is recommended the development of a go-to-market strategy that could address potential barriers such as knowledge gap, saturation, product positioning, promotion and scalability. Using the go-to-market guidelines presented in Section 2.1.4, each cMDF partner developed their own analysis, as follows:

2.2.1.10. AidPlex’ output from coaching session

Scalability of AidPlex can be achieved by following 3 strategies:

- Scale through the expansion to other countries - AidPlex to increase revenues and valuation will seek new countries that have low barriers to entry (regarding regulations, and competition) to penetrate.
- Scale through the creation of new revenue streams - Simultaneously AidPlex will create new products to increase revenues and valuation. Combining the new target countries and the new products, AidPlex will take profit from its market channels and will launch new products with less effort.
- Scale through making partnerships - AidPlex will secure strategic partnerships with key players that will make it easier to follow the aforementioned strategies easier and more effectively if it finds key players and makes partnerships with them to accelerate its progress.

Competitors (Back Brace): The first type of competition is the existing treatment approach which has not changed for decades. Clinicians do not use any technology to monitor patients. To diagnose the severity of scoliosis, clinicians need to know how many hours the brace was worn in a certain period. But the number of wear hours reported by patients and caregivers is highly subjective and difficult to verify. This leads to false conclusions and delays proper treatment, increasing the chances of spinal surgery.

Green Sun Medical has developed its own adjustable back braces. Their approach is very difficult to commercialise. It requires a lot of clinical evidence to prove that their brace is effective in treating

scoliosis and it is time-consuming. They need to commercialise a new type of brace in a very specialist market and replace the Boston or Cheneau braces which are currently the golden standard for treating scoliosis effectively.

The second type of competition is sensor-based monitoring systems fitted on braces (e.g. heat sensors for detecting the wear time of the brace), such as Intellirod Spine and Nova Motum. These systems measure the wearing time of the back brace, removing subjectivity and error, but not in real time. The sensor data is stored on the patient's device and clinicians can only access this data the next time that the patient visits them, which could be several months away.

The fact that clinicians have to wait for months to get feedback from the patient makes the treatment of scoliosis a slow and ineffective process. If feedback loops could be shorter, treatment outcomes would be significantly more effective. Also, despite being accurate, the wearing time estimates provided by the above monitoring systems are not sufficient to enable complete adherence monitoring according to the prescribed treatment regime. This is the main value differentiation provided by ScolioSense.

Competitors (Splint): There were 3 groups of competitors. The first ones are the plaster of Paris companies. Some of them are BSN medical and OrthoTape. The second group of competitors are companies with thermoplastic materials. Some of them are Orfit, T-Tape Company, Performance Health, Ottobock. The third group of competitors are companies with fibreglass splints. There are 2 different products of fibreglass splints. The first one becomes rigid by air and the second one by water. AidPlex is providing splints, which are 5 times lighter by the conventional solutions. They are waterproof, skin friendly, breathable and translucent. They are a ready-to-use solution, which reduces the health economics of healthcare organisations. In addition, AidPlex's splints are recyclable, biodegradable and they can be composted and transformed into fertiliser, being part of the circular economy. The geometry of the splint has IoT integration potential (future product).

Market Size: The Global Scoliosis Treatment Market is expected to reach $3,342B by 2025 with a CAGR of 4.12%. It is reported that every year in the EU and the US more than 100,000 new back braces are built for use by adolescents, with an estimated lifetime of 2-4 years. The brace costs depend on the country with a price range between 1500€ and 6000€. Every patient wear 1 to 3 back braces during the treatment procedure.

The global market for bone fracture repair devices is expected to become $22.3 billion by 2029, growing at a CAGR of 5.7% over the forecast period, driven by increasing prevalence and incidence of osteoporosis, growing elderly population, and technological advancements.

AidPlex is offering a solution that can be retrofitted onto any type of back brace. This enables access to the global market. The extra charge that ScolioSense represents for the end-user is expected to be covered by insurance companies, especially given that improved patient adherence directly affects the risk of costly spine surgery. The total cost of spine surgery in the US could reach $150.000, alongside a six-month rehabilitation for the patient.

Specify and describe TAM, SAM, and SOM: ScolioSense is entering a growing market due to the rapid growth of medical monitoring devices. The transformation of the medical field towards adopting a telehealth operating model represents the best possible opportunity for AidPlex to launch ScolioSense.

The global wearable medical device market size was valued at USD 21.3 billion in 2021. It is expected to expand at a compound annual growth rate (CAGR) of 28.1% from 2022 to 2030. The growth of industries such as home healthcare and remote patient monitoring devices is anticipated to influence market growth. In addition, increasing focus on fitness and a healthy lifestyle orientation are also

expected to impact the market. A surge in product demand during the COVID-19 pandemic and increasing awareness about personal health monitoring is expected to be some of the major market drivers.

AidPlex aims to increase its market share by addressing more orthopaedic and spinal conditions . The selection of the next addressable market will take place after extensive market research. This will be finished by September or October 2023, upon receipt of the *new funding round* and after the market launch of *ScolioSense* in Greece & Cyprus. Potential developments may relate to Kyphosis and Lordosis, which are spine deformities that are similar to scoliosis and they are similarly treated with back braces. These conditions will demand lower development effort and barriers to entry and will be the first transfer of AidPlex's technology.

Regulations: AidPlex acquired the ISO 13485:2016 by September 2022, which is a mandatory Quality Management System for a medical device company to operate in the European Union. In addition, AidPlex has filed the Technical File of ScolioSense to the Greek National Organisation of Medicines in Greek and English, under the latest Medical Device Regulations (MDR). ScolioSense has become CE marked. The CE mark allows AidPlex to sell ScolioSense across Europe, only by translating the content of the Technical File in the targeted country and by notifying the National Organisation of Medicines.

For the US market, AidPlex has already identified a code in the medical device database of the FDA to get listed under this code. This code indicates that the device is considered a class I Medical device by FDA and that it is also exempted from GMP and 510(K). Further research on the FDA approval roadmap will be held with the assistance of a regulatory expert for FDA regulations.

Channels: AidPlex will approach each member of the medical value chain with a different strategy.

Patient Advocacy Groups: Approaching and partnering with Patient Advocacy Groups via direct sales, like Petaluma (https://osteocare.gr/), was one of the greatest growth hacks that AidPlex achieved in 2021. AidPlex received significant validation from the patient perspective and received warm introductions to Key Opinion Leaders and Brace Manufacturers.

Key Opinion Leaders in Orthopaedics will be approached through exhibitions, conferences, marketing efforts, and direct sales. AidPlex must make successful demonstrations and create word of mouth around ScolioSense. By using clinical evidence, AidPlex will persuade them to use ScolioSense. Until now, AidPlex has closed partnerships with 2 of the most well-respected spine surgeons in Greece (Dir. Simulates - Aristotle University of Thessaloniki & rd. Gillis - University Hospital of Ioannina).

Brace Manufacturers will be approached through direct sales. AidPlex goal is to form partnerships with large brace manufacturers, train them and sell ScolioSense in high volume. In addition, a possible channel to acquire more brace manufacturers is Clinicians, which can introduce AidPlex to them. Until now, AidPlex is about to close partnerships with 2 of the largest brace manufacturers in Greece, Scoliosis SLC & Ideal & Hlamidis Orthopaedic Centre.

Patients & their families are the end-users. They can be approached through marketing campaigns (social media & classic media). Until now, AidPlex has developed a partnership with the largest patient focus group in Greece. This channel has great potential for AidPlex's penetration to each country and can be replicated in each target country. As a result of this partnership, AidPlex ran 2 pilot tests with 11 patients to validate the product's value proposition, find and resolve bugs and close the 1st version of ScolioSense.

2.2.1.11. CERTH's output from coaching session

Market Size: The 3D printing market size in the education sector is expected to grow by USD 720.31 million at a CAGR of 11.68 by 2026. CERTH is offering training and educational workshops focused on 3D printing technologies to boost students' creativity and practical knowledge. Students will learn in a hand-on manner and develop their creativity and problem-solving abilities via 3D printing. Additionally, students will benefit from a visual learning environment in the classroom created by 3D printing, that reinforces their involvement and interactivity in getting familiar with digital technologies.

Target group: students (elementary, middle, high-schools or universities/colleges), teachers/ parents and guardians associations

Reach the audience: Training workshops and events with the aid of local ambassadors

2.2.3. German cMDF

The 4 use cases of the German cMDF were translated into service propositions as follows:

2.2.1.12. Co-creation Introduction for SMEs - From idea to prototyping in 3 days

Co-creation methods are widely unknown by SMEs. Their service offer "Live-Prototyping-Service" teaches and presents the basic Design Thinking Mindset to SMEs. The open innovation approach is discussed and/or Design Thinking Methods and Tools used to support the product innovation process within the SME. The format may be agreed and done in the preferred way of the SME (online, F2F, one day or by hour, depending on the setting and time frame agreed with the SME.) SMEs may book the Service by contacting the German CMDF partners: FIT, MSB or ZENIT. The price of the Service is charged on a cost by effort base.

2.2.1.13. Machinery training

This service aims to increase training efficiency in a Makerspace and FabLab context. The partly automated machinery training (or better, on-demand training) shall decrease the workload for instructors and avoid repetitive instructor tasks. Their current idea is to give it out to makerspaces for free. In general, it would be possible as well to let makerspaces pay a fee for using it.

2.2.1.14. Product Forge

Product Forge is the service that was initially called Guided Product Development as a Service (GPDaaS). It is designed to support Start-ups and SMEs in product development. So far companies need trained staff, a location and equipment to pursue product development. By using the German cMDF services, they can spare cost and time for one or more of these. After an analysis of the individual needs the customer receives a tailor-made offering. The service is designed to allow maximum flexibility during usage. As a result, the customer can focus on the core topic of developing his product(s) with assistance (e.g., agile methods like design thinking or support by tech specialists) in the desired/necessary degree. Depending on the contracted support level he can also outsource side topics (e.g., location/catering, procurement of consumables). By focussing on the core functions, customers can save plenty of time and money. Using their service instead of skilling up for seldom-performed tasks is far more efficient. As the service is highly customised, there is no standard price. As a reference, a previous customer used 5-week service costing approximately 35k€ and was very pleased. At the end

of the process, the customer owns the products and the intellectual property. In case effort is shared, the revenues are also with the involved parties. The split is laid out before offering.

2.2.1.15. IoT Education Kit

The IoT Education Kit is a solution offered to makers and manufacturers that provides unparalleled provision of IoT learning kits to schools. The key is to undercut usual high pricing in STEAM (Science Tech Engineering Art Math) arena and to flood the market with equipment that kids can keep instead of leaving it at school. The project was financed by a big industry partner to provide a low-cost product that can be obtained by cities for all kids of a specific age group (usually between 12 and 16 years). Using gamification of learning IT, kids start without a kit but with a simulated device. After solving first tasks they “level up“ and get their first hardware. For levelling up further, they get access to upgrades. This may include for example hardware upgrades like new sensors, 3D printed add-ons and new software elements.

The simulation is available for free. The entry kit costs 20€/kid if sold city wide and includes a programmable microprocessor, a sensor and 2 motors. 3D prints are available for free in the Makerspaces (leading to usage/membership fees). Prices vary according to levels (the more kids level up, the more is invested into their growth). Optimal investment is guaranteed, as everything is based on participation and skill.

Makerspace owns the IP. Makerspace earns from selling produced goods - just enough to keep growing production (“we are non-profit, we profit from growing education”). Fraunhofer earns from providing training to teachers.

2.2.3.1. Service Proposition Analysis and Coaching Session

The service propositions relating to the German Use Cases are thoroughly developed, with clear statements regarding the value they offer and how customers can access them. From the descriptions, it is possible to identify the following values offered by each Use Case:

1. Co-creation Introduction for SMEs: From idea to prototyping in 3 days - offer “Live Prototyping Service” to SMEs with integrated teaching and training in the basic Design Thinking Mindset
2. Machinery training – offer on-demand automated machinery training to ‘makers’
3. Product Forge - support Start-ups and SMEs in product development (5-week service)
4. IoT Education Kit – provision of IoT learning kits to schools

The services offered by the German cMDF focus on 2 areas: training and product/prototype development. During the coaching session, 2 support opportunities were identified: (1) support with communications and go-to-market strategy, and (2) support with usability and user experience. Because Zenit is specialised in communications and marketing, the first opportunity of support is to be provided by them as an intra-cMDF service. With regards the usability and user experience of the machinery training offering, the German cMDF opted for addressing these issues using the skills they bring in their own organisational toolbox, so no further support was provided.

2.2.4. French cMDF

The 2 use cases of the French cMDF were translated into service propositions as follows:

2.2.1.16. Prototyping equipment training videos, baseline and advanced

Digitalisation of training is a solution offered to makers and the public that enables the quick digitisation of training sessions using tools provided by iPRODUCE (video intelligence). By putting their training online, FabLabs can reach a wider audience and optimise time and resource management by avoiding redundant training.

The consumer will be able to access the training directly through the iPRODUCE platform and identify the FabLabs there. Afterwards, they will also be able to visit the FabLab to continue their activities on site.

2.2.1.17. Mobility Sector Product Development Package

The Support for Mobility Projects - From Idea to Industrialisation is a service offered to entrepreneurs and project holders that brings together the stakeholders and knowledge to help an entrepreneur develop and realise his mobility project. By having access to these actors in addition to the tools offered by the iPRODUCE platform, the entrepreneur will have a better vision of the actions to be carried out, of the costs and should benefit from a faster handling of his project. The user will be able to access the different structures directly via the iPRODUCE platform. If developments require physical meetings, it will also be possible to carry them out. The idea is to facilitate and secure the exchanges as much as possible by using the iPRODUCE platform and the tools it contains. After an initial assessment of their needs, an action plan will be defined. The service benefits the user by providing expertise in a coordinated manner set up to meet the needs of the entrepreneur as closely and quickly as possible. Exchanges will be facilitated by the iPRODUCE platform. Through dynamic pricing, the user will pay for the different structures according to the users' specific needs and the work done. Dynamic pricing depending on the partner's needs (e.g. complexity of product/service).

2.2.4.1. Service Proposition Analysis and Coaching Session

The service propositions relating to the French Use Cases are thoroughly developed, with clear statements regarding the value they offer and how the customers can access them. From the descriptions, it is possible to identify the following values offered by each Use Case:

1. Prototyping equipment training videos, baseline and advanced - Create materials to instruct FabLab users facilitating self-managed access and use of machines
2. Mobility Sector Product Development Package - Support Entrepreneurs & SME to develop novel services towards the mobility sector – service strategy and plan

The first coaching session with the French cMDF focused on identifying possible knowledge and implementation gaps referring to their 2 UCs. Using an exploratory approach, the facilitators guided the session by first asking questions regarding the status of UCs implementation, culminating in 2 key questions from the cMDF partners:

a. How to make our service offer clearer? How to market this service offer?
b. How to perpetuate the iPRODUCE project, and more specifically at the French cMDF level?

To address question "a", CBS prepared a "go-to-market strategy" guide to be used by the French cMDF partners in the development of their marketing and sales strategy. The method was presented in the second coaching session, where the partners could ask questions and start delineating a suitable strategy to each service.

Regarding question “b”, the facilitators explained that iPRODUCE coordination and selected partners were discussing an optimal post-project governance and exploitation plan for the platform with the objective to ensure the longevity of iPRODUCE. The pre-final version will be presented to the partners for assessment, questions, and voting or decision by consensus.

Finally, the facilitators suggested joint work between the French (Use Case 1) and German (Use Case 2) cMDFs, given their similarities in format and purpose (virtual training). A meeting to kick-off this collaboration took place in France, following the consortium meeting in Metz in October 2022. The collaboration consisted of the exchange of information and methods, and the elaboration of standards to harmonise the creation of the online training materials. As a result, the two cMDFs defined guidelines for the development of:

- Tutorials under specific themes (3D printing, CAD Design, Machine Uses, etc.)
- A training flow and path for users (Starting with Material selection, Sketching, CAD design, Mechanical Calculations, Prototyping, etc.)
- Training materials for each level of users (Beginners, Intermediate, Advanced, Professionals)

2.2.5. Italian cMDF

The 2 use cases of the Italian cMDF were translated into service propositions as follows:

2.2.1.18. Linear Translation Robo Shaker

The service offered is to support companies and professionals - especially SMEs – in the design and build up of components, devices with innovative technologies, which are not available to them regionally. In more details, the offered services are Design (mechanical and microelectronics), Realisation of goods (3D printing, drilling, and other technologies), Quality check, Measurement, Technical consultancy services and Training on additive basics. By using the co-creation methods and tools offered by iPRODUCE, the customer benefits from research, team building, ideation, development, assessment, evaluation and validation during the co-design and prototyping phases.

Students can participate in projects upon referral to the cMDF by their high-schools/universities. Companies and professionals can search for partners or be contacted by potential partners via the iPRODUCE matchmaking platform, after direct contact via phone or via media communication. The services of design, realisation of prototypes, quality check, measurement, technical consultancy, training and technology transfer are offered based on direct agreement and on a commercial price basis. The client can negotiate the terms, condition of the intellectual property right, and be involved in the development of external actors.

The client can use the facility’s equipment after a specific training programme and guided by a mentor. All the prototypes and documents (cad files, manuals, etc.) related to the products belong to the client. On request, the cMDF can allocate resources as project manager, consumer validation and activate open innovation initiatives.

2.2.1.19. Distributed Watering System

This service relates to the design and building of components and devices using innovative technologies. Particularly, it facilitates access to technology that are not broadly accessible, benefitting companies and professionals in general, especially SMEs. In more details, the offered services are Design (mechanical and microelectronics), Realisation of goods (3D printing, drilling, and other

technologies), Quality check, Measurement, Technical consultancy services and Training on additive basics.

By using the co-creation methods and tools offered by iPRODUCE, the customer benefits from research, team building, ideation, development, assessment, evaluation and validation during the co-design and prototyping phases.

Students can participate in projects upon referral to the cMDF by their high schools/universities. Companies and professionals can search for partners or be contacted by potential partners via the iPRODUCE matchmaking platform, after direct contact via phone or via media communication. The services of design, realisation of prototypes, quality check, measurement, technical consultancy, training and technology transfer are offered based on direct agreement and on a commercial price basis. The client can negotiate the terms, condition of the intellectual property right, and be involved in the development of external actors. The client can use the facility's equipment after a specific training programme and guided by a mentor. All the prototypes and documents (cad files, manuals, etc.) related to the products belong to the client. On request, the cMDF can allocate resources as project manager, consumer validation and activate open innovation initiatives.

2.2.5.1. Service Proposition Analysis and Coaching Session

The partners that compose the Italian cMDF detain a wide range of business skills and experience in their industries, which translates into well-rounded service propositions. From this point of departure, there weren't many (managerial) gaps to be filled through support services. Instead, the Italian cMDF suggested using the opportunity to discuss their existing "pilot design".

The Italian cMDF pilot design highlighted the need to establish KPIs - transversely across use cases and specifically to each use case. Both the Linear Translation Robo Shaker and the Distributed Watering System had assembled prototypes which lacked testing with external partners.

The main point of concern in the discussion referred to the postponed operationalisation of the platform and how that could impact the implementation of the pilot. As a solution, the Italian cMDF opted for dividing the pilot implementation in 2 phases: (1) without the aid of the OpIS and later (2) with the use of the OpIS. In both phases, workshops would serve as testing and feedback collection opportunities. Citizens, SMEs and students were defined as target groups.

As planned during the coaching session, two events took place in November 2022 and February 2023. guidance provided by CBS during the coaching sessions and also present in the "T9.3 Booklet of methods and tools" with particular reference to chapters 2.4 and 2.5 was used in this phase. Each session dealt with a specific Use Case - the first event focused on "smart cradle" or "rocking cot" while the second event focused on "smart watering system."

The events/workshops were performed in two formats:

- hackathon with potential users of the SW platform/tool.
- meetings with ambassadors and stakeholders.

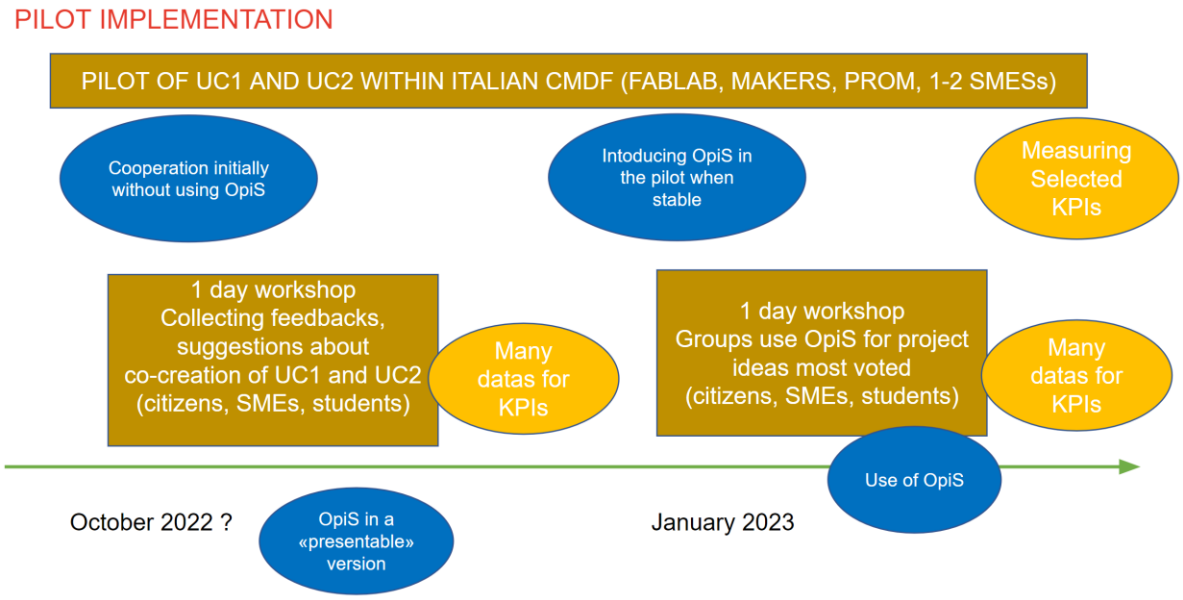


Figure 6. Roadmap to the Italian Pilot Implementation

The UC focused approach allowed for reaching out a wider range of stakeholders (e.g. students/makers involved in the hackathons and entrepreneurs/managers/FabLab involved either as hackathon jury members or as ambassadors)

The events allowed for engagement with stakeholders and discussions about the project itself and about the broader issues of digitisation of production processes and co-creation for new product development. More than 40 people were involved in the first workshop (organising committee excluded): 35 registered hackathon participants and 6 ambassadors/stakeholders. The second event was arranged in the MuSe Science Museum of Trento venue. Although it had lower numbers (29 registered hackathon participants, 4 ambassadors), it was successful in gaining a lot of visibility among museum visitors (that were impossible to track and count) and also from local/regional news. As a result, the Italian cMDF received extremely positive feedback regarding the project and its goals and broad interest in testing the SW tools as soon as possible when they have reached the maturity to be deployed in the company. Yet, at the events the SW tools were not yet mature enough to be used independently by the stakeholders, but it was still possible to conduct a live demo to explain the project and its objectives.

2.3. Assessment of platform-business alignment

With the iPRODUCE Platform reaching its final stages of development, an evaluation of the alignment between the existing online tools and the need of the cMDFs and partners was performed. Through an online survey, project partners rated their level of agreement with the following statements:

- The iPRODUCE platform meets my (my organisation's) needs for the implementation of the service offerings.
- The iPRODUCE platform gives me (my organisation) competitive advantage to develop new products and services.
- The iPRODUCE platform enables me (my organisation) to further develop existing markets.
- The iPRODUCE platform enables me (my organisation) to reach for new markets.
- I noticed that the MMCs around me have shown interest in iPRODUCE.
- I have used at least one tool of the iPRODUCE platform in the development of a service/product.

