D7.3 Business models and case development for iPRODUCE cMDFs 2

CBS

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Abstract	Deliverable 7.3 presents the second set of Business Models (BM) for the iPRODUCE cMDFs. The deliverable uses D7.2 as a baseline to continue developing and co-designing the BMs with the cMDFs and help co-develop the main service offerings and how they align with the iPRODUCE platform. Furthermore, D7.3 reports on existing challenges that need overcoming and how the platform can aid this shortcoming, while also providing a valuable space to exploit available assets.

DELIVERABLE HISTORY			
Date	**Version**	**Author/ Contributor/ Reviewer**	**Summary of main changes**
10/05/2023	V0.8	CBS	
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24/05/2023	V2	CBS	Reviewed and amended suggested changes

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Executive Summary

Task 7.2 focuses on further developing the business models covering iPRODUCE cMDFs cases and processes as well as an overarching business model for the iPRODUCE platform. Using D7.2 as a baseline, we held a second round of workshops with all the cMDFs, through which we evaluated and improved the first set of business models using the extensive knowledge and experience built throughout the project. In addition to using the Business Model Canvas template (as in the first round of workshops), we introduced the UX Berlin Business Model Refinement template to the workshop program. Furthermore, due to the higher level of specialization and depth of this second round of workshops, as well as the particularities and needs of each cMDF (e.g., geographical location, industry, partners' area of expertise), a certain level of flexibility in the methodology was adopted to allow for tailoring CBS' service to each case.

By further developing the customised business models based on the knowledge package of a more mature iPRODUCE project, we were able to refine – in quantity and quality - the intersecting aspects regarding service offerings and market opportunities, building novel cross-contextual business strategies with focus on consumer driven design and production. Upon this solid base, we have also developed an overarching business model for the iPRODUCE platform.

There are similar services and related products across the cMDFs, they represent unique local offers that can further develop and cross-pollinate across the iPRODUCE federation. The more a product/service is known in a society, the higher value it might get and therefore, a wider market (hence the number of services offering the same type of products both physically and digitally). Therefore, having similar competitive services across the markets increases their visibility, adding value and creating increased demand to such services. For example, experimenting with various stages of product prototyping is currently mostly limited to companies with a budget that can accommodate such practice. If this practice is offered as a service, as in the case of some cMDFs' product offer, this service can impact the production and experimentation of various products, making it accessible for smaller companies to develop and test new products through a lower cost than if they had to carry it in-house. Furthermore, when buying or subscribing to such a service, companies might have a higher gain, profiting from the open innovation approach, making use of external expertise towards creating and developing their product.

An intersecting aspect to all the cMDFs is the lack of clear or even existent marketing strategies, which could help them establish themselves in their local markets, if they were to increase their visibility. Another aspect deals with sustainability and forms of production. Even though the cMDFs are concerned and have the topic of sustainability as part of their development, sustainability has not yet gained a central stage within their current projects and productions. To fulfil upcoming societal challenges, the whole of the manufacturing industry will need to work for including sustainability initiatives into their core production processes, while also shifting the production paradigm from a market flood to market demand, leading to a 'deconstruction industry', where the disassembly model is incorporated into the original production model.

Deliverable 7.3 presents the second and final set of Business Models for the iPRODUCE cMDFs, as well as the governance model and the business model of the iPRODUCE federated network and platform. The deliverable initially does a recap of the tools and the approach used for the co-development of the main service offerings, and how they align with the iPRODUCE platform, as well as the methods for developing the governance model. Second, the results of the first and second rounds

of the business model workshops and the iPRODUCE business model are presented and comparisons are drawn to allow for a wholesome understanding of how they evolved, differentiated specialized during the project. Third, both a high-level cost-benefit and PESTEL analysis are described to help contextualise and further inform the markets in which the iPRODUCE cMDFs operate. Fourth, the iPRODUCE governance model chosen by the project partners is introduced and discussed how it intersects and complements the cMDFs and iPRODUCE's business models. Lastly, a summary of the results are followed by conclusions and suggested recommendations for a successful exploitation of iPRODUCE post-project.

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List of Abbreviations

Abbreviation	Definition
DTP	Digital Treatment Planning
BMC	Business Model Canvas
BMU	BetaFactory Mobile Unit
cMDF	Collaborative Manufacturing Demonstration Facilities
F2F	Face to face
GDO	Garden Development Organisations
IoT	Internet of Things
MMC	Manufacturers, Makers and Consumer (communities)
MVP	Minimum Viable Product
OpIS	Open Innovation Space
PESTEL	Political, Economic, Socio-cultural, Technological, Environment and Legal
R&D	Research and Development
RoI	Return on Investment
SME	Small and Medium Enterprises
TOC	Technology Oriented Company
VPC	Value Proposition Canvas

1. Introduction

This deliverable presents the Business Models of the five cMDFs and of the iPRODUCE federated network and platform, which build on the first set of business models presented on D7.2, as well as a governance model for the iPRODUCE federated network and platform using D3.1 - Lean Operational Model for cMDFs' Federations as starting point.