The assessment was performed by rating the aforementioned sentences in a 7-point scale. The rating questions were followed by 3 free-text questions where respondents could explain the drivers of their ratings and any other relevant comments:

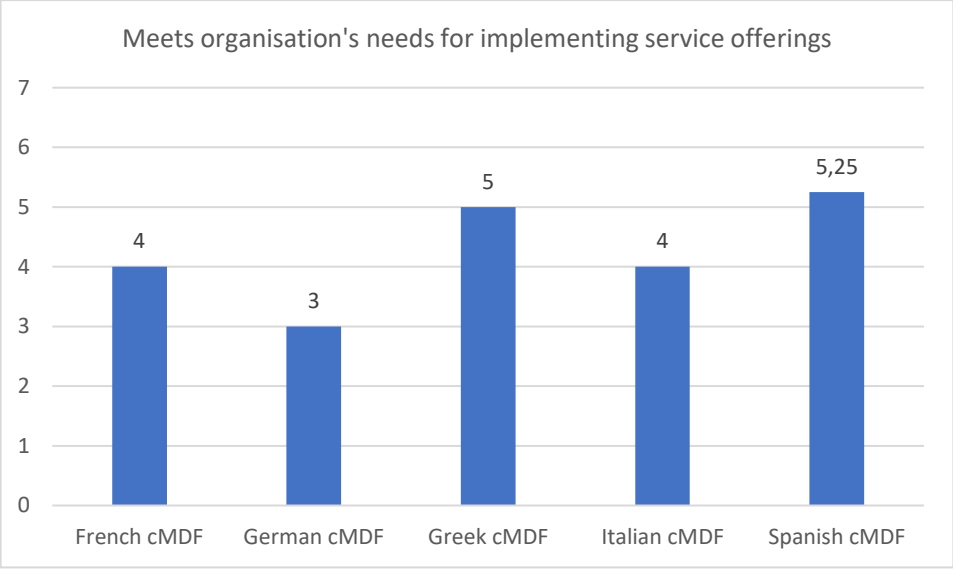
- Please mention 3 key aspects that need to be improved for the successful outcome of the demonstrations.
- Please mention 3 aspects you consider key for a better iPRODUCE platform user experience.
- Please share any other opinion and thoughts on the iPRODUCE's ability to meet your needs regarding the successful outcome of the demonstrations.

Twelve responses from representatives of the five cMDFs were collected in April 2023. The results are presented below:

2.3.1. Rating of platform-business alignment per cMDF

The data collected were aggregated per cMDF by using an average calculation.

The platform was positively evaluated regarding its capacity to meet the partner/user's needs for implementing the service offerings (Figure 7). Of 5 cMDFs, only one (German) attributed a (slightly) negative feedback regarding the statement "The iPRODUCE platform meets my (my organisation's) needs for the implementation of the service offerings." Deriving from the open-text questions, it is possible to conclude that the main driver for this rating refers to the user experience (UX), which in April 2023 was still undergoing major changes in response to the Heuristic Evaluation performed in T9.2 and other feedback channels (e.g. monthly meetings, bug reporting spreadsheet). Given the recent updates and improvements reported on the platform, it is expected that expect that many – if not most – of the issues have been solved by the project end.

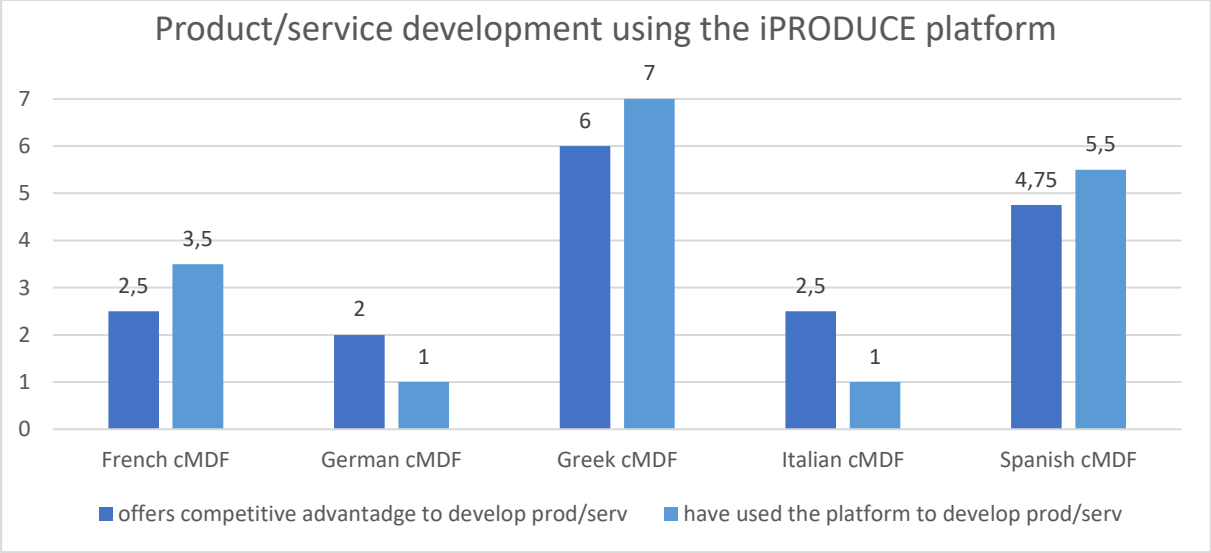


4: neutral / >4: agreement with statement / <4: disagreement with statement

Figure 7. Rating of platform's ability to meet organisation needs for implementing service offerings

The evaluation of the platform's capacity to offer competitive advantage in developing new products and services divided opinions across cMDFs (Figure 8). With ratings varying from 2 (rather low) to 6 (rather high), the iPRODUCE platform/tools served best the Greek cMDF and least the German cMDF. The evaluations regarding the actual use of the iPRODUCE tools and platform in the development of

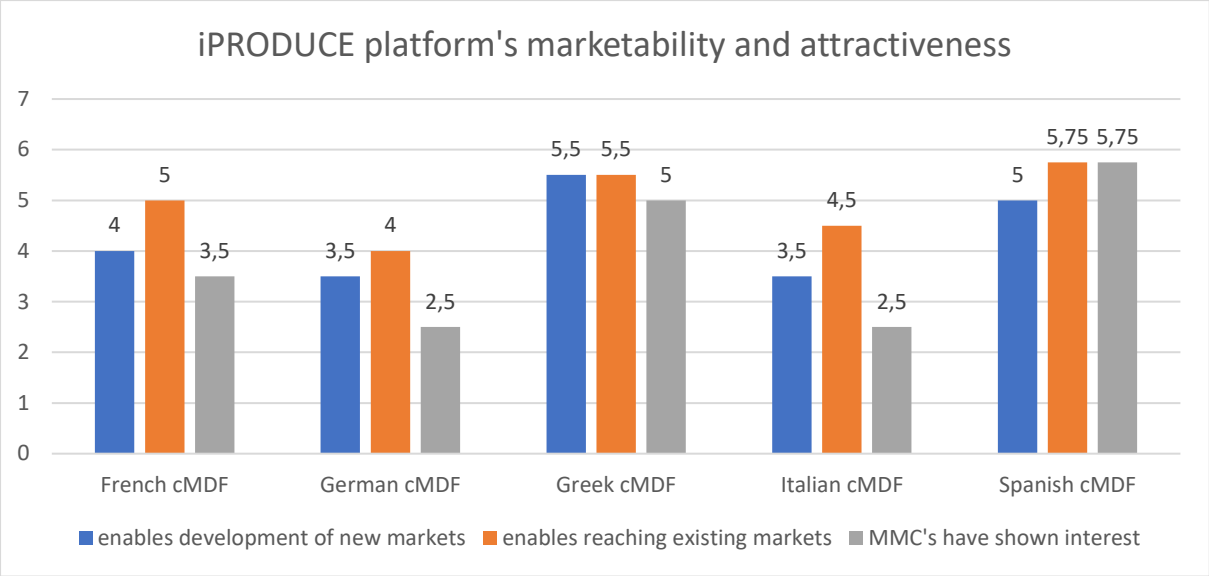
products and services follows a similar trend across cMDFs. Deriving from the coaching sessions, it is possible to infer that this trend can be explained by the different focus of each cMDF. For instance, the Greek cMDF's core service proposition consists of physical products (medical devices) with embedded services (connectivity, data collection, enhanced medical treatment), whose development was facilitated through the iPRODUCE tools, even at early stages of platform development. On the other hand, the German cMDF's core service proposition consists of less tangible outputs (e.g., training, education, product development guidance), which may use the iPRODUCE platform but do not necessarily depend on it for its development. Although this analysis may explain the main driver for this evaluation, a more in-depth analysis is advised in the upcoming phases of iPRODUCE post-project so to ensure that possible barriers to iPRODUCE's ability to support product/service development are identified and addressed.



4: neutral / >4: agreement with statement / <4: disagreement with statement

Figure 8. Rating of platform's ability to offer competitive advantage and actual use of platform

Next, the cMDFs' impressions on the platforms' marketability (Figure 9) and attractiveness were investigated. Reaching a rather positive evaluation, the platform seems to be well suited to support the cMDFs in reaching existing markets and may as well accrue to the development of new markets. With slightly lower ratings, the cMDFs report that the MMCs have shown some interest in joining iPRODUCE and using the services offered by the cMDFs. There are several possible strategies to grow MMC's interest in the platform. The first is to increase awareness regarding the solutions and benefits offered by the iPRODUCE model (tools with embedded service + access to broad expertise from partners). Such strategies are documented in the business models canvas in D7.3 (e.g. targeted magazines, social media, word-of-mouth within existing networks) and suitable methods to design and implement these strategies are presented in Section 2.1.4.4 - Reach the Audience. As the customer base grows, it is important to evaluate customer retention and assess satisfaction levels and improvement opportunities to ensure continuous development and enhanced attractiveness of iPRODUCE.



4: neutral / >4: agreement with statement / <4: disagreement with statement

Figure 9. iPRODUCE platform's marketability and attractiveness

Regarding the free text inputs, the cMDF partners are unanimous regarding the need to achieve a smoother user experience intra and inter tools. Much of the necessary improvements have been performed in the final phases of the project, building on the feedback from the Heurist Evaluation (T9.2), monthly WP9 meetings – including the presentation of the results from this survey, and bug reporting spreadsheets.

All in all, the assessment points to a positive alignment between the platform and the business needs, with improvement opportunities lying in the user experience and in advertising and awareness raising aiming at growing the customer base. Because the implementation of the use cases and OI missions took place with the involvement of external stakeholders and yielded satisfactory results (products and services were developed, be it on common business cases or through the hackathon), this assessment leads to the conclusion that the necessary conditions and maturity were established within the MMCs for a successful outcome of the demonstrations. Looking forward, the adoption of a continuous improvement policy is recommended – especially in the initial phases of exploitation – to ensure customer attraction, satisfaction, and retention.

3. Realisation of Local cMDF Pilots and Open Innovation Missions (T9.4)

Task T9.4 focused on the evaluation of the OpIS in specific scenarios (missions) selected by each Collaborative Manufacturing Demonstration Facility (cMDF). This section showcases the results of efforts in conducting a proof-of-concept exercise to assess the effectiveness and impact of OpIS within diverse partner organisations from the Core Group associated with each cMDF. This evaluation aims to validate the capabilities and potential of OpIS in driving open innovation and collaborative problem-solving within real-world settings, including schools, hospitals, and SMEs.

The OpIS represents a cutting-edge digital platform that facilitates open innovation by connecting stakeholders, enabling the exchange of ideas, expertise, and resources across organisational boundaries. It has been designed to empower participants to engage in innovation missions, co-create solutions, and address complex challenges collaboratively. As part of this evaluation, specific scenarios within each cMDF were strategically selected, involving partner organisations from the Core Group, such as schools, hospitals, and SMEs, to ensure a diverse and representative range of contexts and perspectives.

This report provides an analysis of the evaluation process, presenting key findings, insights, and recommendations derived from the experimentation with OpIS in these specific scenarios. The evaluation focused on multiple dimensions, including the usability of the software, the level of stakeholder engagement, the effectiveness of problem-solving processes, and the impact achieved through open innovation missions. Examining these aspects helps to gauge the practicality, benefits, and challenges associated with the implementation of OpIS in real-world contexts.

The report highlights successful case studies, showcasing how OpIS facilitated collaboration, knowledge sharing, and innovation within each selected scenario. It also sheds light on the challenges encountered, providing valuable lessons learned that can inform future enhancements and refinements of the software.

3.1. Methodology

In this section, the methodology employed for the evaluation of the OpIS within the specific scenarios selected by each Collaborative Manufacturing Demonstration Facility (cMDF) in outlined. The evaluation process aimed to assess the effectiveness, usability, and impact of OpIS in driving open innovation and collaborative problem-solving within real-world contexts. The methodology encompassed several stages, including mission description, pre-implementation assessment, implementation of OI missions using OpIS, and post-implementation evaluation.

3.1.1. Mission Description

Each cMDF was tasked with selecting three Open Innovation (OI) missions relevant to their specific context. Prior to implementation, they provided a comprehensive description of the current situation, outlining how they would have traditionally carried out the OI missions without the OpIS platform. Additionally, they detailed the desired "to-be" situation, illustrating the expected outcomes and benefits of utilising OpIS for the OI missions.

3.1.2. Pre-Implementation Assessment

To gather insights and expectations from the cMDFs, a thorough pre-implementation assessment was conducted. This assessment involved engaging with the cMDF teams and stakeholders to understand their needs and preferences regarding the use of the OpIS platform. Specifically, the assessment focused on determining which tools within OpIS would be utilised for the OI missions and what outcomes the cMDFs expected from the platform's functionality. Here is a following description of the tools to be used by all the cMDFs:

Name	**Description**
Generative Design Platform	Generative Design is used to explore a solution space which adheres to a provided ruleset of constraints.
Ricardian Toolkit (IPR management)	A Ricardian contract is a method of expressing, encoding, and executing a contractual document through software, which means that it represents the recording of documents as contractually lawful, and then securely linking them to other ambits/systems, such as of accounting, for the contract to serve as an issuance of value.
Marketplace	The marketplace will provide the ability to register new users (makers, communities) where each can edit each own profile & list of ideas / products.
Matchmaking	The matchmaking will allow the platform users to find suitable partners, products and services to enable the development of agile collaboration networks.
Agile Network Creation Tool	The agile network creation tool will operate in conjunction with the Matchmaking tool as it supports the creation of collaborative networks that can jointly address specific business opportunities.
AR / VR	The AR / VR component will deal with the end – user interfaces and services design and their integration as part of the iPRODUCE AR/VR based collaborative framework.
Mobile App for Social Media	A mobile application is developing in order to obtain Voice of Customer feedback through which iPRODUCE can actively solicit input about new ideas, stress test existing ideas, etc.
Agile Data Analytics & Visualisation	The main goal of agile data analytics is the design and development of an Agile Data Analytics and Visualisation suite, with a specific focus on Big Data.

Digital FabLab Kit	Toolset for digitising existing knowledge and common practices in makerspaces. It mainly addresses two aspects: (1) Digitisation of training activities and (2) digitisation of production processes. In iPRODUCE will be used to develop a training toolkit for social manufacturing – that combines AR/VR functionalities, video intelligence and e-learning – based techniques to provide a comprehensive training program for the iPRODUCE users.
OpIS Data Platform	This tool covers the data access, exchange and analytics within iPRODUCE which are necessary, as a prerequisite for collaborative production.

Table 3. List of tools

3.1.3. Implementation of OI Missions using OpIS

Following the pre-implementation assessment, the cMDFs were provided with access to the OpIS platform and commenced the implementation of their OI missions. This phase spanned approximately six months, allowing sufficient time for the cMDFs to execute their previously described OI missions while utilising the tools and functionalities provided by OpIS.

3.1.4. Post-Implementation Evaluation

At the conclusion of the OI missions, a post-implementation evaluation was conducted to gather feedback and assess the overall user experience of OpIS. A questionnaire was administered to the users, which encompassed various aspects such as their experience with the platform, the usefulness of the tools, the ergonomics of the platform, the value provided by OpIS, and the relevance of the co-creation methods employed. The questionnaire sought to capture both quantitative ratings and qualitative feedback to gain a comprehensive understanding of the users' perspectives.

During the implementation of the OI missions, the evaluation process faced certain difficulties related to the utilisation of specific tools within OpIS. These challenges impacted the successful realisation of the OI missions and will be elaborated upon in the subsequent sections. The combination of mission description, pre-implementation assessment, implementation using OpIS, and post-implementation evaluation ensured a comprehensive and iterative approach to evaluate the effectiveness and value of OpIS in driving open innovation within the cMDFs. The challenges encountered during the process will be addressed and analysed in the subsequent sections to provide a holistic view of the evaluation outcomes.

3.2. Open Innovation Missions

In this section, the Open Innovation (OI) missions that were selected and carried out by each Collaborative Manufacturing Demonstration Facility (cMDF) within the framework of this evaluation is presented. An open innovation mission was described as follows: An open innovation mission is a mission that will bring together several entities/partners who will collaborate to achieve a project/product. In this case, it should bring together at least one "client" and one member of iPRODUCE. They will have to exchange and work through the iPRODUCE Open Innovation Platform (OpIS) to carry out this mission. Training workshops do not fall into this category.

Each cMDF provided a comprehensive description of their selected OI missions, outlining the current "as is" situation and the desired "to be" situation that was expected to be achieved through the utilisation

of the OpIS platform. The following sections will provide an overview of each OI mission, highlighting the specific objectives, participants, and the expected outcomes in both the "as is" and "to be" scenarios.

3.2.1. Spanish cMDF

3.2.1.1. Smart Headboard

The initial situation:

In the current "as is" situation, a furniture manufacturing company has identified new trends and consumer needs that align with their target market. However, they lack the necessary manufacturing processes and machinery to bring their innovative idea to fruition. To seek support and collaborate on their concept, the company embarks on an extensive online search for maker groups and FabLabs. This search involves various methods such as phone calls, email exchanges, and internet research. Through this process, they discover that none of their competitors are currently addressing the same idea: a customizable bed headboard incorporating lighting, sound, and sensor engineering.

Despite the uniqueness and potential of their idea, the company encounters significant challenges. Finding suitable partners who possess the required manufacturing capabilities becomes a daunting task. Additionally, the existing methods of information exchange prove to be suboptimal for effectively tracking and incorporating different versions of the product design, especially when multiple individuals are collaborating on the same sketch. Consequently, the company faces difficulties in progressing with their idea due to these limitations in partner identification and suboptimal communication processes.

The expected situation using OpIS:

In the envisioned "to be" situation, the furniture producer leverages the capabilities of the iPRODUCE OpIS platform to facilitate their innovation journey. With access to the platform, the company can explore and search for suitable cMDF profiles that align with their requirements and expertise. This enables the furniture producer to find a compatible cMDF and effectively share their market-driven idea.

Recognising the complexity of their new idea and the limitations in addressing it alone, the furniture producer collaborates with the identified cMDF through the iPRODUCE platform. Together, they embark on a co-design process to materialise the concept into a prototype. The collaborative space provided by iPRODUCE facilitates seamless communication, enabling the exchange of ideas, design iterations, and the implementation of the concept.

Within this open collaboration environment, the furniture producer and the cMDF work together to design, prototype, and implement the innovative bed headboard. The prototype is then subjected to virtual testing with a focus group comprising potential consumers. Through this process, iPRODUCE plays a crucial role in facilitating the validation of whether the new bed headboard successfully meets the original identified need.

By utilising the iPRODUCE OpIS platform, the furniture producer gains access to a collaborative network of expertise, resources, and innovative tools. This collaborative and iterative approach enhances the company's ability to realise their innovative concept and validates its market viability, ultimately supporting the successful development and launch of the customizable bed headboard.

Figure 10. Smart headboard

Objectives to achieve:

- Reducing the time finding the right partners to materialise the product idea.
- Increasing the ratio of ideas related to new innovative products brought to market.
- Reducing the product development´s cost.
- Increasing the company's portfolio of innovative products.
- Improving the adequacy of the idea from its original state due to the focus group feedback.
- Motivating co-creation practices between the industry and users.

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If used in OI mission, why?
Generative Design Platform	No	The 3D model was created in Autocad. No changes in the Generative Design Platform. From Autocad it was exported to Blender format (FBX).
Ricardian Toolkit (IPR management)	Yes	Creating a NDA among the 3 companies (AID, LAG and VLC).
Marketplace	Yes	Searching for a profile needed regarding 3D design and technical specifications, creating a collaborative team. Starting chat with the users of the team. Publishing the final product on the marketplace.
Matchmaking	Yes	Searching and filtering users that have the needed skills and are not too far from the city where LAG is located.

Agile Network Creation Tool	Yes	Creating a collaborative team. Sending notifications and being proactive.
AR / VR	Yes	Displaying the model in VR and AR environments to make demonstrations and see how it will look like the final product. Customize it by changing colours, materials etc. After checking the result of the 3D models in wood, AIDIMME liked the idea of making the headboard with natural materials instead of wood to use stone in order to include lights.
Mobile App for Social Media	Yes	Asking the users what they think about the product. AIDIMME created questionnaires and did several iterations with some external users/ambassadors.
Agile Data Analytics & Visualisation	Yes	Visualising the analytics of the products in the platform. Analysing surveys feedback and analytics.
Digital FabLab Kit	No	
OpIS Data Platform	Yes	Accessing all data regarding users/products for collaborative work.

Table 4. Tools used in the Smart Headboard development

3.2.1.2. Gamer Chair

The initial situation:

In the current "as is" situation, AIDIMME has conceptualised an innovative idea for a gamer chair that does not currently exist in the conventional market. The envisioned chair aims to enhance the overall gaming, movie-watching, and music-listening experience by providing improved immersion and ergonomics. Specifically, the chair incorporates synchronised vibration mechanisms that align with the vibrations present in the game, movie, or music being enjoyed by the user. While the conceptualisation of the chair has been completed, the actual implementation and manufacturing processes are yet to be realised.

The expected situation using OpIS:

In the envisioned "to be" situation, the furniture manufacturer leverages the iPRODUCE OpIS platform to engage with potential consumers, specifically gamers, and gather valuable insights and ideas. By utilising the platform's functionalities, the manufacturer can connect with the target audience and gain a deeper understanding of their preferences and requirements for a gamer chair. Simultaneously, gamers themselves can access the cMDF through the iPRODUCE platform, initiating a collaborative process. In this scenario, both the furniture manufacturer and gamers are brought together by the cMDF, facilitating collaboration and co-design efforts. Through the collaborative spectrum provided by the cMDF, all stakeholders work collectively to materialise the concept into a prototype. This involves the design, prototyping, and implementation stages, facilitated by the open collaboration space available on

the iPRODUCE platform. To ensure the chair meets the identified needs, the prototype undergoes virtual testing with a focus group of gamers. This process enables validation and feedback from the target audience, ensuring that the chair satisfies the original detected needs and effectively enhances the gaming experience.

The iPRODUCE OpIS platform plays a pivotal role in connecting the furniture manufacturer, gamers, and the cMDF, fostering collaboration, idea exchange, and co-creation. By leveraging this platform, the stakeholders can collectively contribute to the development of a gamer chair that meets the expectations and demands of the target consumer base.

Figure 11. Gamer Chair

Objectives to achieve:

- Reducing the time finding the right partners to materialise the product idea.
- Increasing the ratio of ideas related to new innovative products brought to market.
- Reducing the product development´s cost.
- Improving the adequacy of the idea from its original state due to the focus group feedback.
- Filling the gap of products of this category for young people.
- Improving the overall well-being of gamers while spending countless hours playing games.

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	No	The 3D model was created in Autocad. No changes in the Generative Design Platform. From Autocad it was exported to Blender format (FBX)..
Ricardian Toolkit (IPR management)	Yes	Creating a NDA among AID and VLC, as LAG is not interested to be included in their business.

Marketplace	Yes	Searching for a profile needed regarding 3D design and technical specifications, creating a collaborative team. Starting chat with the users of the team. Publishing the final product on the marketplace.
Matchmaking	Yes	Searching and filtering users that have the needed skills and are not too far from the city where LAG is located.
Agile Network Creation Tool	Yes	Creating a collaborative team. Sending notifications and being proactive.
AR / VR	Yes	Displaying the model in VR and AR environments to make demonstrations and see how it will look like the final product. Customize it by changing colours, materials etc. No changes in the final aesthetics.
Mobile App for Social Media	Yes	Asking some gamers what they think about the gamer chair. AIDIMME created questionnaires and did several iterations with some gamers/ambassadors.
Agile Data Analytics & Visualisation	Yes	Visualising the analytics of the products in the platform. Analysing surveys feedback from gamers and analytics
Digital FabLab Kit	No	No
OpIS Data Platform	Yes	Accessing all data regarding users/products for collaborative work.

Table 5. Tools used in the Gamer Chair development

3.2.1.3. 3D Component

The initial situation:

In the current "as is" situation, a maker entrepreneur has conceived a design idea that centres around the production of 3D printed components for creating customised furniture. Recognising the need for innovation in the realm of design, the entrepreneur considers the idea to be potentially compelling, whether as the foundation for their own venture or as a proposition to manufacturers or groups of manufacturers.

To progress with the idea, the maker entrepreneur embarks on an online search for manufacturers and maker spaces that can provide the necessary support. However, they encounter significant difficulties in finding suitable partners, primarily due to their limited experience in the realm of industrialisation. Despite possessing digital fabrication skills, which would enable them to address certain prototyping

requirements in a collaborative Manufacturing Demonstration Facility (cMDF), the lack of suitable partners hinders their progress.

Nevertheless, the maker entrepreneur remains open to sharing benefits or entering into partnerships for the production or commercialisation of this innovative idea. Their focus lies in finding collaborators who can help bring the concept to fruition by leveraging their expertise in industrialisation and manufacturing processes.

The expected situation using OpIS:

In the envisioned "to be" situation, the "maker" profile represents an entrepreneurial individual with a keen interest in digital manufacturing technologies, particularly 3D printing. This profile develops innovative 3D printed components that can be effectively utilised in collaboration with a cMDF or the industry. The primary objective is to leverage these components to extend the lifespan of furniture, thereby reducing environmental impact by facilitating easy replacement of broken or worn-out parts. To facilitate this vision, the maker profile utilises the iPRODUCE OpIS platform to identify a suitable cMDF capable of supporting the development and potential industrialisation of their 3D printed components. Through the platform, the maker gains access to a collaborative spectrum within the cMDF, fostering co-design efforts and materialisation of the components.

Within the open collaboration space, the maker collaborates with experts from the cMDF to design, prototype, and implement the 3D printed components. This collaborative process allows for iterative improvements, ensuring the components meet the desired specifications and quality standards. Moreover, the cMDF acts as a valuable resource, offering connections and contacts with furniture manufacturers interested in incorporating the innovative components into their existing designs. This collaboration enables the maker to explore commercialisation opportunities and establish partnerships within the industry.

By utilising the iPRODUCE OpIS platform and collaborating with the cMDF and furniture manufacturers, the maker profile gains the necessary support and resources to advance the development, industrialisation, and widespread adoption of their 3D printed components. This not only extends the lifespan of furniture but also contributes to environmental sustainability by minimising waste and promoting a circular economy approach.

Figure 12. 3D module

Objectives to achieve:

- Double the product life cycle of furniture pieces by applying the 3D components, thus reducing the environmental impact.

- Find industrialisation partners to incorporate / distribute the 3D components.

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	No	The 3D model was created in Autocad. No changes in the Generative Design Platform. From Autocad it was exported to Blender format (FBX).
Ricardian Toolkit (IPR management)	Yes	Creating a NDA among the 2 companies (AID and VLC).
Marketplace	Yes	Searching for a profile needed regarding 3D design and technical specifications, creating a collaborative team. Starting chat with the users of the team. Publishing the final product on the marketplace
Matchmaking	Yes	Searching and filtering users for some decorative items.
Agile Network Creation Tool	Yes	Creating a collaborative team. Sending notifications and being proactive
AR / VR	Yes	Displaying the model in VR and AR environments to make demonstrations and see how it will look like the final product. Customize it by changing colours, materials etc. No changes in the structure.
Mobile App for Social Media	Yes	Asking the users what they think about the product. AIDIMME created questionnaires and did several iterations with some external users/ambassadors
Agile Data Analytics & Visualisation	Yes	Visualising the analytics of the products in the platform. Analysing surveys feedback and analytics.
Digital FabLab Kit	No	
OpIS Data Platform	Yes	Accessing all data regarding users/products for collaborative work.

Table 6. Tools used in the 3D component development

3.2.2. Italian cMDF

3.2.2.1. Solar Watering System

The initial situation:

The current OI mission focuses on the development of a smart irrigation system, referred to as the "Solar Watering System." This innovative solution aims to achieve energy autonomy by utilising solar panels to power the system. The objective is to automate and optimise the watering process for plants, lawns, or gardens by employing a network of sensors, controllers, and valves. These components work in tandem to monitor essential factors such as soil moisture levels, weather conditions, and other relevant parameters. By analysing this data, the system can determine the optimal timing and amount of water required for efficient irrigation.

However, in the current situation, the project is still in its initial stages. The concept for the sensor, solar panels, and actuators has been established, but there is no existing solution or design available for the hardware connection and software control. At this stage, the user is responsible for undertaking all the necessary tasks using traditional tools and methods. This includes manually seeking partners, identifying relevant communities, and managing the development process independently.

The OI mission recognizes the need for collaboration, co-design, and co-development to bring this smart irrigation system to fruition. The objective is to leverage the OpIS platform and its open innovation tools to connect with potential partners, experts, and resources. By embracing the principles of co-creation and co-development, the mission seeks to foster collaborative efforts that will enable the realisation of a comprehensive solution for the Solar Watering System.

The expected situation using OpIS:

In the envisioned "to be" situation, the OI mission aims to transform the current state of the smart irrigation system, known as the "Solar Watering System," by leveraging the principles of co-design and co-development along with the OpIS platform. The primary focus is on two key pillars: the establishment of co-creation communities and the utilisation of the OpIS development platform with its open innovation software tools.

Through the formation of co-creation communities, diverse entities such as companies, makers, do-it-yourselves, and professionals collaborate synergistically to generate innovative product solutions. This collaborative environment fosters idea generation, knowledge sharing, and collective problem-solving, enabling the exploration and implementation of creative concepts. The OpIS development platform serves as a central hub for open innovation, providing a wide range of innovative digital tools and resources. These tools encompass generative design, design thinking, marketplaces, matchmaking, AR/VR-based collaboration tools, community engagement apps, smart contracts for intellectual property rights protection, and interactive training tools. Leveraging these resources, participants can facilitate agile synchronous and asynchronous collaborations, enhancing the efficiency and effectiveness of the development process.

In this "to be" scenario, the OI mission focuses on designing robust hardware connections and software solutions for the Solar Watering System. By harnessing the collective expertise and creativity of the co-creation communities, the aim is to develop comprehensive and optimised solutions that address the existing gaps in the system's hardware and software components. Additionally, gathering feedback and

validation inputs from the involved stakeholders through the digitals tools ensures that the final solution meets the desired requirements and aligns with the identified needs of end-users.

The "to be" situation emphasises the transformation of the smart irrigation system by utilising the OpIS platform's open innovation tools, and emphasising the design of hardware connections and software solutions.

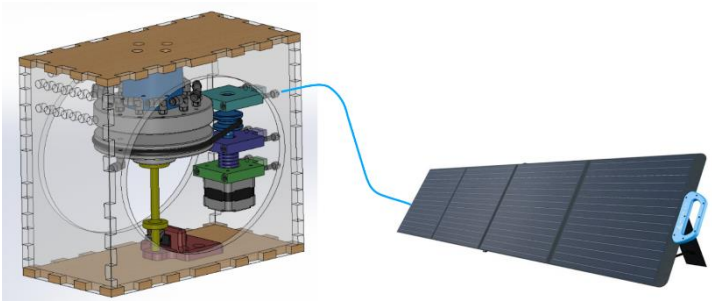


Figure 13. Solar Watering System

Objectives to achieve:

- Increasing the ratio of ideas related to new innovative products brought to market.
- Improving the adequacy of the idea from its original state due to the focus group feedback.

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	No	Not needed for the type of use case.
Ricardian Toolkit (IPR management)	No	Not fully working at the time of the open innovation initiative. Bug reported to the IT member.
Marketplace	No	Some of the teams created registered to the platform and uploaded a product.
Matchmaking	No	The competence and related people were already identified.

Agile Network Creation Tool	No	Not needed for the type of use case.
AR / VR	No	Team members did not have the required hardware.
Mobile App for Social Media	No	Not needed for the type of use case.
Agile Data Analytics & Visualisation	No	Since no relevant amount of data were generated there were no needs to analyse it.
Digital FabLab Kit	No	Not needed for the type of use case.
OpIS Data Platform	No	Not needed.

Table 7. Tools used in the Solar Water System development

As indicated in the table above, the Italian cMDF initially had higher expectations for utilising the OpIS platform compared to the actual usage. Several factors contributed to this situation. Firstly, during the execution of the OI mission, many of the tools available on the OpIS platform were still facing technical issues or limitations. As a result, the cMDF had to find alternative methods and solutions to carry out their activities without relying heavily on the OpIS platform.

Additionally, it's worth noting that most of the partners involved in the OI mission were already familiar with each other. Therefore, there was less need to utilize the marketplace or matchmaking tools provided by OpIS to connect with new partners. This can be attributed to the relatively small size of the ecosystem at that time, with the cMDF network still in the process of expanding and growing.

Considering these circumstances, the Italian cMDF made practical decisions to work around the limitations and challenges they encountered. They found alternative approaches to fulfil their objectives and collaborate effectively within the existing network of partners.

3.2.2.2. Smart watering system

The initial situation:

In the current situation, the OI mission revolves around the development of a smart irrigation system, referred to as the "Watering System," which aims to automate and optimise the watering process for plants, lawns, or gardens. This system utilises a network of sensors, controllers, and valves that collaborate to monitor crucial factors such as soil moisture levels, weather conditions, and other variables. By analysing this data, the system determines the appropriate timing and amount of water required for optimal plant growth.

However, in the current state, the Watering System is still at a basic conceptual stage. While the idea of incorporating sensors, solar panels, and actuators is present, no concrete solutions or designs have been developed for the hardware connections or software control. Consequently, users are left to manually address these aspects and rely on traditional tools and methods.

To bring the Watering System to fruition, users must independently seek partners, manually search for existing communities, and rely on their own resources to carry out the necessary tasks. There is a lack of readily available solutions, collaborative platforms, and efficient tools to streamline the development process and ensure the system's effectiveness and usability.

The expected situation using OpIS:

The envisioned "to be " situation for this OI mission is similar to the solar watering system and aims to leverage the OpIS Platform and the collaborative tools to develop the smart watering system.

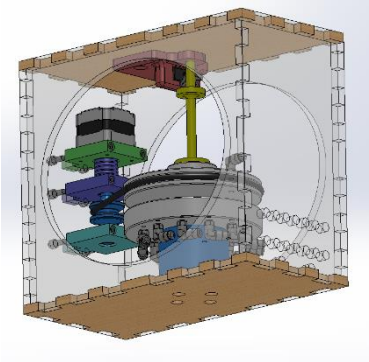


Figure 14. Smart Watering system

Objectives to achieve:

- Increasing the ratio of ideas related to new innovative products brought to market.
- Improving the adequacy of the idea from its original state due to the focus group feedback.

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	No	Not working at the time of the open innovation initiative.
Ricardian Toolkit (IPR management)	No	Not fully working at the time of the open innovation initiative.

Marketplace	No	The stakeholders found the platform extremely articulated (user interface “not friendly”) and its use complex.
Matchmaking	No	The competence and related people were already identified.
Agile Network Creation Tool	No	Not fully working at the time of the initiative.
AR / VR	No	Team members did not have the required hardware.
Mobile App for Social Media	No	The teams were concentrated to develop the prototype.
Agile Data Analytics & Visualisation	No	Since no relevant amount of data were generated there were no needs to analyse it.
Digital FabLab Kit	No	Not needed for the small number of components.
OpIS Data Platform	No	Not needed.

Table 8. Tools used in the Smart Watering System development

In the same way as the OI mission below and for the same reason, it is possible to see that the Italian cMDF didn’t expect to use the tools from OpIS.

3.2.2.3. The smart Cradle

The initial situation:

In the current situation, the OI mission revolves around the development of a Servo-assisted baby cot, referred to as the "cradle." The objective is to enhance a traditional cradle by incorporating technology to create a smart version of it. The focus is on assisting students in the design and creation phase of the components required for this conversion.

At present, there exists a basic concept idea and a draft design for the structure of the cradle. However, there is a lack of solutions and designs for the hardware and software control aspects of the smart features. This means that the necessary mechanisms and systems for controlling the servo-assisted functions of the cradle are yet to be developed.

The current stage requires further exploration and development to devise the hardware components and software control systems necessary for the implementation of the smart features. By embracing open innovation principles, collaborative efforts, and leveraging appropriate tools and resources, the OI mission aims to bridge this gap and realize the vision of a fully functional and technologically advanced Servo-assisted baby cot, providing an improved experience for both parents and babies.

The expected situation using OpIS:

The envisioned "to be" situation for this OI mission follows a similar path as the solar watering system and smart watering system. It aims to utilise the OpIS Platform and collaborative tools to facilitate and support students in the development of the smart cradle. By leveraging the open innovation principles, co-design methodologies, and the digital capabilities offered by the OpIS Platform, the objective is to create a collaborative environment where students can collaborate with experts, makers, and professionals to bring their innovative ideas for the smart cradle to life. This collaborative approach will enable the exchange of knowledge, skills, and resources, fostering a dynamic ecosystem that nurtures creativity and results in the realisation of a technologically advanced and user-friendly smart cradle.

Figure 15. Smart cradle

Objectives to achieve:

- Explore and implement creative ideas and innovative solutions following the principles of co-design and co-development using also the OpIS development platform.

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	Yes	Not working at the time of the open innovation initiative.
Ricardian Toolkit (IPR management)	Yes	Not fully working at the time of the open innovation initiative.
Marketplace	No	The stakeholders found the platform extremely articulated (user interface “not friendly”) and its use complex.

Matchmaking	No	The stakeholders were already identified.
Agile Network Creation Tool	No	Not working at the time of the initiative.
AR / VR	Yes	Not working at the time of the initiative (not possible to upload and render proposed 3D models).
Mobile App for Social Media	Yes	Not working at the time of the initiative (impossible to retrieve results).
Agile Data Analytics & Visualisation	No	Since none of the OpIS tools were used there are no data to analyse
Digital FabLab Kit	No	Not needed for the small number of components.
OpIS Data Platform	No	Not needed.

Table 9. Tools used in the Smart Cradle development

It is noticeable that even if the cMDF expected to use some of the tools, they were not ready at the time of the OI which rendered it useless for the cMDF at the time of the OI execution.

3.2.3. Greek cMDF

3.2.3.1. Splints for Pets

The initial situation:

In the current "as is" situation, AidPlex is an established company specialising in the design of splints primarily for human patients. However, they have identified an untapped market opportunity and acknowledge the growing demand for splints designed specifically for pets. Recognising the significance of ensuring a comfortable treatment experience for animals, AidPlex is committed to developing specialized splints that cater to the unique needs of pet patients. Key considerations in their design process include prioritising features such as waterproofing, lightweight construction, and the use of skin-friendly materials to optimize the healing process. In order to create innovative and effective designs, AidPlex aims to collaborate closely with veterinarians and pet owners to gather valuable feedback and insights. However, the current process of collaboration and design iteration follows traditional approaches, which can be time-consuming and potentially limit the efficiency of the development process.

The expected situation using OpIS:

In the envisioned "to be " situation, the utilisation of the developed OpIS Platform will facilitate seamless communication between veterinarians, pet owners, Greek cMDF, and AidPlex. Leveraging the

iPRODUCE OpIS platform, these stakeholders will come together to collaborate on the design and fabrication of ground-breaking 3D printed splints for pets. AidPlex, benefiting from the support of CERTH's provision of 3D printing equipment and materials, will establish close partnerships with the involved parties to create splints that are characterized by efficiency, customisation, and hight quality. The primary objective of this collaborative effort is to significantly enhance the treatment experience for pets, prioritising their well-being, while simultaneously addressing healthcare cost reduction and operational inefficiencies. By harnessing the power of the OpIS Platform, this innovative collaboration seeks to revolutionize the field of veterinary splints, offering improved outcomes for animal patients and their caregivers.

Objectives to achieve:

- Increase the ratio of ideas related to new innovative products brought to market
- Reduce the product development´s cost
- Increase the company's portfolio of innovative products
- Improve the adequacy/effectiveness of the idea from its original state due to the Focus Group feedback
- Raise co-creation practices between the industry and users

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	No	Not, possible for this use case
Ricardian Toolkit (IPR management)	Yes	Planning the process of designing the product. Exchanging files, making decisions and selecting the models with the collaboration of the companies.
Marketplace	Yes	Searching for a profile of the user and creating a collaborative team. Starting chat with the users of the team. Publishing the final product on the marketplace.
Matchmaking	Yes	Searching and filtering users that have skills and leave in the same city
Agile Network Creation Tool	Yes	Searching the potential users in order to create a team, in collaboration with Matchmaking tool

AR / VR	Yes	Displaying the model in VR and AR environments to make demonstrations and see how it will look like the final product. Customize it by changing colours, materials etc.
Mobile App for Social Media	Yes	Asking feedback from the users about the product
Agile Data Analytics & Visualisation	Yes	For visualisation of the data related to the product
Digital FabLab Kit	No	Not applicable with this OI mission
OpIS Data Platform	Yes	Using all the tools provided by the platform

Table 10. Tools used in the development of the Splints for Pets

3.2.3.2. Splints for Fractures

The initial situation:

In the current "as is" situation, AidPlex is an established company that specializes in designing splints for adult patients with fractures. Their current product offerings prioritize essential features such as durability, functionality, and patient comfort. However, AidPlex acknowledges the necessity of broadening their product range to cater to a wider range of patients with specific needs. Factors like size variations, colour preferences, and strap options are considered to ensure the splints are customized to individual requirements and treatment experiences.

Despite their commitment to innovation, AidPlex currently relies on traditional methods for the design and development of splints, resulting in a time-consuming process. This conventional approach may limit the efficiency and agility required to meet the evolving demands of patients and healthcare providers. Recognising the need for a more streamlined and efficient process, AidPlex seeks to explore alternative solutions that can expedite product development while maintaining high-quality standards.

By addressing these challenges and adopting more efficient approaches, AidPlex aims to enhance their ability to provide patient-specific splint solutions, improving overall treatment experiences and ultimately advancing the field of orthopaedic care.

The expected situation using OpIS:

In the envisioned "to be" situation, AidPlex harnesses the power of the iPRODUCE platform and its comprehensive set of tools to foster collaboration among doctors, healthcare professionals, young patients, and the Greek cMDF. Together, they embark on a journey to design and develop cutting-edge splints specifically tailored for patients with fractures. The Greek cMDF, drawing on their expertise in additive manufacturing technologies and equipped with state-of-the-art 3D printing and 3D scanning equipment and materials provided by CERTH, assumes a pivotal role in the fabrication process of these splints. Through this fruitful collaboration, AidPlex spearheads the development of efficient and customizable splint solutions that significantly enhance the treatment experience for patients. By placing

patients at the centre of orthopaedic care, this collaborative effort not only improves individual outcomes but also drives advancements in the broader field of patient-centred care. The innovative use of the iPRODUCE platform and the expertise of the Greek cMDF collectively propel the development of new solutions, changing the way fractures are treated and reinforcing the commitment to delivering patient-centric orthopaedic care.

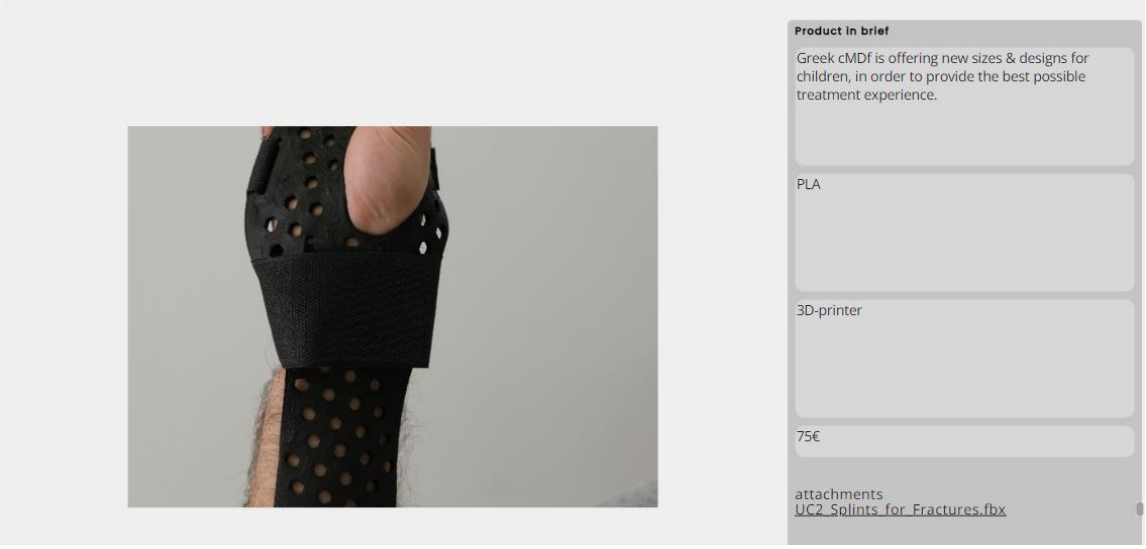


Figure 16. Splinter for broken bone

Objectives to achieve:

- Increase the ratio of ideas related to new innovative products brought to
- market
- Reduce the product development´s cost
- Increase the company's portfolio of innovative products
- Improve the adequacy/effectiveness of the idea from its original state due to the Focus Group feedback
- Raise co-creation practices between the industry and users.

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	No	Not, possible for this use case
Ricardian Toolkit (IPR management)	Yes	Planning the process of designing the product. Exchanging files, making decisions and selecting the models with the collaboration of the companies.

Marketplace	Yes	Searching for a profile of the user and creating a collaborative team. Starting chat with the users of the team. Publishing the final product on the marketplace.
Matchmaking	Yes	Searching and filtering users that have skills and leave in the same city
Agile Network Creation Tool	Yes	Searching the potential users in order to create a team, in collaboration with Matchmaking tool
AR / VR	Yes	Displaying the model in VR and AR environments to make demonstrations and see how it will look like the final product. Customize it by changing colours, materials etc.
Mobile App for Social Media	Yes	Asking feedback from the users about the product
Agile Data Analytics & Visualisation	Yes	For visualisation of the data related to the product
Digital FabLab Kit	No	Not applicable with this OI mission
OpIS Data Platform	Yes	Using all the tools provided by the platform

Table 11. Tools used in the development of Splints for Fractures

3.2.3.3. 3D Printed Smart Luminous Artefact

The initial situation:

The current "as is" situation refers to an ambitious student who demonstrates a passion for design and technology. With the guidance and support of an experienced educator or parent, this student envisions a remarkable creation—an intricately designed 3D printed smart luminous artefact that seamlessly blends personalised aesthetics with advanced functionality. However, the student faces inherent challenges in transforming this captivating concept into a tangible reality due to various limitations.

One significant obstacle they encounter is the scarcity of resources and expertise in crucial areas of manufacturing and electronics. The student lacks comprehensive knowledge and skills in pivotal domains such as PCB manufacturing, electronics assembly, prototyping, and IoT device testing. This knowledge gap hinders their ability to navigate the complexities of bringing their vision to life. Additionally, the student requires a deeper proficiency in programming and development, as well as familiarity with cutting-edge 3D design and 3D printing technologies.