Task 7.2 took on developing business models covering iPRODUCE cMDFs cases and processes. With the help of each cMDF, business models have been co-developed and deployed during the first phase of the project making use of the Business Model Canvas as a tool. Each cMDF co-developed a first set of business model that fits with their social, economic, and political contexts. Roughly a 1.5 year after the development of the first set of business models, a second round of workshops was held for the further development of the cMDFs' business models – which helped to identify the intersecting aspects that can help build novel cross-contextual business strategies with focus on consumer driven design and production - as well as of an overarching business model for the iPRODUCE platform.

D3.1 elaborates on the initial works regarding a governance model for iPRODUCE during the project period and reported that the cMDFs unanimously voted for a hybrid governance model. Since the development of business models feeds into the iPRODUCE platform's governance model and vice-versa, this report builds on the finalised business models to further develop the iPRODUCE hybrid governance model, defining structures, assigning responsibilities, amongst others.

1.1. Structure and content

Section two of this report describes the methods and tools used in the workshops as well as the steps taken post-workshop to finalise the co-creation of the BMs with the cMDFs. Section 3 is subdivided into specific subsections for the cMDFs and the iPRODUCE platform. Each subsection contains a summary of the corresponding first BM, the BMC from the second round of workshops, and an in-depth analysis of the second and final BM. Section four - **Error! Reference source not found.** contains a data analysis of the BMs workshops with an overview of the results and refining the overall business propositions for the cMDFs. Section five - iPRODUCE Federation & Platform Governance Model suggest an initial business model for the iProduce platform followed by a PESTEL analysis.

2. Methods and Tools

The workshops' activity plan was composed of (1) an introduction containing the workshop's objectives, a summary of the activities held in the first round of workshops and a brief explanation of the methods to be used; (2) work in small groups for the evaluation of the first set of business models and brainstorming of improvements and adjustments, joint review of the use cases as discussed in T9.3; (3) presentation of the small groups' work to the large group with simultaneous debate and co-creation of a *pre-final* business model. As the number of participants in each of the cMDF' workshops varied, in some of the workshops the groups were divided (Italian and Spanish cMDFs) while in the others they worked as one group (French, German and Greek).

Upon completion of the workshops, the outputs were photographed for documentation purposes and recreated in digital format and uploaded to the project repository. The cMDF partners were granted time for reviewing and commenting on these files. CBS then held an internal workshop to assess the outputs, cross-checking similarities and differences between the first and second round as well as among cMDFs, searching for any missing information, and critically assessing the feasibility and competitiveness of the business models.

The second round of business model workshops ran from May to October 2022 with all five cMDFs. Differently from the first round, the second round consisted of in-person and hybrid events and visits to the cMDFs facilities, when possible, to allow for a better understanding of the assets and capacities of each location. The workshops' length ranged from 3 to 6 hours, depending on the particular needs and availability of each cMDF.

2.1. Business Models

2.1.1. Business Model Canvas (BMC)

Like the first round of workshops, we used the Business Model Canvas from *Strategyzer* to help define and identify key business aspects for a functioning business model.

The Business Model Canvas is composed of nine areas covering:

a. **Value proposition** of what is offered to the market – the core service/product offering.
b. Target **customer segments** addressed by the value proposition – the different customers groups to have in focus while delivering and marketing the product.
c. Communication and distribution **channels** to reach customers and offer the value proposition – the means to distribute and reach customers.
d. **Relationships** established with **customers** – the diverse types of relationships one can develop with the customers.
e. The core **capacities** needed to make the business model possible.
f. The configuration of **activities** to implement the business model.
g. The **partners** and their motivations of coming together to make a business model happen.
h. The **revenue streams** generated by the business model constituting the revenue model.
i. The **cost structure** resulting from the business model.

These nine aspects are organised in a structured layout that provides a unified overview, helping businesses to reframe or develop - from scratch - an understanding of their products/services. In short, it provides an indication of the viability of the product/service, how it will operate and fulfil its goals.