These limitations present significant barriers to the student's pursuit of realising their 3D printed smart luminous artifact. Without the necessary resources, expertise, and technical proficiency, their vision remains trapped in the realm of imagination. However, by recognising these challenges, the student, with the support of educators and parents, can explore avenues to acquire the required knowledge, skills, and resources to bridge the gap between their vision and its tangible manifestation.

The expected situation using OpIS:

In the envisioned future, the Greek cMDF emerges as a pivotal partner for the aspiring student, bolstered by the guidance and support of their knowledgeable mentor. Through the collaboration with experienced educators, esteemed professors, or supportive parents, the student gains entry into a vibrant ecosystem that nurtures their creativity and enhances their technical skills. Within the Greek cMDF, they have the opportunity to connect with experts who specialize in additive manufacturing technologies and IoT applications, unlocking a world of possibilities for their project.

This collaboration paves the way for the student to embark on a co-design journey, working alongside the experts at the Greek cMDF to fabricate their envisioned 3D printed smart luminous artifact. Leveraging the wealth of knowledge and experience available, the student benefits from the expertise of the Greek cMDF in additive manufacturing techniques, ensuring the highest quality and precision in the fabrication process.

Furthermore, the student gains access to the iPRODUCE Open Innovation Platform (OpIS), which becomes a valuable resource in their quest to transform their idea into a tangible reality. Through OpIS, they are empowered with an array of tools and functionalities that facilitate the co-creation of customized 3D printed prototypes, as well as the development of a fully functional self-made prototype. This collaborative environment fostered by OpIS serves as a fertile ground for innovation, igniting the student's imagination and nurturing their growth as they navigate the realms of exploration and creation.

In this envisioned future, the Greek cMDF, supported by the iPRODUCE Open Innovation Platform, becomes the catalyst that propels the student towards realising their dreams. The student's journey of co-design and fabrication within this collaborative ecosystem not only fuels their passion but also equips them with the skills, knowledge, and confidence needed to flourish in the world of design and technology.

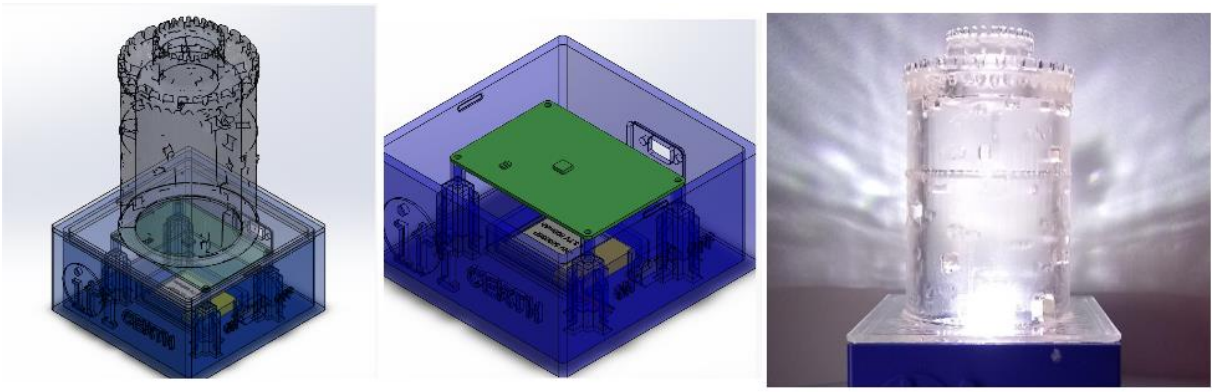


Figure 17. Luminous artefact project

Objectives to achieve:

- Improve product design through focus group feedback
- Facilitate quick prototype cycles and efficient knowledge transfer to accelerate product development
- Assess the demand and interest for such a product among educators, schools, and educational institutions
- Explore market opportunities for the 3D printed smart luminous artifact

- Streamline and expedite the contract signing process with educators, schools, and institutions, enduring efficient and secure documentation of arguments
- Enhance end-user experiences and improve design through the integration of AR/VR technologies

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	No	Not, possible for this use case
Ricardian Toolkit (IPR management)	Yes	Planning the process of designing the product. Exchanging files, making decisions and selecting the models with the collaboration of the companies.
Marketplace	Yes	Searching for a profile of the user and creating a collaborative team. Starting chat with the users of the team. Publishing the final product on the marketplace.
Matchmaking	Yes	Searching and filtering users that have skills and leave in the same city
Agile Network Creation Tool	Yes	Searching the potential users in order to create a team, in collaboration with Matchmaking tool
AR / VR	Yes	Displaying the model in VR and AR environments to make demonstrations and see how it will look like the final product. Customize it by changing colours, materials etc.
Mobile App for Social Media	Yes	Asking feedback from the users about the product
Agile Data Analytics & Visualisation	Yes	For visualisation of the data related to the product
Digital FabLab Kit	No	Not applicable with this OI mission
OpIS Data Platform	Yes	Using all the tools provided by the platform

Table 12. Tools used int he development of 3D Printed Smart Luminous Artefact

3.2.4. German cMDF

3.2.4.1. Smart chair

The initial situation:

In the current situation, Vintus is a company that specializes in the development of electromechanical designs and IoT devices. They have expertise in creating prototypes and products that integrate mechanics, electronics, and software. One of their notable developments is the Hipwings, an in-house smart office chair that incorporates an innovative movement mechanism, an electromotive drive unit, and a software control system accessed through a mobile app.

However, despite its innovative features, the current pricing of the product is considered too high. In response to this, Vintus's client has expressed the need to explore a new approach for the product. They are seeking to find solutions that would make the product more cost-effective without compromising its functionality and unique features. This implies a desire to optimize the design, manufacturing, or sourcing processes to achieve a more affordable price point while maintaining the product's high quality and performance.

The expected situation using OpIS:

In the to be situation, by leveraging the extensive network of the cMDF, Vintus aims to achieve a reduction in the price of their product. They recognize the potential of utilising the collaborative environment and resources provided by the cMDF network to explore innovative approaches and solutions. Through this collaborative ecosystem, Vintus intends to engage with experts, manufacturers, and other stakeholders to optimize various aspects of their product, such as design, production processes, and component sourcing. The goal is to identify cost-saving measures and efficiencies that will ultimately result in a more affordable price point for their product, making it accessible to a wider customer base.

Objectives to achieve:

- Modification of the existing product or new development of a similar product for the consumer sector

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	No	
Ricardian Toolkit (IPR management)	No	

Marketplace	Yes	First contact
Matchmaking	No	
Agile Network Creation Tool	No	
AR / VR	No	
Mobile App for Social Media	No	
Agile Data Analytics & Visualisation	No	
Digital FabLab Kit	No	
OpIS Data Platform	No	

Table 13. Tools used in the Smart Chair development

It was difficult to evaluate the German cMDF on the expected and actual tools of the OpIS, as a matter of fact, change in the staff made it a bit difficult to retrieve all the expected data from the maker space bonne partner.

3.2.4.2. Nerd Testing

The initial situation:

The current situation in the "Nerd Testing" service is characterized by unstructured testing of initial product ideas or, in some cases, no testing at all. Companies have not fully tapped into the potential of engaging with makers, who represent a unique user group known for their strong technological expertise and open-mindedness. The service aims to address this by facilitating the testing of software or hardware products by makers in the early stages of development. The term "Nerd Testing" reflects the target user group, who possess specialized knowledge and a deep understanding of technology. By involving makers in the testing process, companies have the opportunity to identify areas for technical product optimisation and enhance the overall usability and user experience of their products. However, in the current situation, this potential remains largely untapped due to the lack of structured testing practices or the absence of any testing activities.

The expected situation using OpIS:

In the desired future state, the "Nerd Testing" service will introduce structured testing practices that provide early feedback on the initial states of software or hardware products. Companies will actively engage with makers, a user group known for their technical expertise and open-mindedness, to conduct thorough and systematic testing. By involving makers in the early stages of product development, companies will be able to gather valuable insights and feedback to improve the usability and user experience of their products. This structured testing approach will enable companies to identify and address any potential issues or areas for optimisation at an early stage, ensuring that the final product

meets the highest standards of quality and user satisfaction. Ultimately, through the implementation of structured testing processes, the "Nerd Testing" service will contribute to the development of innovative and user-centric products.

Objectives to achieve:

- Find a new “nerd” tester that can give valuable insight to compagnies.

Expected use of the tools:

In this OI mission, the participants had initially not anticipated using the OpIS platform or its associated tools. Instead, their focus was primarily on leveraging the collaborative and co-creation methodologies within the German cMDF network. They relied on the established network of partners and the existing collaboration channels to drive their project forward. The participants believed that the resources and expertise within the German cMDF network would provide them with the necessary support and enable effective collaboration.

3.2.5. French cMDF

3.2.5.1. Vlotek project support

The initial situation:

In the context of the Fr UC2 initiative for "new service offer for soft mobility project leaders" and the iPRODUCE My Mobility competition, the VLOTEK project led by Antony Bordron has been selected as an Open Innovation (OI) mission, receiving support from French partners.

VLOTEK is guided by the principle of "Less is more" and aims to provide simple, affordable, and disruptive alternatives that reduce the environmental impact of mobility and replace the need for a second car in households. The project enables families with children and individuals from modest backgrounds to embark on an accessible, sustainable, and locally driven ecological transition through two key solutions:

1. Several kits designed to enhance and expand the functionalities of standard bicycles, catering to the specific needs of families and cyclists.
2. A 4-person vehicle, known as the "Jolly Rogers" project, which embodies minimalism and frugality on wheels. This vehicle is intended for people who require transportation for home, school, work, leisure, errands, or other trips, accommodating 2, 3, 4, or more individuals. It provides a safe and cost-effective option for riding in sheltered areas, such as bicycle lanes.

The French partners, in collaboration with the iPRODUCE Core Group and the OpIS platform, will provide valuable support to the VLOTEK project. Their assistance includes:

- Conducting a market study to evaluate demand and identify potential opportunities.
- Performing field surveys, building upon previous efforts initiated within the Xtreme Challenge of the ADEME.
- Exploring avenues for market access, with an initial focus on either the vehicle or the accessories.
- Assessing the feasibility of adopting an open-source business model aligned with the project's goals.
- Addressing intellectual property considerations to protect innovative ideas and designs.

The existence of the iPRODUCE partners and the OpIS platform is crucial for the VLOTEK project. Without their involvement, the project lead would need to individually contact each person, search for specific skills, and face difficulties in obtaining a holistic approach to address the project's challenges. This would result in wasted time and increased struggles. However, with the support of iPRODUCE partners and the OpIS platform, the project holder can benefit from streamlined collaboration, expertise, and a comprehensive approach to problem-solving.

The expected situation using OpIS:

In the envisioned future, Thanks to the OpIS platform, the partnership, and the co-creation methodology, VLOTEK has made significant progress in achieving the following objectives:

1. Efficiently structuring the project and the company as a whole, ensuring a clear roadmap and effective organisation.
2. Creating a vibrant community of users to test and refine the product according to their specific needs, fostering a user-centric approach.
3. Establishing strong connections with FabLab communities, makers, and users, forming a collaborative ecosystem that promotes knowledge sharing and innovation.
4. Preparing a compelling prototype presentation to launch a crowdfunding campaign, aiming to gauge customer interest and secure pre-orders. This will also facilitate the initiation of a small-scale beta testing phase.
5. Seeking funding opportunities to initiate the pre-series production, enabling VLOTEK to meet the demand and potentially cover project team expenses partially or in full.

Through the OpIS platform, VLOTEK has been able to leverage the power of co-creation and collaboration, leading to accelerated progress, a growing user community, and a strategic path towards market launch and product viability.

Figure 18. Vlotek project

Objectives to achieve:

- Explore and implement creative ideas and innovative solutions following the principles of co-design and co-development using also the OpIS development platform.
- Be able to find partners more efficiently.
- Reduce the time to market of the developed solution.

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	Yes	Generate parts and choose the best parameters (materials, sizing, balance points…)
Ricardian Toolkit (IPR management)	Yes	Secure data sharing between partners, generate NDA about made products. To protect connection technology (tank-bike)
Marketplace	Yes	Find partners, material and gears providers
Matchmaking	Yes	Next to marketplace to get details about identified partners (location, members…)
Agile Network Creation Tool	No	
AR / VR	Yes	To be able to visualize the product on your own bike and how it can fit your needs
Mobile App for Social Media	Yes	Get feedback about everyone's use?
Agile Data Analytics & Visualisation	No	
Digital FabLab Kit	No	
OpIS Data Platform	No	

Table 14. Tools used in the Vlotek project support

3.2.5.2. Vipedi project support

The initial situation:

In the existing scenario, the VIPEDI project led by Rene HIRWA NSHUTI is receiving support from the French partners as part of the Fr UC2 initiative and the iPRODUCE My Mobility competition, under an Open Innovation (OI) mission.

The current urban landscape necessitates the development of new, space-efficient modes of transportation that address the growing demand for personalized travel in urban areas while considering environmental concerns. Folding bikes have emerged as a promising solution, offering active mobility, space-saving features, and adaptability to urban infrastructures such as apartments, offices, and public transport. However, the adoption of folding bikes is hindered by their limited intermodality, meaning the ability to combine multiple modes of transportation during a single journey.

The complexity of current folding mechanisms results in a lack of intuitive handling, making it difficult to fold and unfold the bike quickly and easily for daily intermodal travel. The VIPEDI project introduces an innovative architecture that overcomes these challenges and offers several advantages, including:

1. Speed and ease of folding in a single step, significantly faster and easier compared to existing competition.
2. Effortless rolling of the bike in its folded position.
3. Compactness suitable for all forms of public transport.
4. Futuristic and minimalist architecture and aesthetics.
5. Enhanced ergonomics and comfort, influenced by the design of a tricycle with larger wheels.

The final version of the VIPEDI bicycle aims to differentiate itself not only through its unique architecture but also by incorporating electric assistance to maximize travel distance and frequency without increasing physical exertion. Additionally, the bike will integrate sensors and connectivity features, leveraging emerging Internet of Things (IoT) technologies to optimize navigation, enhance user experience, and promote collaboration among various devices in the urban environment.

In the current situation, the project holder requires guidance and support in various areas, including market study, field surveys, intellectual property advice, technical design development, and conducting the first Proof of Concept (POC). Without the OpIS platform and the iPRODUCE project, the project holder would need to seek advice separately from different companies and support entities. This process would be time-consuming and complicated, lacking a holistic approach to address the project's requirements efficiently.

The expected situation using OpIS:

In this envisioned "to be" situation for this OI mission, with the help of the OpIS platform and the iPRODUCE methodology, the project holder will be empowered to swiftly accomplish the following key elements:

1. Efficient project and company structuring: The project holder will be able to establish a solid foundation for the project and effectively organize the company as a whole.
2. Advancement in product design and technical functionalities: Leveraging the collaborative environment of OpIS and the iPRODUCE methodology, the project holder can make significant progress in enhancing the design and technical features of the product, ensuring its innovation and competitiveness.
3. Development of a comprehensive prototype: Through iterative design and prototyping facilitated by OpIS, the project holder will be able to create a more refined and complete prototype that can serve as a Proof of Concept (PoC). This improved prototype will demonstrate the viability and potential of the product to stakeholders and potential customers.
4. Securing funding for pre-series launch: The project holder will have the opportunity to explore various funding options with the support of OpIS and iPRODUCE. This could include seeking

investment, applying for grants, or engaging with relevant funding entities to secure the necessary resources for launching the pre-series production of the product.

By leveraging the OpIS platform and following the iPRODUCE methodology, the project holder will be equipped with the necessary tools, resources, and guidance to expedite progress across these critical areas, accelerating the realisation of their project and paving the way for future success.

Figure 19. Vipedi project

Objectives to achieve:

- Accelerate the development and file exchanges between the stakeholders
- Get feedback from potential users/clients
- Generate contracts easily and quickly

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	No	
Ricardian Toolkit (IPR management)	Yes	Generate contracts in a fast way.
Marketplace	Yes	The use depends on the project holder, in case they want to present the product to the general public or to sell it via the platform

Matchmaking	Yes	Easy search for partners
Agile Network Creation Tool	No	
AR / VR	Yes	To better communicate on the design between all the stakeholders taking part in the development
Mobile App for Social Media	Yes	Get feedback and adapt the product development
Agile Data Analytics & Visualisation	No	
Digital FabLab Kit	No	
OpIS Data Platform	No	

Table 15. Tools used in the Vipedi project support

3.2.5.3. Adaptive Scooter Basket

The initial situation:

In the current scenario, the OI mission aimed to engage all partners of the French cMDF core group in a collaborative product development exercise, without a specific project holder. The objective was to assess the capabilities and limitations of the iPRODUCE tools and evaluate the effectiveness of collaboration among the partners within a project context.

The FabLab Vosges, Materalia, and Excelcar demonstrated the highest level of commitment and involvement in the development process. Lab'Cesi, Inozh, iD4CAR, and Quest for Change, as partners from the Core Group, also contributed their efforts during the initial stages of the project.

Virtual meetings were conducted on two occasions, allowing the partners to discuss and define the technical, geometrical, and mechanical specifications of the product. Some progress was made in terms of 3D design and material selection, as well as identifying the preferred manufacturing process.

To facilitate collaboration, a product profile was created in the marketplace, initially associated with a team. Unfortunately, due to an error, the product profiles and associated data were inadvertently removed.

Despite this setback, the partners have made valuable strides in defining the product specifications and initiating the design process. Moving forward, it will be important to rebuild the necessary structures within the marketplace and continue the collaborative efforts to ensure the successful development of the product.

The expected situation using OpIS:

The desired future scenario involves external users in the customisation process by utilising the Generative Design product. The objective is to invite these users to personalize the product according to their specific requirements and preferences, and subsequently, they can upload the new file to the team. The implementation of OpIS and Generative Design significantly simplifies the customisation process, eliminating the need for separate designs for each adaptation. With the OpIS platform, the goal is to make customisation accessible and user-friendly for all users.

Furthermore, the establishment of a seamless process for users to locate suitable printing or manufacturing services for their customized parts is intended. This will ensure that customers can easily find a place or partner capable of printing and producing the customized scooter baskets.

By leveraging the capabilities of OpIS and Generative Design, FabLab-Vosges and Excelcar can effectively utilize these files to print or manufacture each individualized scooter basket, streamlining the production and delivery process.

Objectives to achieve:

- Explore and implement creative ideas and innovative solutions following the principles of co-design and co-development using also the OpIS development platform.
- Easily share the co-created work
- Be able to easily customise the design

Expected use of the tools:

In the following table you will find a description about the way the cMDF expected to use the tools to go from the as is situation to the to be situation:

Name	Tool to be Used in OI Mission:	If Used in OI Mission, why?
Generative Design Platform	Yes	To Customize the scooter basket
Ricardian Toolkit (IPR management)	No	
Marketplace	Yes	Create a Team and share the design with the community, offering them the possibility to download and use the product 3D File
Matchmaking	No	
Agile Network Creation Tool	No	

AR / VR	Yes	Create some virtual appearances of the design
Mobile App for Social Media	Yes	Get feedback from the community
Agile Data Analytics & Visualisation	No	
Digital FabLab Kit	No	
OpIS Data Platform	No	

Table 16. Tools used in the development of the Adaptive Scooter Basket

3.3. Tools evaluation

However, the progress of the platform and tools' development faced significant delays, which posed challenges to the evaluation process. As a result, many cMDFs had to proceed with their OI missions without being able to fully leverage the functionalities provided by the tools and platform.

This situation created difficulties in collecting comprehensive feedback and evaluations from the users. Despite efforts to gather information, the response rate was limited, with only 5 users providing feedback regarding their utilisation of the platform and tools.

By carefully analysing these responses, valuable information can be gained regarding the user perception, effectiveness, and usability of the platform and tools utilized during the OI missions. This analysis will help identify areas of improvement, address any limitations, and guide future enhancements to enhance the overall user experience and maximize the benefits for the cMDFs participating in similar OI missions.

3.3.1. General evaluation of the platform

In order to evaluate the platform, the respondents were asked several questions. You will find below example of the question asked as well as the given answers:

On a scale of 0 to 10, how would you rate the performance of the IProduce plateform response time and access etc.) ?

Copy

5 responses

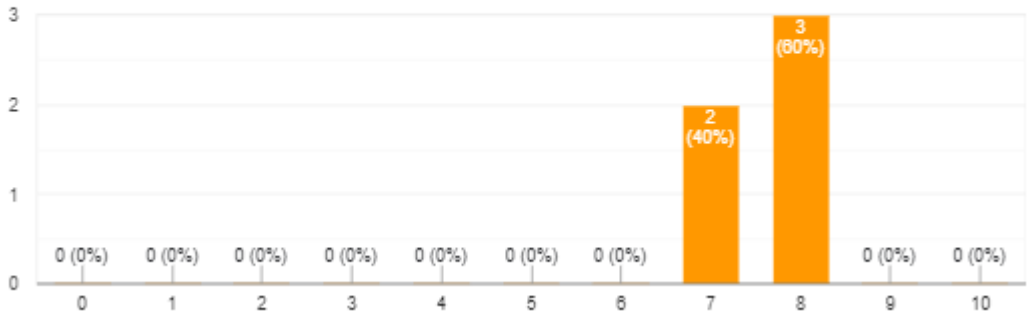


Figure 20. Platform evaluation - performance

On a scale of 0 to 10, how would you rate the understanding / ease of use of the IProduce platform?

Copy

5 responses

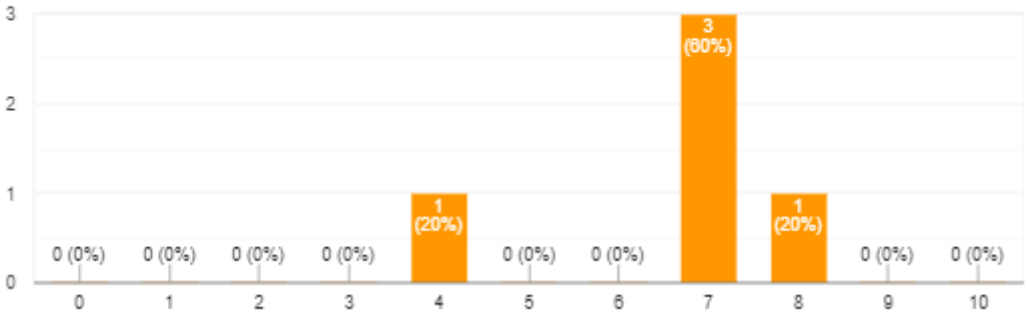


Figure 21. Platform evaluation – understanding

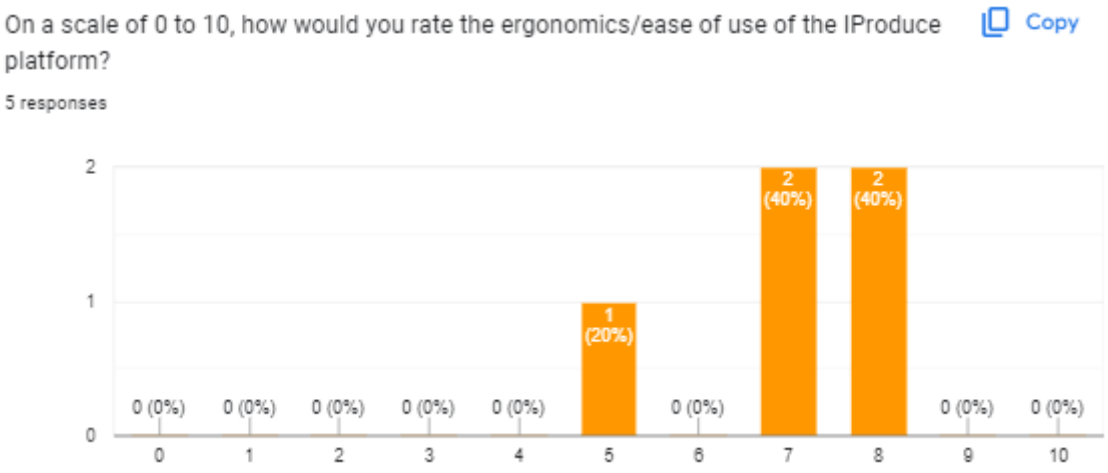


Figure 22. Platform evaluation - ergonomics

Based on the participants' feedback regarding their overall remarks about the iPRODUCE platform, there is a general consensus that the platform offers valuable features and tools for design and idea realisation. Participants appreciated the extensive toolset, which catered to their needs and allowed them to unleash their creativity, even without prior manufacturing experience. The platform was praised for its ability to bring together different stakeholders and provide a comprehensive ecosystem for collaboration.

However, there were some areas of improvement mentioned by the participants. They highlighted the need for a simplified and more user-friendly interface, as well as improved navigation between the various tools. While the overall quality of the tools was appreciated, the connection between them could be enhanced for a smoother user experience. Some participants expressed difficulty in navigating the platform and mentioned that it didn't feel seamlessly integrated.

Despite these areas of improvement, it is noteworthy that 100% of the participants would recommend the iPRODUCE platform to their friends or contacts. This indicates a positive sentiment and confidence in the platform's potential to facilitate idea realisation and product development.

In conclusion, the feedback reflects a recognition of the iPRODUCE platform's value in providing a wide range of tools, fostering collaboration, and empowering users to bring their ideas to life. Addressing the mentioned areas of improvement, such as interface simplicity and tool integration, could further enhance the platform's usability and overall experience, ensuring it continues to be recommended and utilized by participants and potential users.

3.3.2. Evaluation of the iPRODUCE Ecosystem

The respondents have shared their positive experiences and perspectives on the iPRODUCE ecosystem, highlighting its value in facilitating collaboration, innovation, and the development of their projects. One notable aspect mentioned by the respondents is the ecosystem's ability to provide useful contacts that they could reach out to for further project development. This feature demonstrates the ecosystem's effectiveness in connecting individuals and creating networking opportunities within the iPRODUCE community.

The iPRODUCE ecosystem has been praised for providing a comprehensive solution that empowers users to bring their ideas to life. It is seen as a vibrant and collaborative platform that brings together makers, manufacturers, designers, and consumers. The ecosystem offers a wide range of innovative

tools and resources that enable users to develop their product ideas and streamline the entire product development process. Respondents have appreciated the effectiveness and usefulness of the OpIS platform, particularly the Marketplace and the AR/VR tool, which have expanded their possibilities for creativity and collaboration.

The emphasis on social manufacturing and the exchange of skills and knowledge within the iPRODUCE ecosystem has been recognized as a significant aspect of its success. This emphasis creates a dynamic and supportive environment where participants can share expertise and ideas, fostering collaboration and mutual growth. The respondents have experienced the positive impact of this collaborative environment, noting that it has contributed to driving positive change in local communities.

However, some respondents have also mentioned that the ecosystem may have too much overhead for services. This feedback suggests that the platform might require further optimisation to better cater to service-based projects and their specific needs. It indicates a potential area for improvement in order to provide a more balanced experience across different project types within the iPRODUCE ecosystem.

Overall, the respondents' feedback highlights the iPRODUCE ecosystem's instrumental role in fostering innovation, connecting like-minded individuals, and driving positive change. The ecosystem has proven to be an effective platform for bringing ideas to life, streamlining the product development process, and creating a collaborative and supportive environment. While there is room for improvement in certain areas, the overall sentiment is highly positive, emphasising the ecosystem's value in empowering users and facilitating the realisation of their projects.

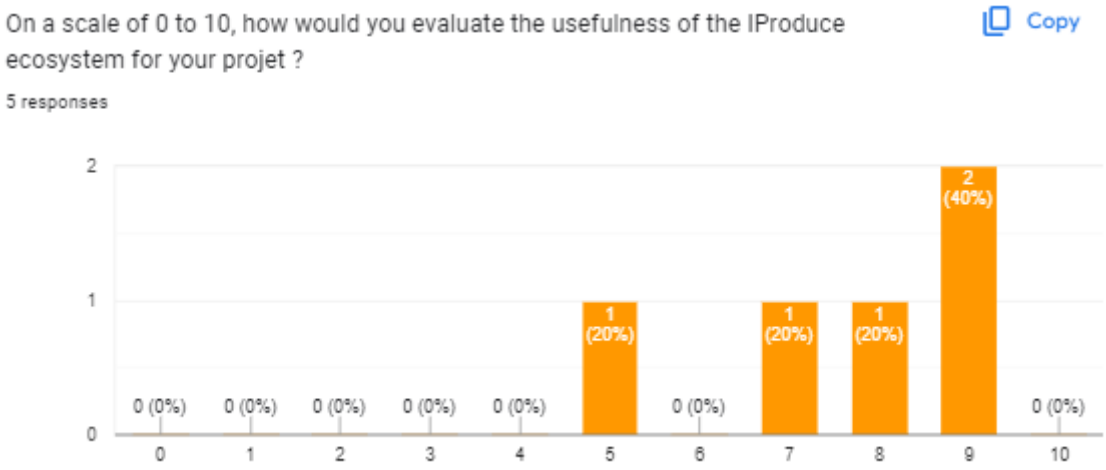


Figure 23. Ecosystem evaluation

3.3.3. Evaluation of the OpIS Tools

3.3.3.1. Generative design

Only one feedback was received for the evaluation of the Generative Design platform. It rated the platform with a score of 6 out of 10. The user found the tool to be not particularly easy to grasp and felt that it provided little added value to their project.

3.3.3.2. IPR management

The respondents provided positive evaluations for the IPR management tool, with ratings of 6, 7, 10, and 10. When asked if the tool addressed a specific problem that they or their organisation had before using the iPRODUCE platform, they responded affirmatively. They mentioned that the tool effectively tackles the issue of contract signing by streamlining the process and making it quick and efficient. It has significantly improved their organisation's workflow in terms of contract management.

Regarding the value added to their projects by this tool, the ratings on a scale of 0 to 10 were 6, 8, 9, and 10. This indicates that the tool has provided varying levels of value to different users, with some perceiving a moderate increase in value and others experiencing a substantial improvement.

In terms of the ease of understanding of the tool, the ratings ranged from 5 to 10 on a scale of 0 to 10. This suggests that while some users found the tool slightly challenging to grasp, the majority considered it easy to understand and navigate.

When assessing the ergonomics of the tool, the ratings provided were 6, 8, and 9. This indicates that the tool was generally perceived as ergonomic, providing a comfortable and user-friendly interface for the respondents.

Overall, the evaluations of the IPR management tool highlight its effectiveness in addressing contract signing issues, its value in enhancing project outcomes, and its favourable user experience in terms of ease of understanding and ergonomics.

3.3.3.3. Market Place

The respondents provided positive evaluations for the Marketplace tool, with ratings of 7, 7, 8, 8, and 9. When asked if the tool addressed a specific problem that they or their organisation had before using the iPRODUCE platform, they mentioned finding new collaborators as a key issue. The Marketplace tool successfully resolved this problem by providing a platform where they could connect with other users who possessed the necessary skills and expertise. This facilitated team creation and enhanced their organisation's ability to collaborate effectively.

Additionally, the Marketplace tool enabled them to showcase their products, addressing the need to find representatives of different interest groups. This feature allowed them to reach a wider audience and attract potential partners or customers for their products.

When asked to rate the value added to their projects by this tool on a scale of 0 to 10, the responses were 6, 8, 8, 9, and 10. This indicates that the Marketplace tool provided varying levels of value, with some perceiving a moderate increase and others experiencing a substantial improvement in their project outcomes.

In terms of the ease of understanding of the tool, the ratings ranged from 6 to 8 on a scale of 0 to 10. This suggests that while the majority of users found the tool relatively easy to comprehend, there were a few who found it slightly more challenging.

Regarding the ergonomics of the tool, the ratings provided were 6, 7, 8, and 9. This indicates that the tool was generally perceived as ergonomic, providing a comfortable and user-friendly interface for the respondents.

Overall, the evaluations of the Marketplace tool highlight its effectiveness in addressing the need for finding collaborators and showcasing products. It has added value to the projects of the respondents, with positive ratings in terms of value, ease of understanding, and ergonomics.

3.3.3.4. Matchmaking tool

The respondents provided positive evaluations for the Matchmaking tool, with ratings of 6, 8, 8, and 9. When asked if the tool addressed a specific problem that they or their organisation had before used the iPRODUCE platform, they mentioned two key challenges: reaching other people interested in additive manufacturing applications and finding new potential customers.

The Matchmaking tool proved to be invaluable in addressing these challenges. It provided an additional channel for the respondents to connect with individuals who were interested in additive manufacturing applications. By leveraging this tool, they were able to expand their network and reach a wider audience of like-minded individuals, creating opportunities for collaboration and co-creation.

Furthermore, the Matchmaking tool helped them find new potential customers. It facilitated a seamless and efficient process of connecting with individuals who were interested in their products or services. This allowed them to expand their customer base and explore new business opportunities.

When asked to rate the value added to their projects by this tool on a scale of 0 to 10, the responses were 7, 8, 8, and 9. This indicates that the Matchmaking tool provided varying levels of value, with most respondents perceiving a moderate to high level of value added to their projects through the tool's functionality.

In terms of the ease of understanding of the tool, the ratings ranged from 7 to 9 on a scale of 0 to 10. This suggests that the majority of users found the tool relatively easy to comprehend, indicating a user-friendly interface and intuitive features.

Regarding the ergonomics of the tool, the ratings provided were 7, 8, and 9. This indicates that the tool was generally perceived as ergonomic, providing a comfortable and user-friendly experience for the respondents.

Overall, the evaluations of the Matchmaking tool highlight its effectiveness in addressing the challenges of reaching interested individuals in additive manufacturing and finding potential customers. It has added value to the projects of the respondents, with positive ratings in terms of value, ease of understanding, and ergonomics. The Matchmaking tool has successfully facilitated collaboration, expanded networks, and contributed to the overall success of their endeavours within the iPRODUCE ecosystem.

3.3.3.5. Agile Network Creation

The respondents provided positive evaluations for the Agile Network Creation Tool, with ratings of 5, 7, 7, and 10. However, when asked if the tool addressed a specific problem that they or their organisation had before using the iPRODUCE platform, the response was negative. This suggests that the tool did not directly solve a specific problem or fulfil a particular need for these respondents or their organisations.

Moving on to the ratings, on a scale of 0 to 10, the respondents rated the value added to their projects by the Agile Network Creation Tool as 6, 7, 7, and 10. These ratings indicate varying levels of perceived value, with the majority of respondents acknowledging at least a moderate level of value added. While the tool may not have addressed a specific problem, it still contributed positively to their projects,

potentially by improving collaboration, enhancing networking capabilities, or streamlining certain processes within the iPRODUCE platform.

Regarding the ease of understanding of the tool, the ratings provided were 6, 7, 8, and 9 on a scale of 0 to 10. These ratings suggest that the tool was generally considered relatively easy to understand by the respondents. It implies that the tool's features, functionalities, and user interface were reasonably intuitive and user-friendly, allowing users to grasp its usage without significant difficulties.

In terms of ergonomics, the ratings ranged from 6 to 9 on a scale of 0 to 10. These ratings indicate that the tool was generally perceived as ergonomic, providing a comfortable and user-friendly experience. It suggests that the tool's design and usability were satisfactory, enabling users to navigate and interact with it in a smooth and efficient manner.

Overall, the evaluations of the Agile Network Creation Tool highlight its positive impact on the respondents' projects within the iPRODUCE platform. Although the tool did not directly address a specific problem, it still provided value to their projects, as indicated by the ratings. Additionally, the tool was generally considered relatively easy to understand and had satisfactory ergonomics, enhancing the user experience. While the tool may not have fulfilled a specific need, it contributed positively to the respondents' project workflows within the iPRODUCE ecosystem.

3.3.3.6. AR/VR

The respondents provided positive evaluations for the AR/VR tools on the iPRODUCE platform, with ratings of 6, 8, 8, and 10. These ratings indicate that the AR/VR tools were well-received and considered valuable by the respondents. When asked if the tools addressed a specific problem that they or their organisation had before using the iPRODUCE platform, the responses highlighted the benefits of the AR/VR tools in providing a sense of scale and size to virtual objects, as well as facilitating visualisation of product ideas.

The AR/VR tool on the iPRODUCE platform significantly improved the visualisation process for the respondents, offering an interactive and immersive experience that enhanced the assessment of designs. This suggests that the tool effectively addressed the challenge of accurately perceiving the size and proportions of virtual objects, enabling better understanding and evaluation of product concepts.

On a scale of 0 to 10, the respondents rated the value added to their projects by the AR/VR tools as 7, 8, 8, and 9. These ratings indicate a generally positive perception of the value provided by the tools, with the majority of respondents recognising a significant level of value added to their projects. The AR/VR tools likely contributed to improved design accuracy, better visualisation, and enhanced communication of product ideas within their respective projects.

Regarding the ease of understanding of the tool, the ratings provided were 7, 8, 8, and 9 on a scale of 0 to 10. These ratings suggest that the AR/VR tools were generally considered relatively easy to understand by the respondents. It implies that the tools' features, functionalities, and user interface were intuitive and user-friendly, allowing users to navigate and utilize them with relative ease.

In terms of ergonomics, the ratings ranged from 7 to 9 on a scale of 0 to 10. These ratings indicate that the AR/VR tools were generally perceived as ergonomic, providing a comfortable and user-friendly experience. It suggests that the tools' design and usability were satisfactory, enabling users to interact with the virtual environment and manipulate virtual objects in a smooth and intuitive manner.

Overall, the evaluations of the AR/VR tools demonstrate their positive impact on the respondents' projects within the iPRODUCE platform. The tools effectively addressed the challenge of visualising and understanding the size and scale of virtual objects, providing value to the respondents' projects. Additionally, the tools were generally considered easy to understand and had satisfactory ergonomics, enhancing the user experience and facilitating the design process. The AR/VR tools on the iPRODUCE platform proved to be valuable assets in improving visualisation and assessment of product ideas for the respondents' projects.

3.3.3.7. Mobile APP

The respondents provided a positive evaluation of the mobile app on the iPRODUCE platform, with ratings of 6, 6, 7, and 7. While the ratings indicate a generally positive perception of the mobile app, they also suggest that there may be room for improvement in certain areas. When asked if the app addressed a specific problem that they or their organisation had before used the iPRODUCE platform, the responses highlighted the value of the mobile app in gathering feedback from other users and facilitating communication and collaboration within the community.

The mobile app proved to be a valuable tool for the respondents, enabling them to gather feedback on their projects and engage in effective communication and collaboration with other users. This suggests that the app effectively addressed the challenge of seeking input and engaging in discussions with fellow community members, enhancing the overall collaborative experience within the iPRODUCE platform.

On a scale of 0 to 10, the respondents rated the value added to their projects by the mobile app as 6, 7, 7, and 7. These ratings indicate a moderate to high level of value perceived by the respondents. The mobile app likely contributed to improved project outcomes and facilitated interaction and engagement with the iPRODUCE community, resulting in valuable insights and feedback for their projects.

Regarding the ease of understanding of the tool, the ratings provided were 6, 7, 7, and 7 on a scale of 0 to 10. These ratings suggest that the mobile app was generally considered relatively easy to understand by the respondents. It implies that the app's features, functionalities, and user interface were reasonably intuitive and user-friendly, allowing users to navigate and utilize it with a satisfactory level of ease.

In terms of ergonomics, the ratings ranged from 6 to 7 on a scale of 0 to 10. These ratings suggest that the mobile app's ergonomics were deemed acceptable by the respondents. While not exceptionally high, the ratings indicate that the app provided a reasonably comfortable and user-friendly experience, allowing users to interact with the platform and engage in communication and collaboration effectively.

Overall, the evaluations of the mobile app indicate that it played a valuable role in gathering feedback and facilitating communication and collaboration within the iPRODUCE platform. While there is room for improvement, the mobile app added value to the respondents' projects, enhancing their ability to receive input and engage with the community. It was generally perceived as relatively easy to understand and had acceptable ergonomics, contributing to a satisfactory user experience

3.3.3.8. Agile data analytics

The respondents provided a positive evaluation of the Agile Data Analytics & Visualisation tool on the iPRODUCE platform, with ratings of 6, 7, 8, and 8. These ratings indicate a generally positive perception of the tool and its contribution to the respondents' projects. When asked if the tool addressed a specific problem that they or their organisation had before used the iPRODUCE platform, the responses highlighted the value of the Agile Data Analytics & Visualisation tool in providing valuable statistical

information about users, products, materials, and other aspects of the ecosystem. The tool offered a comprehensive view of the ecosystem and aided in decision-making processes.

The Agile Data Analytics & Visualisation tool proved to be a valuable asset for the respondents, enabling them to gain insights from the statistical information it provided. This data-driven approach allowed them to make informed decisions, identify trends, and analyse various aspects of the ecosystem. By offering a comprehensive view of users, products, and materials, the tool addressed the specific challenge of accessing and interpreting relevant data for decision-making purposes.

On a scale of 0 to 10, the respondents rated the value added to their projects by the Agile Data Analytics & Visualisation tool as 6, 7, 8, and 8. These ratings indicate a moderate to high level of value perceived by the respondents. The tool likely played a significant role in improving the quality of their decision-making processes and providing valuable insights for project development within the iPRODUCE platform.

Regarding the ease of understanding of the tool, the ratings provided were 6, 7, 8, and 8 on a scale of 0 to 10. These ratings suggest that the Agile Data Analytics & Visualisation tool was generally considered relatively easy to understand by the respondents. It implies that the tool's features, functionalities, and user interface were reasonably intuitive and user-friendly, allowing users to navigate and interpret the statistical information with a satisfactory level of ease.

In terms of ergonomics, the ratings ranged from 6 to 8 on a scale of 0 to 10. These ratings suggest that the tool's ergonomics were generally considered acceptable by the respondents. While not exceptionally high, the ratings indicate that the tool provided a reasonably comfortable and user-friendly experience, allowing users to access and analyse statistical data effectively within the iPRODUCE platform.

Overall, the evaluations of the Agile Data Analytics & Visualisation tool indicate that it played a valuable role in providing statistical information and aiding decision-making processes within the iPRODUCE platform. The tool added value to the respondents' projects by offering a comprehensive view of the ecosystem and facilitating data-driven decision-making. It was generally perceived as relatively easy to understand and had acceptable ergonomics, contributing to a satisfactory user experience. The Agile Data Analytics & Visualisation tool on the iPRODUCE platform proved to be a valuable asset for the respondents, supporting their project development and enhancing their ability to analyse and interpret data within the ecosystem.

3.3.3.9. Digital FabLab Kit

The respondents provided evaluations for the Digital FabLab Kit on the iPRODUCE platform, giving ratings of 6 and 7. These ratings indicate a generally positive perception of the tool.

When asked about the value added to their projects by the Digital FabLab Kit, the respondents rated it as 6 and 7 on a scale of 0 to 10. These ratings suggest that the tool provided a moderate level of value to their projects. While it may not have had a significant impact or brought transformative changes, it still offered useful features and resources that contributed to the respondents' project development within the iPRODUCE platform.

In terms of the ease of understanding of the tool used, the respondents rated it as 6 and 7 on a scale of 0 to 10. These ratings indicate that the Digital FabLab Kit was moderately easy to understand for the respondents. While it might have presented some complexities or required a learning curve, the overall understanding of the tool was satisfactory for the users. They were able to navigate its features and functionalities with a reasonable level of ease.

Regarding the ergonomics of the tool, the respondents rated it as 6 and 7 on a scale of 0 to 10. These ratings suggest that the Digital FabLab Kit had an acceptable level of ergonomics. While it might not have offered the most seamless or intuitive user experience, the tool's ergonomics were still deemed satisfactory by the respondents. They were able to interact with the Digital FabLab Kit comfortably, despite potential minor usability issues.

4. Demonstration of the Federated Network of cMDFs and Business Model Validation (T9.5)

While the individual cMDFs have their own BMs strongly focused on on-demand product development/product upgrading/modification through matchmaking with existing companies and resources, with a main but not exclusive focus on the local scope -communities-, the “federated network” and structure of cMDFs (collaboration, partnerships and exchanges), the developed Tools and the OpIS open up and facilitate the expansion of the natural activity of the cMDFs, first with their own counterparts (the cMDF structure/federation) and also with new partners, shaping a wider overarching BM than, therefore, combines and includes:

- the Produce on Demand business model (the product is only produced after being agreed on or purchased).
- an alt-marketplace business model, where the cMDFs engage in modes for collaboration and transaction to expand and foster untapped opportunities.

This BM has been outlined in Deliverable 7.3, and his validation needs to go further than the individual cMDF. For this purpose, an inter-cMDF Use Case has been put into practice between the Spanish and Italian cMDFs. This UC is detailed in the next section, while its validation goes through all the key elements in the anticipated BM and checks the level they are satisfied with, while also addressing aspects that might be needed in future developments.

4.1. Demonstration of the Federated Network of cMDFs

In order to demonstrate and validate the iPRODUCE Federated Network of cMDFs, a joint Use Case (UC) has been designed and executed between 2 cMDFs (IT-cMDF and ES-cMDF). they have chosen, focusing on the consumer goods, a piece of furniture (a chair). The way to proceed through iPRODUCE platform would be matching with the cMDF that can best deliver the job (via Marketplace and Matchmaking tools), according to the skills necessary to carry it out. The name of the UC is inter-cMDF.

In the hybrid management model as the selected governance model for the federated network, as defined in D3.1 “Lean Operational Model for cMDFs’ Federations”, the local cMDF is contacted by the client and tries to deliver the project internally, the Spanish cMDF acts as Project Manager, being the responsible of coordinating and supporting the complete project, and that will handle the circumstances where the iPRODUCE OpIS does not have control and orchestration mechanisms. The local cMDF defines the project specifications, a delivery date and coordinates the co-design phase with other cMDF, in this case the IT cMDF, that act as suppliers on specific parts of the project. Once all the involved cMDFs complete their tasks and the project is completed, the local hub delivers the outcome to the client. The necessary specific training activities are delivered by the Spanish cMDF that conducted the development of the chair.

The hybrid solution encompasses the advantages of having a specifically defined figure managing the project in the Spanish cMDF. The local hub defines the project specifications, while the IT cMDF acts as supplier, mainly in the design phase.

4.1.1. Users’ Profiles

The different users who have participated in the inter-cMDF UC are the following:

- Enrique Soriano Muñoz: Client (industrial designer, freelance)

- Maurizio Rossi: Administrator/Manager in IT cMDF of the OpIS (Trentino Sviluppo)
- Gianluca Berti: Product designer in IT cMDF (Trentino Sviluppo)
- Matteo Perini: Additive manufacturing technician (researcher) in IT cMDF (Trentino Sviluppo)
- Mario Martínez: Designer (researcher) in Additive Manufacturing in Spanish cMDF (AIDIMME)
- Daniel Ivaylov: Project Manager in Spanish cMDF (AIDIMME)
- Do Sanchez: Product designer in Spanish cMDF (VLC)
- María José Núñez: technician (researcher) in prototyping, testing in lab

4.1.2. Storytelling

This is the storytelling defined as process flow between the different actors involved in the inter cMDF UC:

1. A Spanish product designer Enrique Soriano Muñoz wants to design an innovative sofa-chair from a new or novel material with large dimensions. He is aware of the iPRODUCE platform and he registers in the **Marketplace.**
2. He (now he is the customer) contacts the Spanish cMDF (AIDIMME) through the iPRODUCE platform (OpIS).
3. Spanish cMDF (role of Project Manager) cannot manufacture it in AIDIMME´s facilities (due to the dimensions) but Spanish cMDF will collaborate in the co-design phase. VLC cannot manufacture as well but *Do Sanchez* will participate in the sofa-chair co-creation.
4. Enrique starts searching (“3D printing large format”) in the Marketplace and he finds some suitable partner/s and contacts them (*gianluca.berti* and *maurizio.rossi*) through **messages** in the Marketplace.
5. He checks different competences (in **Matchmaking**), and locates users from the IT cMDF, that leads them to IT cMDF´s members.
6. He contacts them through the Marketplace and Spanish cMDF **Create a Team** (IT-ES Chair) creating the product in its first version uploaded by the customer (just rough design), without making it public.
7. A first Ricardian contract is issued -as **NDA**, initially, among all team members.
8. The IT cMDF´s selected members help the customer to verify the feasibility of the project and provide support for 3D printing manufacturing; but he lacks competences on some design aspects.
9. Enrique and the Spanish cMDF start the co-creation process creating the second 3D design version with the help of the IT cMDF (mostly offline). 3 variations of the design are done (original and 2 versions).
10. Spanish cMDF follows up the design sessions and basic project management (mostly offline).
11. Enrique collects feedback from the team members via the **Mobile App for social media** creating a **Survey** regarding the 3 designs. Answers from the team members are collected.
12. The customer checks the answers from the questionnaires in the platform´s **analytics** to choose one proposal from the 3 proposed ones.
13. The chosen design is validated by all parties. Different messages in the team are exchanged through the platform.
14. Upload the 3D model (in FBX format) selected in the **AR/VR toolkit** to check it in different environments.
15. IT cMDF manufactures the chosen prototype.
16. Customer and Spanish cMDF validate it in the lab´s facilities.
17. Final version is published in the Marketplace.

4.1.3. Process Flow

Following the storytelling defined in the previous section, this section illustrates the process flow through the platform, step by step:

4.1.3.1. Steps 1 to 4: registration, searching and first contact

A Spanish product designer Enrique Soriano Muñoz wants to design an innovative single chair from a new or novel material with large dimensions. Enrique registers in the **Marketplace** (now he is the customer) contacts AIDIMME (from the Spanish cMDF) through the iPRODUCE platform (OpIS).

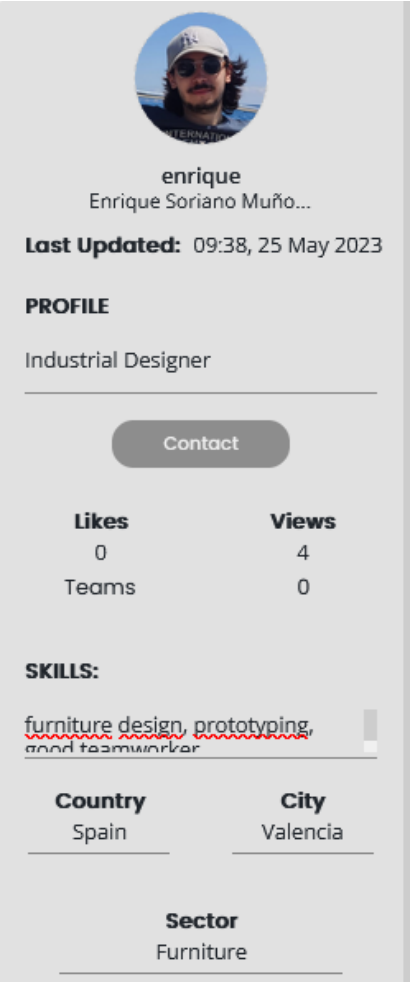


Figure 16. Enrique´s Profile

Spanish cMDF (role of Project Manager) cannot manufacture it in AIDIMME´s facilities (due to the dimensions) but Spanish cMDF will collaborate in the co-design phase. VLC cannot manufacture as well but Do Sanchez will participate in the chair co-creation. Enrique starts searching (“3D printing large format”) in the Marketplace and he finds some suitable partner/s and contacts them (gianluca.berti and maurizio.rossi) through messages in the Marketplace.

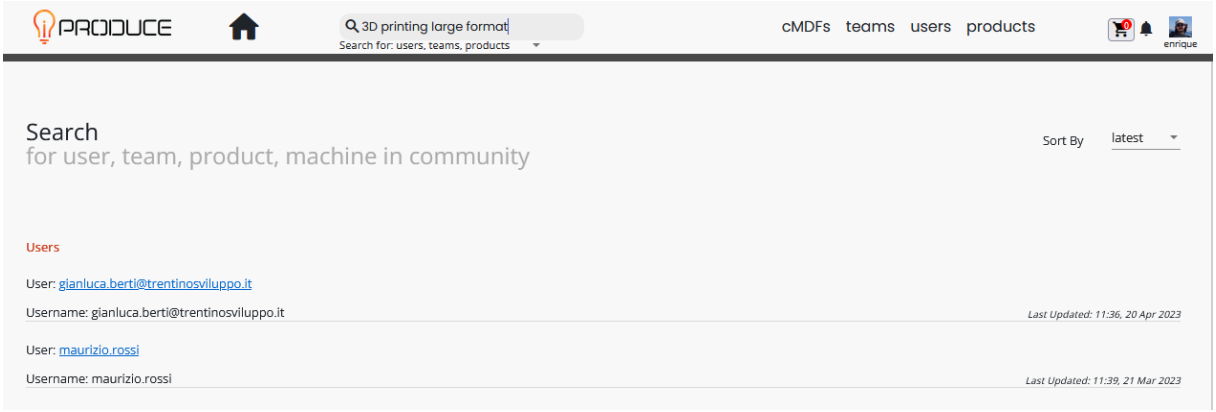


Figure 12. Enrique searches for “3D printing large format” in the Marketplace

After the search Enrique finds two possible users:

- User: G*ianluca Berti from Trentino Sviluppo (IT)*
- User: *Maurizio Rossi from Trentino Sviluppo (IT)*

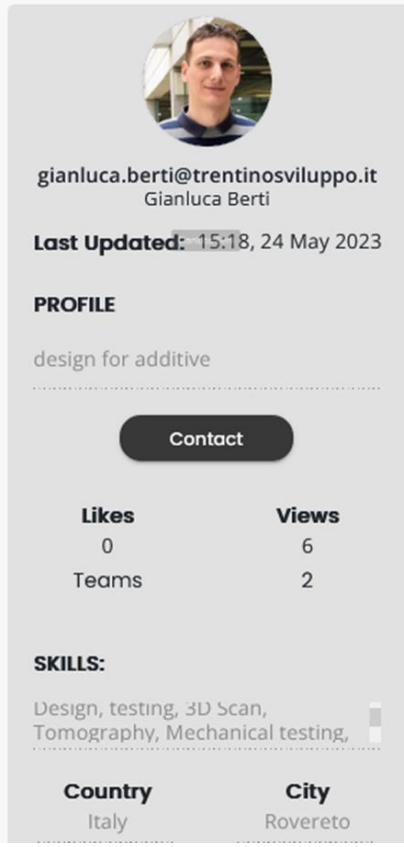


Figure 13. Gianluca’s profile

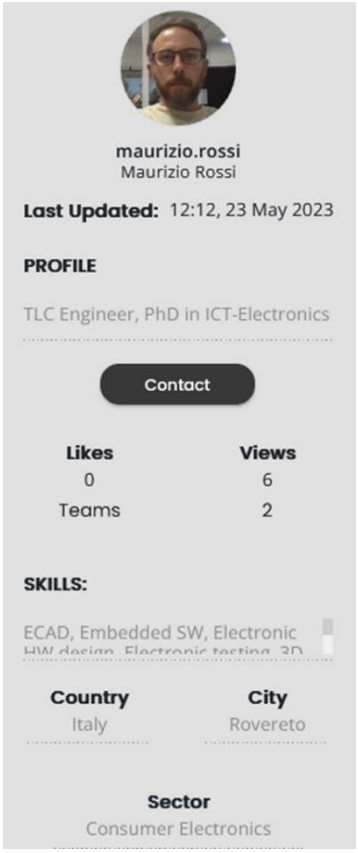


Figure 14. Maurizio’s profile

and send them some **messages** to contact them in order to see if they can manufacture (in additive manufacturing) a sofa-chair with large dimensions.

Figure 15. Messages exchanged between Enrique and the 2 users

4.1.3.2. Steps 5 and 6: Matchmaking and Team´s creation

Enrique checks different competences (in **Matchmaking**) and locates other users as well from the IT cMDF.

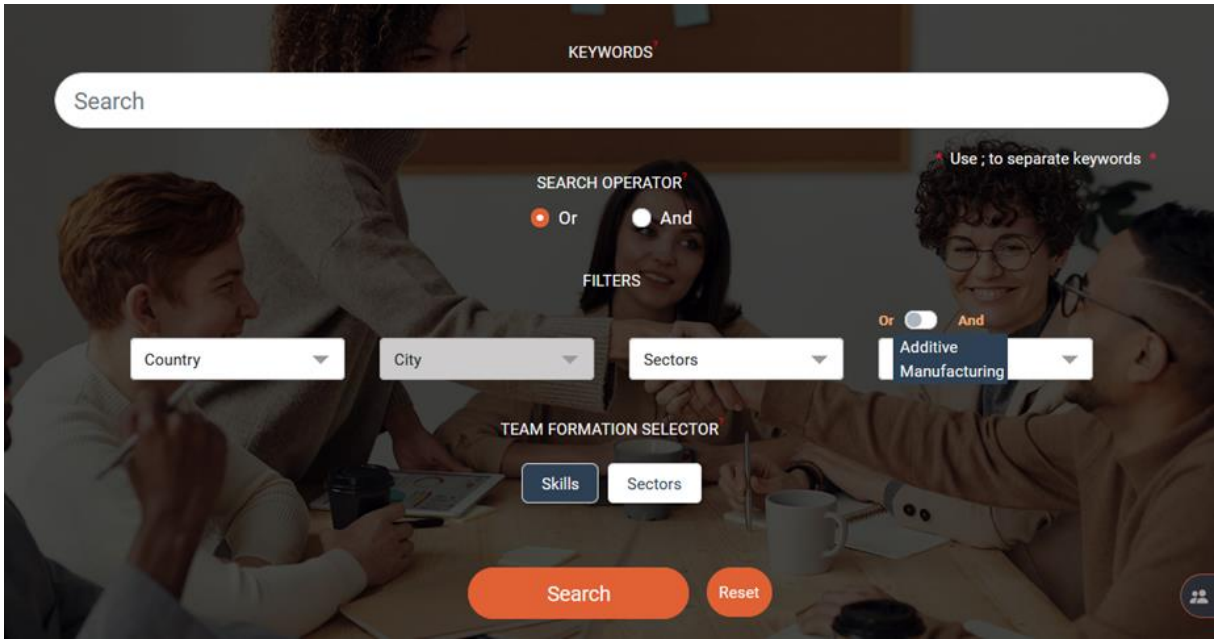


Figure 16. Matchmaking

Enrique searches in the matchmaking tool filtering by Sector “Research” and Skills “Additive Manufacturing" because he needs a technician specialised in Additive Manufacturing. Enrique applies the option “*And*” to filter and find results that include all of the applied filters. Then, he clicks in “View User” and contacts Matteo with a private message. Once Matteo replies to Enrique, he starts to create the team.

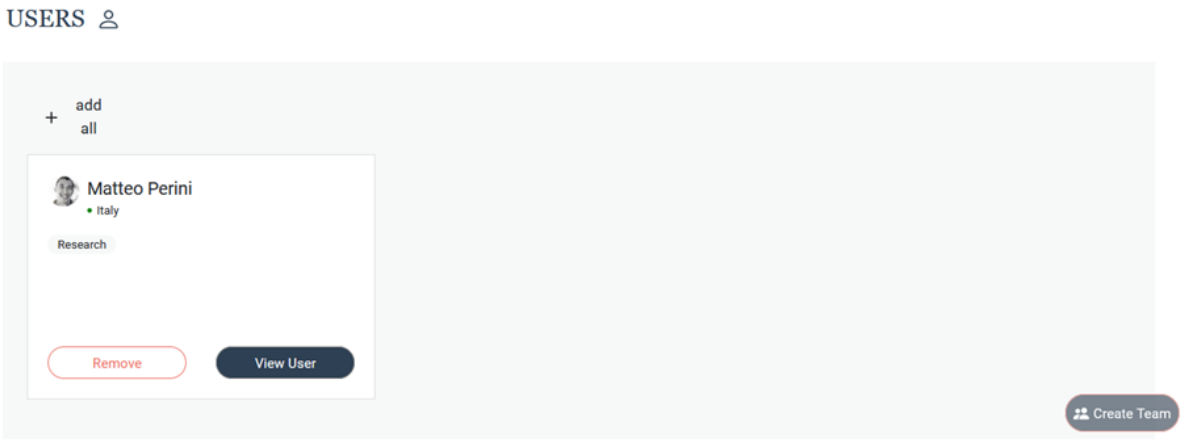


Figure 17. Adding users to the team.

Enrique contacts all selected users before creating the Team and finally **Creates a Team** *(IT-ES Chair)* with a first version (just rough design) of the product starting the co-design phase, without making it public.

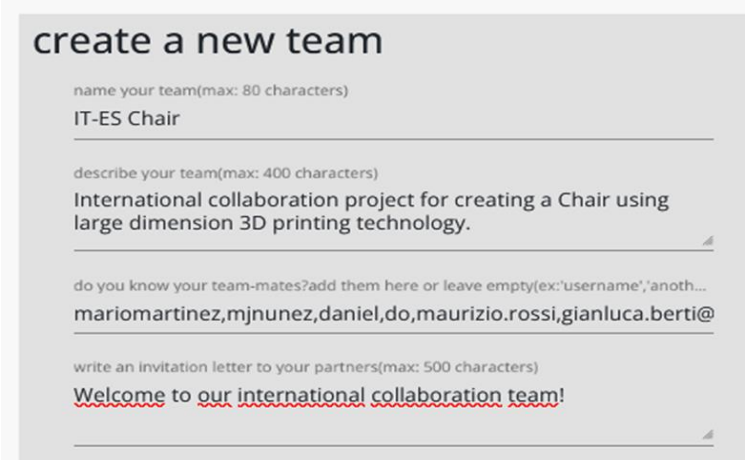


Figure 18. Team´s creation

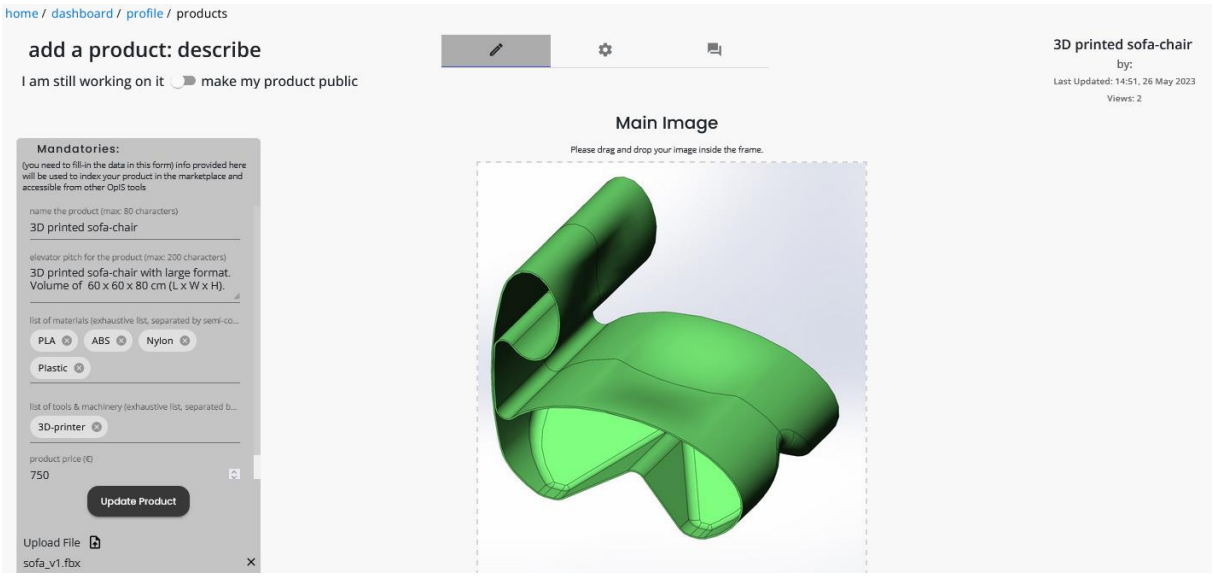


Figure 19. First product version

4.1.3.3. Step 7: IPR Contract

After creating a product in the Team, an IPR contract is automatically created with all the users forming the team. Enrique selects the option of “Review Contract” from the team because a first Ricardian contract is issued -as NDA-, initially, and must be revised from all members in the team.

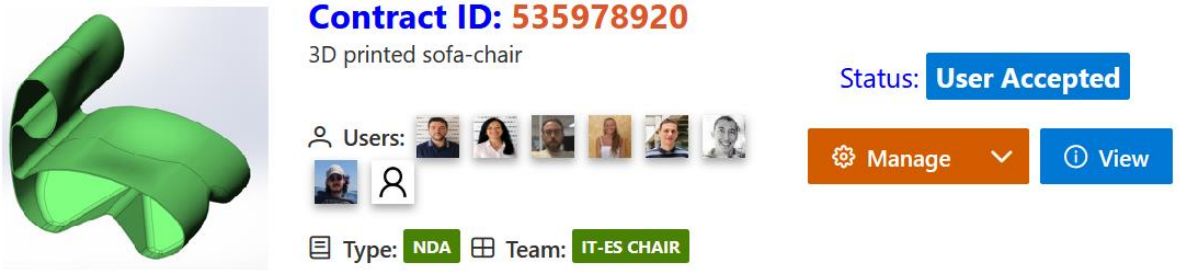


Figure 20. List of IPR contracts

Enrique selects the NDA of the IT-ES CHAIR Team in order to start with the first version of the NDA. All users are automatically written in the NDA and you can write all the content as you want.

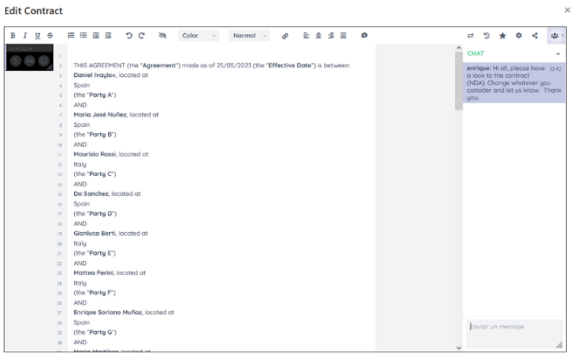


Figure 21. IPR Contract users

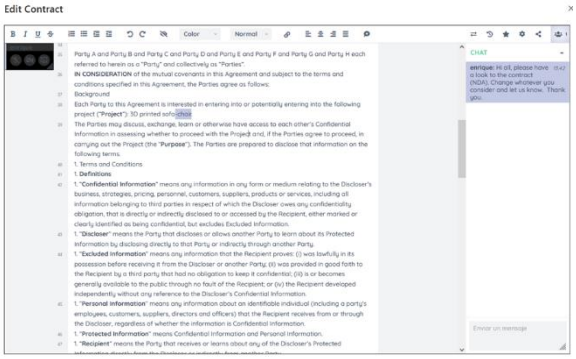


Figure 22. IPR Contract content

He advised all members in the team´s chat regarding the first version, waiting for all members to revise, change and update. Enrique advises all team members as well in the team´s chat regarding the needed checking of the NDA by all members. Enrique needs to wait till all members “Accepted” the NDA to proceed with the sofa-chair co-creation.

4.1.3.4. Steps 8 to 10: offline work

The IT cMDF´s selected members help Enrique to verify the feasibility of the project (the sofa-chair product) and provide support for 3D printing manufacturing; but Enrique lacks competences on some design aspects. Enrique and the Spanish cMDF (AIDIMME and VLC) start the co-creation process creating the second 3D design version with the help of the IT cMDF. Finally, 3 variations of the initial design are done (original and 2 versions) in digital format.

Spanish cMDF´s users follow up the design sessions and basic project management (mostly offline).

4.1.3.5. Step 11: Creating survey and Mobile App

Enrique collects feedback from the team members via the **Mobile App for social media** creating a **Survey** regarding the 3 designs. 3 JPGs files illustrate the 3 variants. The survey is answered by the team members.

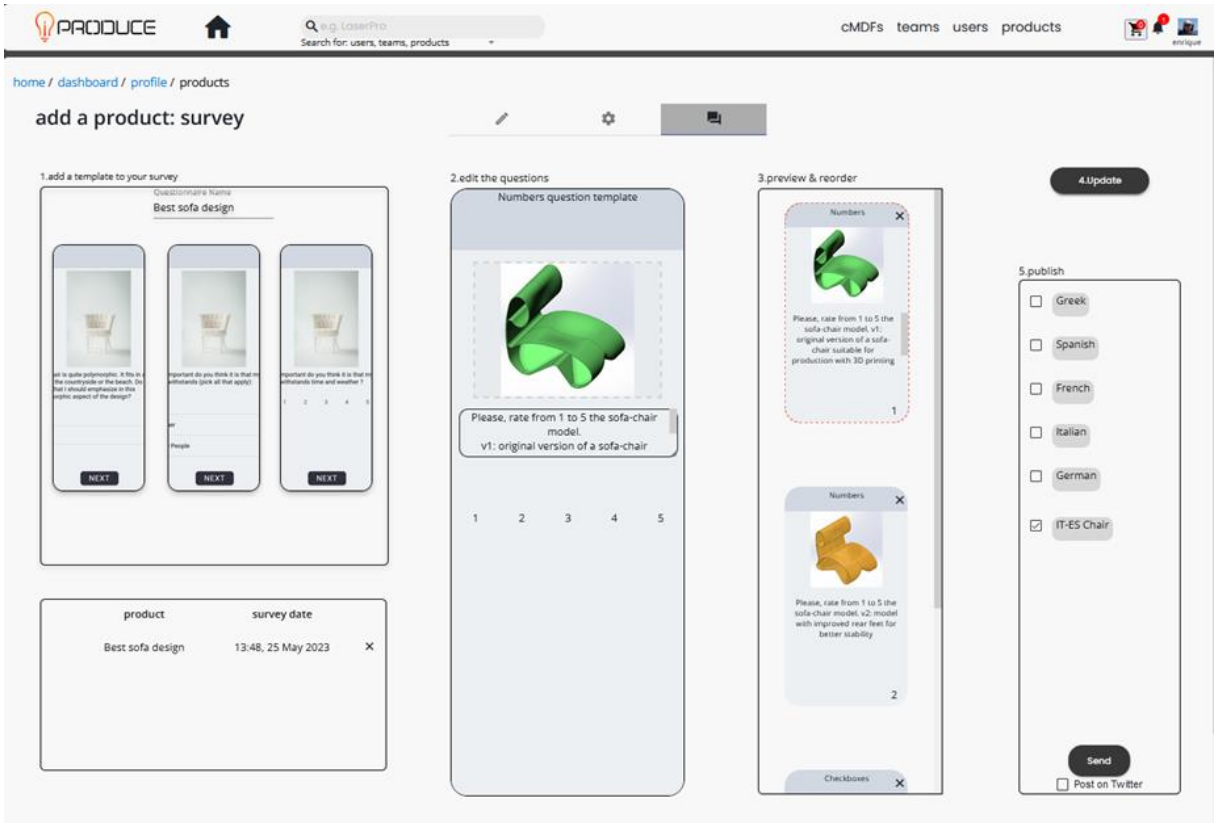


Figure 23. Survey creation

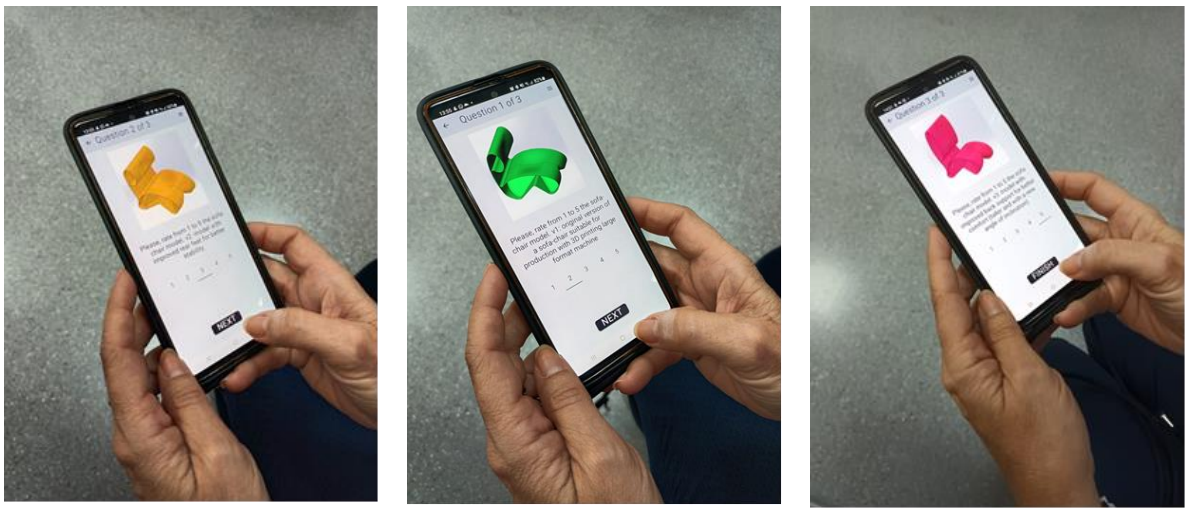


Figure 24. Survey response in v1, v2 and v3

4.1.3.6. Step 12: Data Analytics

Enrique checks the answers from the questionnaires in the platform´s **analytics** to choose the winner proposal from the 3 proposed ones.

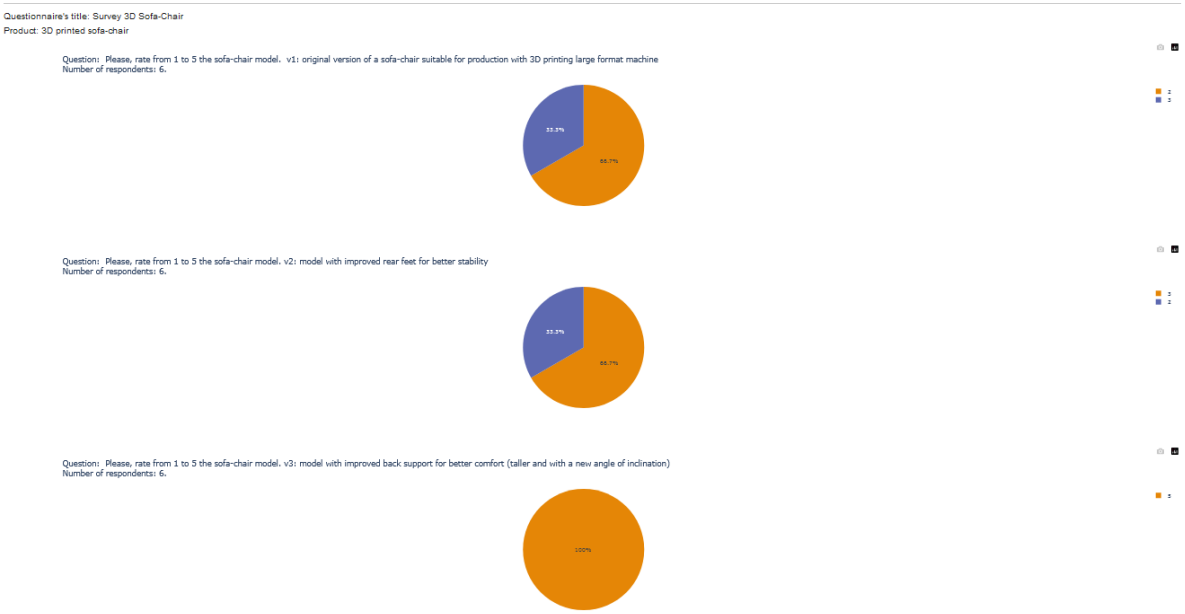


Figure 25. Survey results

The three product variations are voted by the 6 users involved in the inter-cMDF and the most voted is version 3.

4.1.3.7. Step 13: Choose design

Enrique informs the team about the winner proposal and different messages in the team are exchanged through the platform.

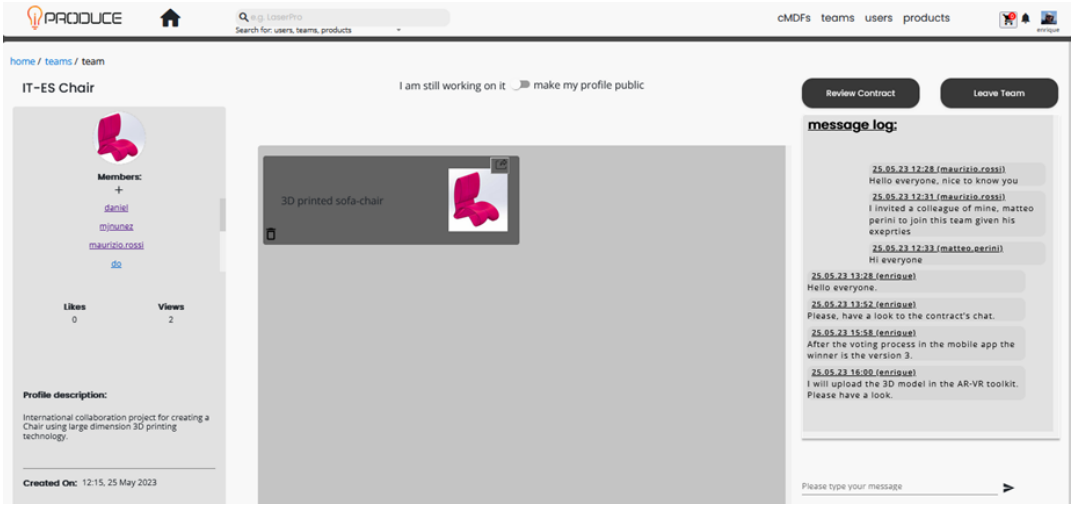


Figure 26. Messages exchanged in the chat about the winner proposal

4.1.3.8. Step 14: AR/VR Toolkit

Enrique converts the STEP file in FBX format and uploads it on the platform. In this way, the team members can check it in the **AR/VR toolkit**. All users revised the 3D model changing colours and materials.

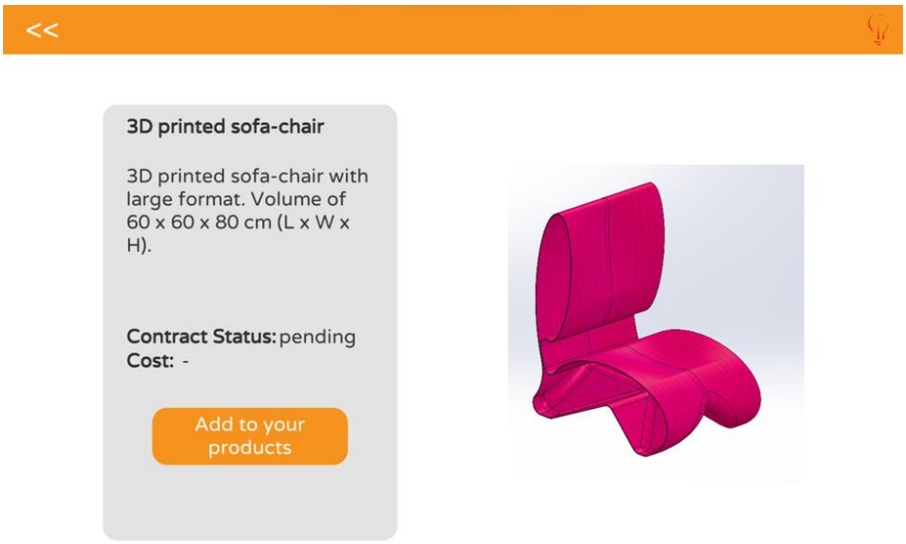


Figure 27. Adding the 3D model in the AR/VR Toolkit

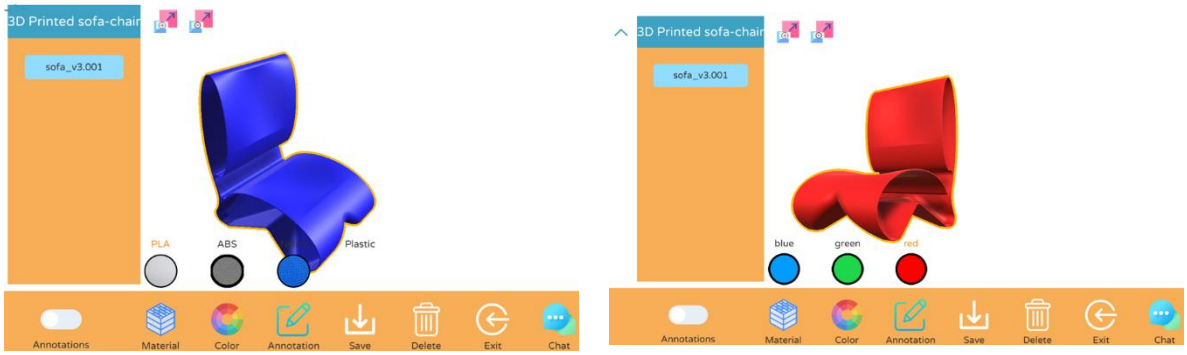
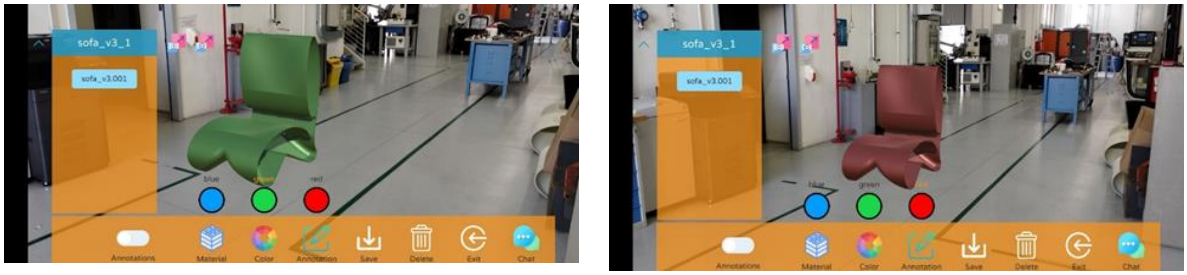


Figure 28. Selection of Material and Colours



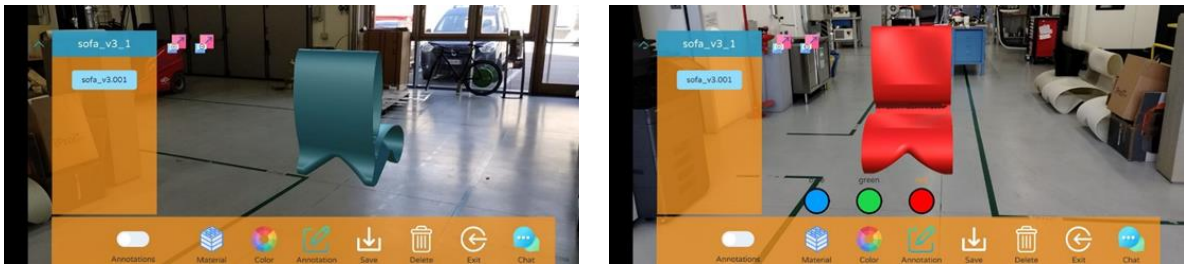


Figure 29. Selected model in AR toolkit

Some messages are exchanged among the team´s users to select the final colour.

4.1.3.9. Steps 15 to 17: prototypes´ manufacturing, testing in Lab and final version publication

The chosen version is manufactured and tested in AIDIMME´s laboratories.

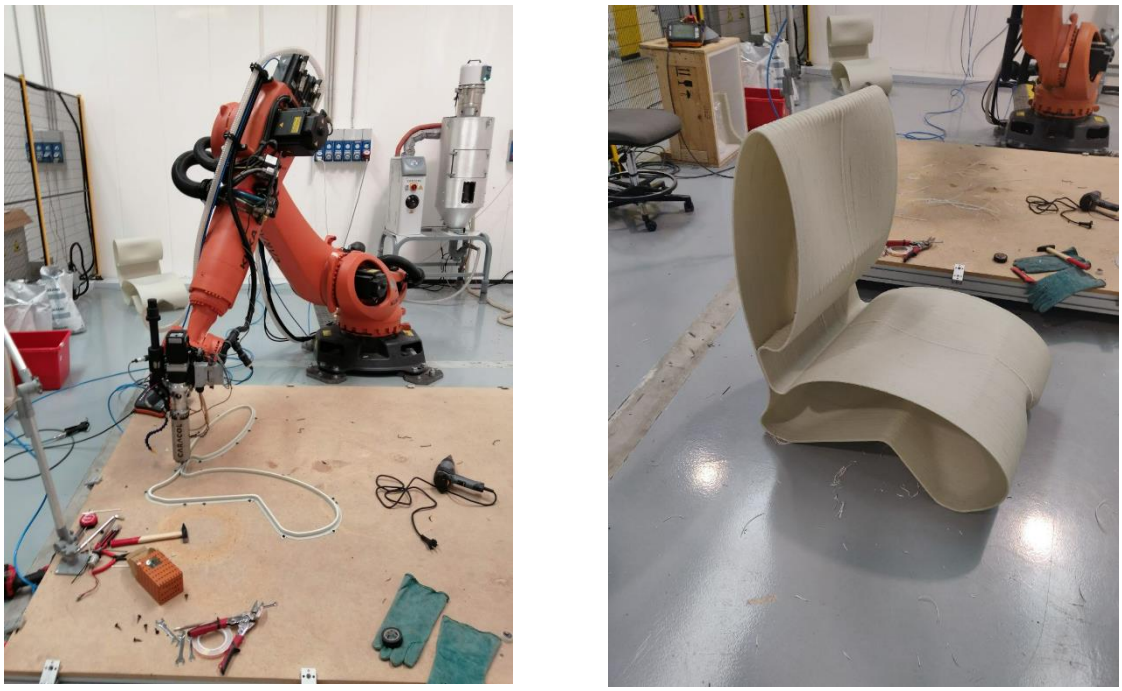


Figure 30. Prototype produced in Additive Manufacturing

The product is publicly available in the Marketplace.

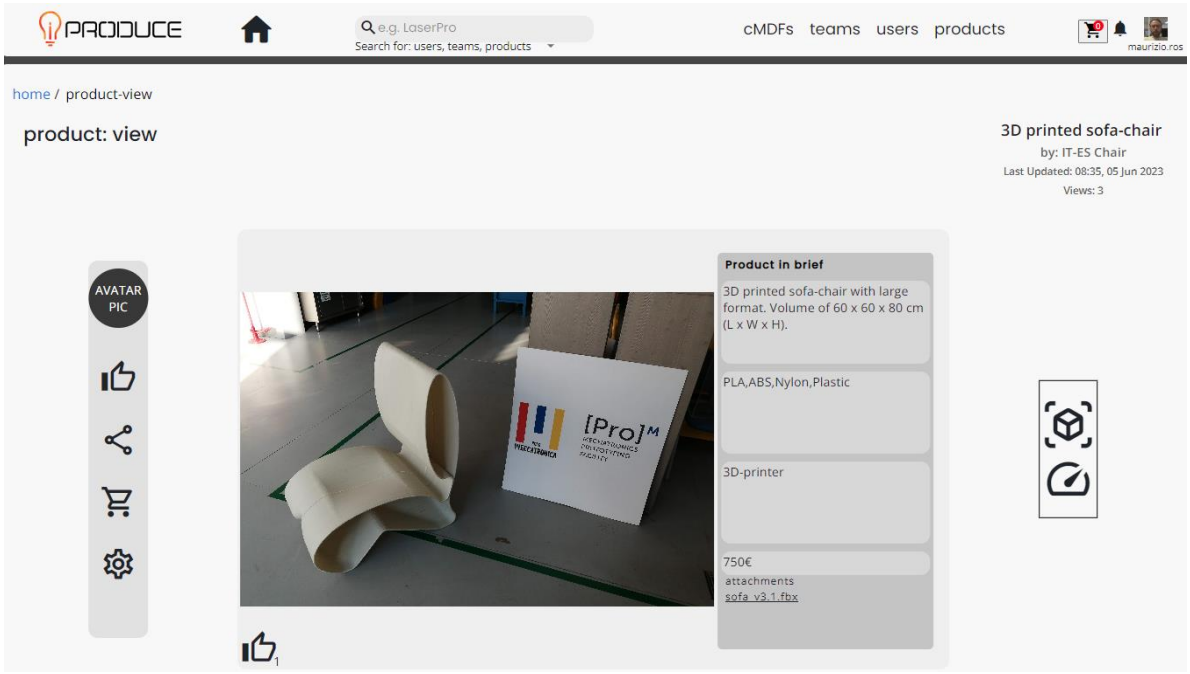


Figure 31. Publication of the product in the Marketplace

Enrique is very happy with the work carried out with the co-design of the sofa-chair and decides to complete his profile by uploading his products (portfolio) and made them public and thus find new opportunities for collaboration in the near future.

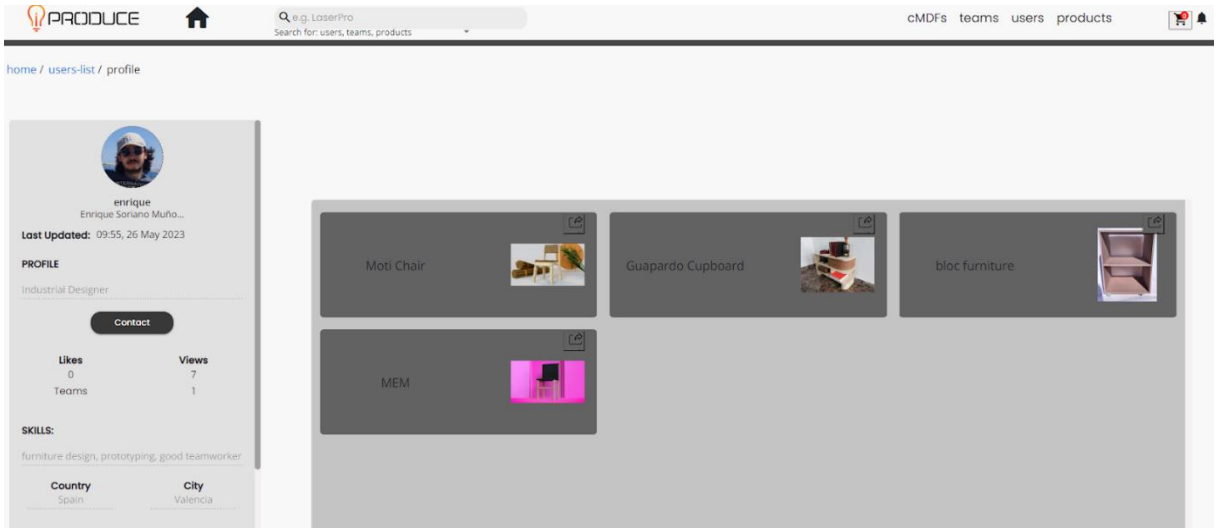


Figure 32. Enrique´s profile

The dual complementary nature of the digital/social space in iPRODUCE has been demonstrated in the different use cases, developed in the -mostly- local framework of the individual cMDFs. However, when more than one cMDF are involved - *federated* operation-, the iPRODUCE platform must respond counterbalancing the lack of F2F interaction expected at the local level, while providing additional guidance in the user flow. An inter-cMDF UC has been defined to validate these requirements as well as the BM of the Platform -which is what justifies the sustainability of the *federation.*

The interactions among the different stakeholders of the inter-cMDF Us Case through the Marketplace, not knowing each other once the product designer started the process, has been very interesting from the business perspective because the creation of a team between different users from different countries gave us the opportunity to create new ways for collaborative work co-designing a new product concept, having the possibility to arrange an NDA among the parties and maintain the privacy and confidentiality of the product´s idea and production.

4.2. Business Model Validation

As indicated, the BM of the "Federated Network" (See D7.3) is validated through the Inter-cMDF UC above. The different blocks in the Canvas, as well as procedural issues are considered:

4.2.1. Generic Workflow

The demonstrated workflow in the Inter-cMDF UC (Spanish-Italian) responds both to the natural workflow of the individual cMDFs operation and the different user journeys anticipated for the Tools in the Platform. In this case, the journey for the "Maker" Profile (See D4.10 for a more detailed description).

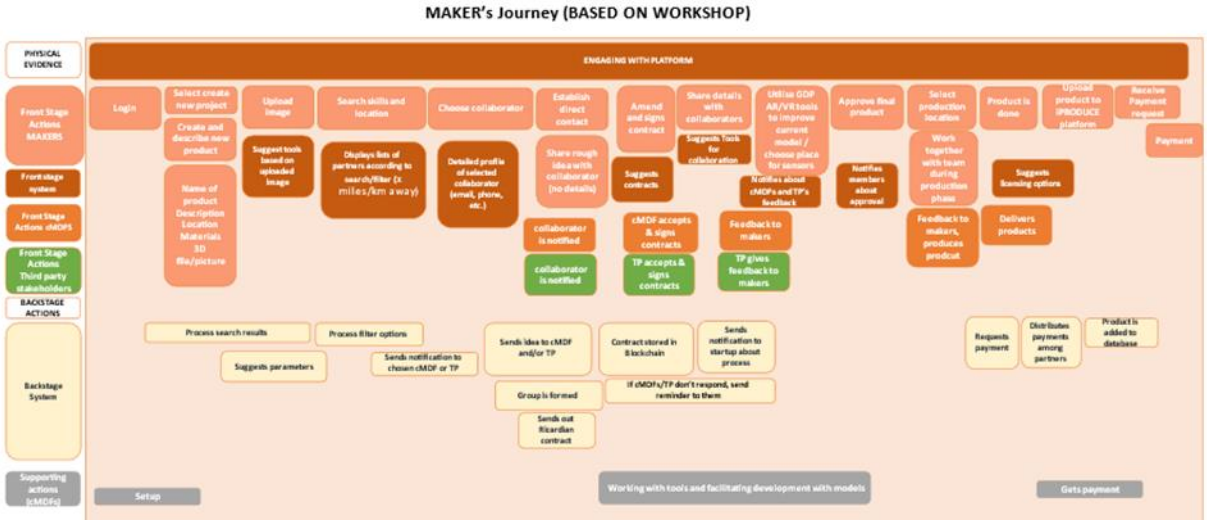


Figure 33. User Journey used in the Inter-cMDF Use Case

4.2.2. Values, Capabilities and Value proposition

Values drive the actions and concepts used, while not always being direct actors. Here, the *Community* and *Market Growth* are satisfied in the sense that the proximity network is used, whereas the "far" network is transparent for the user, which receives the same service and interaction than with the direct local counterparts. *Sustainable approaches* and *Resource efficiency* are usually implicitly considered, but in this UC -which ends up in the prototyping phase, they are not relevant.

The capabilities demonstrated include the *Tools in the Platform* (Matchmaking, marketplace and mobile app, Ricardian contracts and Analytics. Since the user -a designer- has knowledge of design, IT and furniture, no need to use the *aid to design tools* and the *Training Toolkit*), as well as *Facilitate contractual needs,* by proposing the more meaningful templates (in this case the entities suggested a simple NDA

template, as design contributions were considered unimportant), and obviously the *Network management, Establish collaborations* and *Wide market reach.*

The value proposition components are fully satisfied, in the sense that the cMDF components -in this case AIDIMME-, play the role of *One-stop shop for on-demand product development,* receiving the interest of the prospective user, identifying the collaborative approach needed and signposting it to the iPRODUCE workflow. The chosen approach, which analyses the problem by *deepening collaboration with existing partners* (VLC advises on production processes and possible collaborators in the local area), and as a consequence *elicits collaborations with new partners* (ProM facility, through the IT cMDF). Ending the UC at the prototype stage, the *expanded market reach for MMCs* cannot be validated.

4.2.3. Market, Partners and Customers

The Partners used in the Inter-cMDF UC are exclusively the cMDFs in the project. *Project partners* and extended *networks* are available but not validated.

The stakeholder segments would need a wider demonstration, but the current Inter-cMDF case deals with: the *furniture sector*, *Makers*, *product designers* and *R&D Departments*.

In terms of Touchpoints and Channels the natural relation *networks* -already existing- drove the contact and the link between the Designer and the cMDF. The effectiveness of the developed channels (*Promotion strategy, web, App, Social Media Campaigns*) is still to be validated.

4.2.4. Cost and revenue model.

The Service provision is agreed offline. According to the value proposition, it is the increase in market reach and activity which will be the basis of the revenues, to be partially invested in the existing cost structure, despite non-validated future possibilities, like *freemium incomes*.

Partners have agreed to continue subsidising the main costs of the Platform (*Site and App maintenance, site hosting, domain hosting and overheads related*) for two years. During this time, and given the level of activity related to the iPRODUCE collaborative manufacturing approach in the cMDFs, a further definition and validation of the economic model will be carried out.

The validations of the different elements in the iPRODUCE BM are shown in the figure below

- green - validated
- yellow - mostly validated,
- orange - partially validated

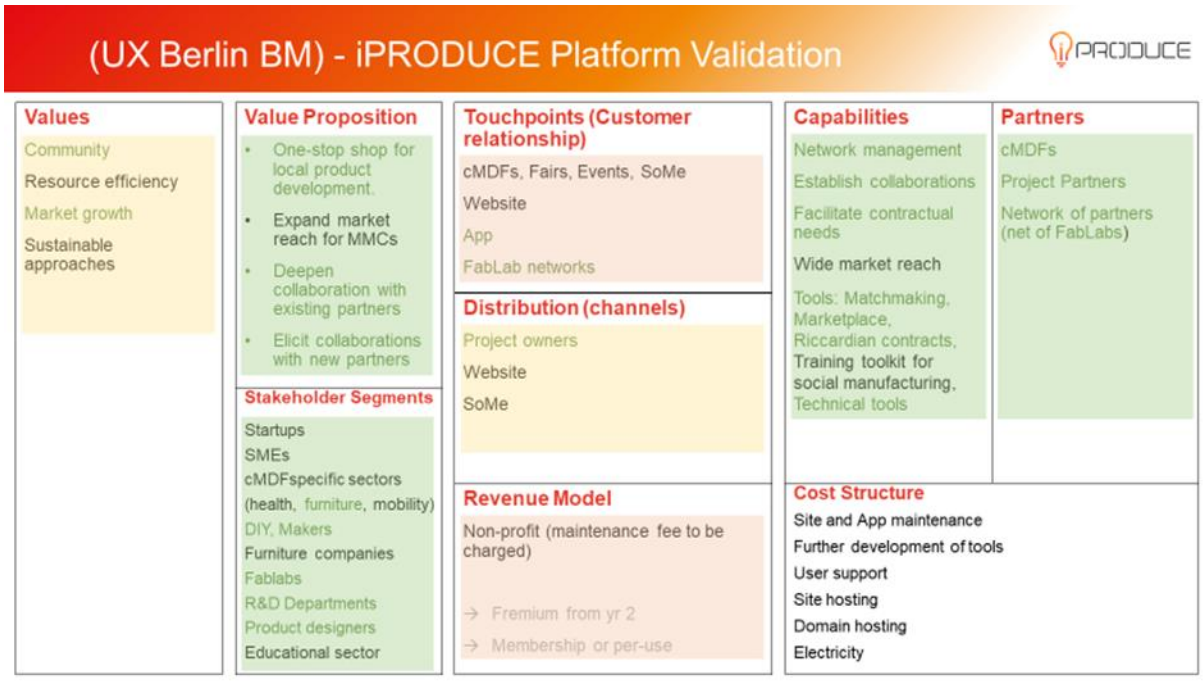


Figure 34. Validated elements in the Networked (Platform) BM

As shown above, most of the elements initially defined have been validated. The validation exercise has been successful in those elements already existing (cMDFs, partners, stakeholders and communities, provision of services, collaboration, tools, etc.) that have been put into practice in a coordinated way between the two cMDFs. Although not complete, a high degree of validation has been proven to those fields depending on the commitment of the cMDFs (values, distribution efforts and economic effort). Finally, it is important to acknowledge lack of complete validation in the definition of the revenue strategy - to be defined depending on the level of activity of the individual cMDFs - and in the customer relationship area, where only the close environment (cMDFs, FabLabs) and the App possibilities were tested, with not enough evidence of the wider touchpoints (e.g. Fairs, Events, Website campaigns).

5. Conclusions

This document reported on work performed in tasks 9.3 - iPRODUCE innovation services to MMCs, 9.4 - Realisation of Local cMDF Pilots and Open Innovation Missions, and 9.5 - Demonstration of the Federated Network of cMDFs and Business Model Validation.

Beginning with T9.3, a description of the individualised support services is provided. Such support services offered by the relevant partner (Copenhagen Business School) aimed at supporting the roll-out of the OI missions and to endure the MMC's maturity for the successful outcome of the demonstrations. Based on UC-specific service propositions and a kick-off meeting with each cMDF to diagnose support opportunities, CBS developed a tailored course of action for each case. Coaching sessions were scheduled with the cMDFs, where methods and tools to support marketing and business/cMDF development were presented and employed in a collaborative environment. The outputs of these tailored support services vary across cMDFs, given their specific needs and wishes. To allow for cross-pollination, the methods and tools used individually were compiled in a booklet, which aims to support all cMDFs in future endeavours and to further develop a culture of knowledge sharing in the federated network. The booklet is annexed to this DL and is made available also in the iPRODUCE website. Finally, a survey aiming to evaluate the alignment between the business/partners and the iPRODUCE platform was applied to the cMDFs. The data collected shows a satisfactory overall perception of the iPRODUCE platform, but also pointed out the need to improve the user experience intra and inter-tools. These results were presented in a plenary meeting to inform the last steps towards improving the OpIS.

T9.4 consisted of the implementation of innovation missions by each cMDF. It describes 3 innovation missions implemented by each cMDF in detail, allowing for a deeper understanding of the extent to which the OpIS facilitated the collaboration, knowledge sharing, and innovation within each selected scenario. It also highlighted challenges and yielded valuable information to inform further development of iPRODUCE. Even if the evaluation of the OI mission was somewhat challenging due to the delayed availability of certain tools for user testing and the limited number of evaluations received. However, despite these limitations, it can be observed that the respondents who evaluated the tools expressed satisfaction with their capabilities and functionalities. Moreover, it is noteworthy that beyond the specific tools, users of iPRODUCE greatly appreciated the network and ecosystem with what they were connected. They found it valuable in terms of further developing their ideas or projects. The collaborative environment and the opportunities for connecting with like-minded individuals were seen as beneficial for fostering innovation and driving positive change. Although the evaluation process may have had its limitations, the positive feedback regarding the tools and the overall appreciation for the network and ecosystem highlights the potential of iPRODUCE in supporting users and enabling them to thrive in their creative endeavours.

T9.5 aimed at demonstrating and validating the iPRODUCE Federated Network through a joint UC implemented by the Italian and Spanish cMDFs. Together, they used the OpIS tools to co-develop a chair. The user journey is reported in detail, from conceptualisation to team creation, design, IPR contract, to manufacturing and project management. The successful outcome of this demonstration suggests that the iPRODUCE digital solutions and joint expertise, as well as the network and trust developed throughout the project can yield valuable user-driven open-innovation outputs. Going further, the analysis performed in T9.5 indicated the compatibility of the iPRODUCE Business Model with the two pillars of iPRODUCE, namely, the OpIS and the federated network. Yet, a few elements of the Business Model remain unvalidated due to opportunity constraints. These will be continuously assessed during the first months of exploitation.

All in all, the work performed in tasks 9.3, 9.4 and 9.5 supported the implementation of the OI missions and demonstrated a satisfactory performance of the OpIS and the federated network in rolling out collaborative, open and user-driven design and manufacturing missions. With successful demonstrations in place and the corresponding (mostly) validated Business Models as well as the Governance Model presented in D7.3, iPRODUCE enjoys sufficient maturity for exploitation. Regarding next steps, it is recommended that the iPRODUCE partners continue to improve the OpIS - especially in terms of UX - and nurture the bonds and operations across and intra cMDFs for the sustainability and longevity of iPRODUCE.

AIDIMME TECHNOLOGY INSTITUTE

LAGRAMA

OCÉANO NARANJA

Fraunhofer FIT

ZENIT

materalia

FABLAB VOSGES

BetaFactory

Excelcar ACCÉLÉRATEUR D'INNOVATION INDUSTRIELLE

Energy@work

[Pro]M MECHATRONICS PROTOTYPING FACILITY

CBS COPENHAGEN BUSINESS SCHOOL HANDELSHØJSKOLEN

EUROPEAN DYNAMICS

Aidplex

CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

F6S

ICE Information Catalyst Services Data Software

SIEMENS Ingenuity for life

WHITE RESEARCH

TRENTINOSVILUPPO BUSINESS DEVELOPMENT AND DESTINATION MARKETING AGENCY

T9.3 Booklet

Methods and tools to support the implementation of OI missions/challenges under the pilots

Copenhagen Business School

June 2023

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 870037.

DISCLAIMER

iPRODUCE ● Grant Agreement: 870037 ● Innovation Action ● 2020 – 2022 | Duration: 36 months

Topic: DT-FOF-05-2019: Open Innovation for collaborative production engineering (IA)

Table of contents

1. Introduction

iPRODUCE T9.3 - innovation services to MMCs - focuses on (1) facilitating the implementation of the iPRODUCE pilots, (2) ensuring that the necessary conditions and maturity are established within the MMCs towards successful demonstrations, and (3) aligning and collaborating with the business, scientific and technology partners to provide coaching and support services to the OI missions/challenges under the pilots.

Our approach to T9.3 is to provide individual support and cater solutions to each cMDF, as each of them is unique in industry, country, challenges, and capacities, to mention a few. Yet, some solutions and support provided to a specific cMDF have shown to be applicable beyond the boundaries of that cMDF. With the aim of creating a space for sharing knowledge and scaling the impact of T.9.3 on the roll-out of the Use Cases, this document compiles a set of approaches and tools that can be used by the cMDFs as they run their Use Cases (UC) in this final and important stretch of the iPRODUCE project.

As T9.3 is an ongoing task, it will continue to breed new insights in the coming months. Therefore, the present document is a living tool that will continue to be updated as we advance towards implementing the pilots.

2. Tools and methods

2.1. Service propositions

Service propositions are a detailed but short description of a service that:

- helps people understand what the service is and does,
- shows the value the service brings to their lives, and
- explains how people can use the service.

With that in mind, and based on our knowledge of the services [to be] provided by iPRODUCE, we suggest a succinct guideline for developing service propositions, as follows:

Each iPRODUCE UC Service Proposition ideally answers the following questions:

1. What is the name of the product and service offered?
2. Who are the target consumer groups of the product/service?
3. What are the assets, benefits and/or differentiation offered by iPRODUCE in the making or use of the above mentioned product/service)
4. How can the consumer acquire/use the product/service? (online, in-person, DYI, previous training required?, etc.)
5. What is the value exchange involved in the offering/selling of the product/service?
    a. How much does it cost?
    b. What is included in the price?
    c. Is the price dynamic?
    d. Who owns the product produced?
    e. How is the revenue shared among the partners and iPRODUCE?

Please note: The instructions above are a good starting point to describing your services to your target markets. You may, of course, add or extract elements according to each case.

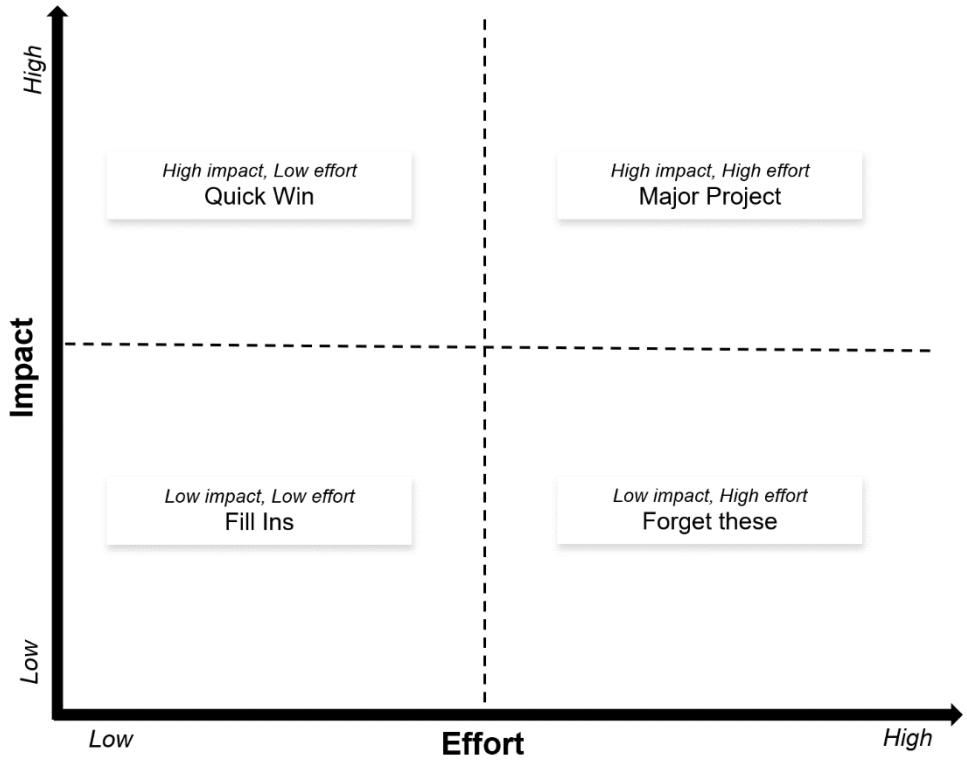
2.2. Impact vs. Effort Matrix

The *Impact x Effort Matrix* is a prioritization tool that uses two criteria – impact and effort - to visually rank comparable tasks or projects. In short, the effort to implement a certain task and the impact (or value) that its output will bring to relevant stakeholders are plotted into a matrix, helping users visualize which tasks or projects should be taken on, put on hold, or dropped. Variations of this tool are used in renowned methodologies such as Six Sigma, design thinking, and Agile.

The matrix can be subdivided into four quadrants:

- **Quick wins** include low-effort, high-impact items that are worth pursuing.
- **Major Projects** include high-effort, high-value items, thus requiring meticulous planning and, if implemented, may function as differentiators in relation to competitors.
- **Forget These** (also referred to as Money Pits) are the endeavours that will have low-impact but require high-effort, thus not being attractive for business investment.

- **Fill-ins** require low-effort and low-impact that may or may not be worth the effort. The decision making in these cases may be taken using a value-oriented perspective (e.g. business purpose and strategy-focused)



2.3. Go-to-market strategy

CMDFs can launch their services and penetrate their regional markets following the suggested steps:

1. Market Research
2. Target Market
3. Package and Product Price
4. Reach the Audience

2.3.1. Market research

In this phase, the cMDFs map related products/services in the market and collect information on existing competitors. This can be carried out via desktop research or hire a specialised market research consultancy.

The market research should answer the following questions:

- Who are my competitors?
- Are they direct or indirect competitors?

    - Indirect competitors offer slightly different products and services but target the same group of customers with the goal of satisfying the same need. Example: Pepsi is a direct competitor to Coca Cola, while a juice shop is an indirect competitor.
- What services (and value) do they offer?
- Is there a gap in the market that I could fill in with my service?

iPRODUCE has performed a comprehensive market research regarding related platforms and services, which is documented in D7.1. We encourage you to read this document and combine this information with your own research to create a customized market overview for your cMDF.

2.3.2. Define Target Market

A target market is the group of entities (companies, communities, people, etc.) that are the primary potential customers for a product or service. Identifying the target market is a key part of the decision-making process when a company designs, packages, and advertises its product.

2.3.3. Package and Product Price

The next step to follow if to define a service package and a price catered to your target market. You might want to create a list of services and prices offered by your competitors, compare them to your offering (how is my service different? What is the value I bring? Why would customers choose mine instead of my competitor's?), and define the elements of your service and average pricing.

You may want to answer the following questions while defining your product package:

- Can my target market be subdivided into more specific groups according to their needs?
- How can I tailor my package(s) to these specific groups?
- Do all my potential customers have similar needs? Or do they need tailored solutions?
- Can I offer "slices" of my total range of services to best cater to specific customers?
- What elements of my services are always needed by my customers? And what elements are not always needed?
- Does it make sense to offer packages that progressively contain (1) the core services, (2) the nice-to-haves + the core services, and (3) a "luxury" version where I offer even the more sophisticated services in addition to the core services?
- Can I offer only standardized services? Or would it be better to customize my offer to each customer and their needs?
- What other aspects must I take into consideration while defining my service package(s) beyond the above-mentioned questions?

Once you have defined what packages best serve your potential customers, it is time to define prices. You may want to ask yourself the following questions:

- What are the costs I have for providing a given service?
- What are my competitors' prices for similar or comparable services?
- What is my cost unit? Should I charge by the hour, by the day, by output, by product delivery?
- What other units could I use that would both be attractive (and easy-to-understand) to the customer and ensure the financial viability of the service offer?
- Should I use price ranges or specific pricing?
- What other aspects should I consider when defining prices beyond the above-mentioned questions?

2.3.3.1. Shared identity

Many of the iPRODUCE services are carried out by multiple partners. This can be confusing to the customer, and they may ask themselves "who is the service provider I am dealing with? Can I trust it/them? What is a cMDF?" and other similar questions. Questions like these may push away potential customers, and therefore it is important that all partners are aligned and use the same communication style, advertising material, language, visual identity, etc. In the end, our ultimate goal is to make our customers' life easier and help them in their innovation journey.

One approach is to create a shared identity for a given service. The service should have one name and one description, and all the mentions and advertisements to this service will be done using one specific language and possibly a specific set of colours and logo. The service itself is what reaches the target market, making it easy for the customer to understand the value it brings – instead of creating confusion regarding multiple providers and inconsistent descriptions.

Once the shared identity is defined, you may want to create profiles for the service in relevant media channels.

Note:

Building a brand for a service can take time, whereas your company may already be well known in your market. How can you create a service identity and at the same time take advantage of your company's brand awareness?

2.3.4. Reach the Audience

Next, you want to make your service known in your community and to your target market. To do so, you may use target audience relevant channels. The channels can vary from visits to education institutions (high school and universities for example), host or participate in hackathons and other challenges, showcase your service in fairs, industry-specific events, magazines and websites, social media (Facebook, TikTok, Google maps, Instagram, etc.), and even well-established media, such as radio, billboards and other forms of public displays. In this phase, you have a couple of main questions to answer: what media channels does my target market use/read? What's the language used? Once you have an answer to these questions, you may want to target the related channels as your main communication venues.

2.3.4.1. Plan Communications

Now that you know your target group and their preferred communication outlets, you have a service defined and a price that fits the market, it is time to define how you want to communicate your service and the value it brings to your potential customer.

You may want to ask yourself:

- Should I use technical language or general language?
- What is the relevant information for each channel?
- How much does my potential customer need to know about the service at a first glance?
- Can I use visuals to better deliver the message? Or are texts a better fit for my service?
- How often should I reach the audience?
- What are the costs to advertise on specific channels and for how long?
- What is my budget for each campaign?

- How do I measure the effectiveness of my campaign/each channel/etc.?
- What other elements should I take into consideration beyond the above-mentioned questions?

The points listed in this document are to serve as a guidance towards the running of the UCs across the project cMDFs. This document is also supported by WP7, T7.2 as some of the points highlighted in the *go-to-market* strategy are well aligned with the Business Models (BM) being currently developed.

2.4. Guidelines for experimentation intra cMDF

2.4.1. Set experimentation goals

What do we want to achieve through this experimentation? Some possibilities are:

- Test tools, workflow, communication processes
- Assess tool integration and ease of use
- Follow and document the user journey and experience (what works, what does not work, frustrations, possibilities, etc.)
- Implement Use Cases
- Identify improvement opportunities and report back to IT development
- Harvest common questions and set a plan to optimize in-platform information and communication
- *What else beyond the above-mentioned items?*

2.4.2. Planning and timeline

An optimal experimentation depends on the readiness of the online tools developed by iPRODUCE. Therefore, a first step is to define a timeline for the experimentation considering a realistic forecast for when the tools will be ready to be tested. Below we suggest a few steps to follow:

- Ask relevant iPRODUCE IT developers regarding tools' readiness
- Define experimentation goals

> **Question**: Which outputs and outcomes do we wish to accomplish with the experimentation? Do the goals allow for a comprehensive test of the cMDF pilot?
>
> Example: tasks ranging from idea to design/idea to prototype/idea to a functioning/tested product, error reports and mitigation plans, establishment of communication process, development of cMDF governance system, role assignment, cMDF agreement draft, etc.

- Plan co-creation activities and experimentation procedures (tools/methods to be applied, tasks to be performed, milestones during experimentation time, periodical meetings to share experiences, shared document for reporting progress, etc.)
- Define timeline accordingly (starting and ending date, duration, milestones, output due dates, etc.)
- Send out invitation e-mail to all relevant partners containing detailed plan, activity description and any other relevant information
- Prepare and supply materials (physical and/or online resources).

- Assign roles – if necessary, certain participants may act as facilitations, task leaders, etc.

2.5. Guidelines for workshop with third parties

2.5.1. Set workshop goals

The first step is to define what information and knowledge we expect to gain by doing the workshop(s). Some possibilities are:

- Engage local stakeholders
- Promote iPRODUCE awareness
- Follow and document the user experience (what works, what does not work, frustrations, possibilities, willingness to use the platform in the future, understanding of the platform and ease of use, etc.)
- Identify improvement opportunities and report back to IT development
- Harvest common questions and set plan to optimize communication
- Identify knowledge gap and set plan to fill it in
- Further investigate market gaps and opportunities
- *What else beyond the above-mentioned items?*

One idea could be to set different tasks to be performed by the groups, so various aspects of the OpIS can be explored in one event.

2.5.2. Preparing for the workshop

- Set up a date and send out an invitation email
    - Date, time and location, format (online, physical, hybrid), agenda, duration, requirements and preparation (if any), any other relevant information.
- (Physical meeting) Book room/location, arrange coffee, water, etc.
- Prepare materials (for printing, in case of physical meetings; online files in case of online meeting).
- Decide if participants will use their own computers/phones or if they will use computers/phones that already loaded with the platform.
- Decide who will be the main facilitator and the supporting facilitators. The supporting facilitators should be responsible for **taking pictures**, helping the main facilitator and the participants in the activities, etc.)
- If a hybrid meeting, please make sure to have at least 3 facilitators: two or more for the physical space and another one for the online part.
- **Prepare consent forms**

2.5.3. Workshop agenda

Below we present a standard agenda. Please adjust according to your needs.

Make sure every participant signs a consent form. Remember to document the event with pictures and video when appropriate.

5 min	Introduction
5 min	Project presentation
5 min	Divide participants in groups

20 min	**Presentation/overview of the OPiS platform** (in case of won computers, share link, etc.)
10 min	***break***
20 min	Training sessions
120 min	Hands on activity (assign activities, clarify tasks, define groups, provide support)
10 min	***break***
30 min	Presentation of achievements (time might need to be adjusted depending on the number of participants)
10 min	Feedback session
10 min	Wrap up

2.5.4. Post workshop

- Write to participants thanking them for their participation.
- Write down workshop results and plan for next steps within 3 days of holding the workshop.
- Upload images and recordings (if online) to the repository
- *What else beyond the above-mentioned items?*

The points listed in this document are to serve as a guidance towards the running of the UCs across the project cMDFs.

PRODUCE

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