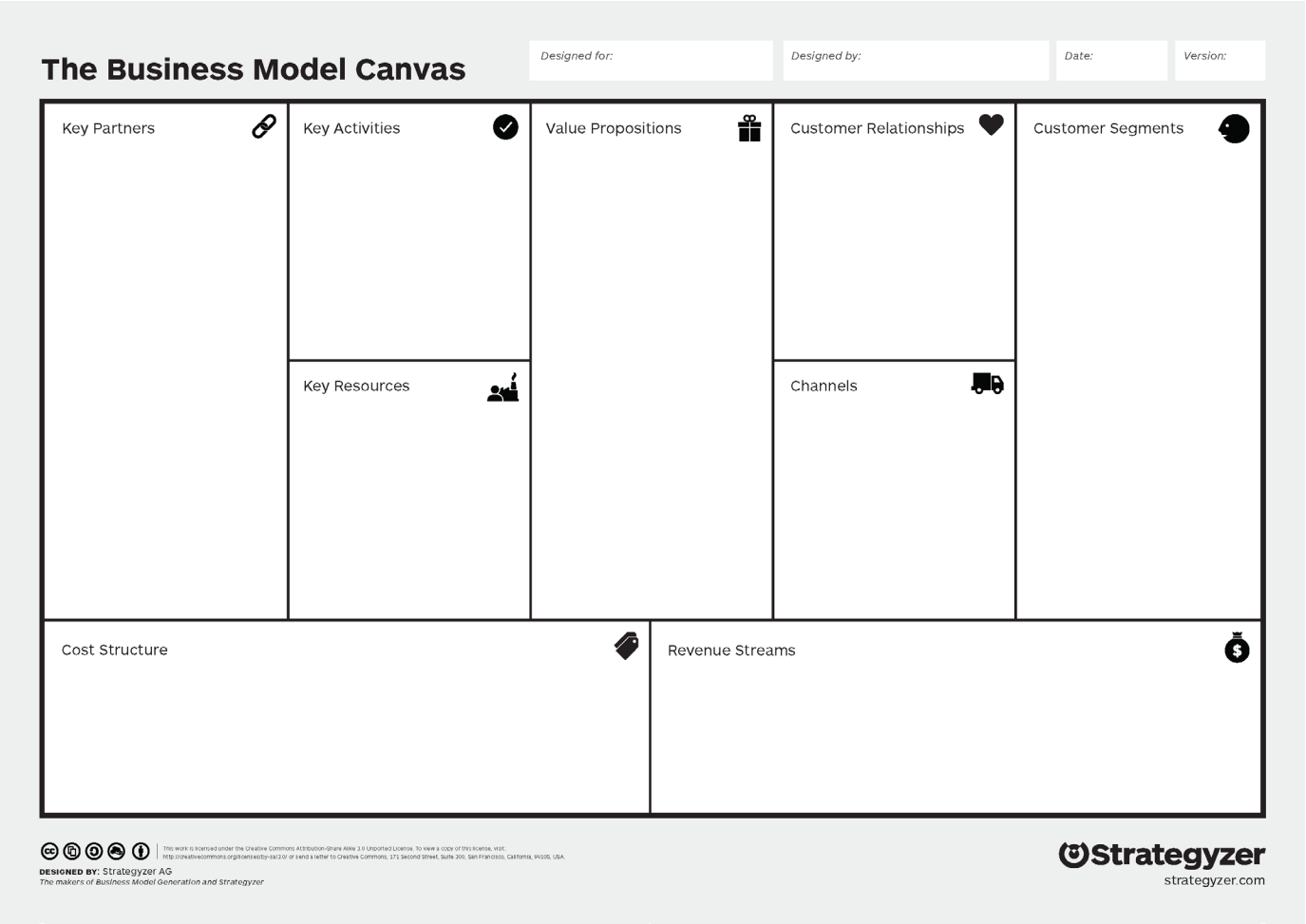

Figure 1. Business Model Canvas Template

2.1.2. Refinement Sheet for Business Modelling

The Refinement Sheet for Business Modelling[1] created by the UX Berlin Innovation Consulting firm is a tool for refining a business model, once the key business aspects have been listed and discussed.

The Refinement Sheet for Business Modelling is composed of nine areas arranged in four groups. Below we present a brief description of the refinement template.

1. **Grounding**
   Refers to the definition of the values - or common ground - upon which the business will be built, of a mutual understanding of the business purpose and a normative foundation that guides strategy and operations. The output of grounding is often expressed in the form of a mission or vision. This group consists of one area, namely, **values**.
2. **Demand**

[1] *https://www.uxberlin.com/businessinnovationkit/*

This group consists of two areas: **value proposition** and **stakeholder segments**. By proposing an analysis that connects these two elements of the business model, this group helps refine the values being proposed and their relevance and impact - positive or negative - to the different stakeholders.

3. **Interaction**
   This group refers to how the business interact with its stakeholders in terms of **touchpoints**, **distribution** and **revenue model**.
4. **Performance**
   This group deals with the business ability to deliver value based on its **capabilities**, taking into consideration the role of **partnerships**, and how this translates into a **cost structure** that fits into an economically viable business model.

Two main benefits come from applying the refinement sheet to the iPRODUCE business model workshops. First, by rearranging the elements of the BMC into a new template with comparable – yet slightly different – categories, the participants are instigated to adopt a distinct perspective, leading to a fresh analysis of the business model elements. Second, the addition of the category *values* (within the *grounding* theme) allows for the identification and discussion of intangible and normative organizational aspects, such as principles, purpose and objectives. Considering that iPRODUCE is a partnership among actors from different industries, countries and cultures, the development of a common ground among these actors is paramount for a successful exploitation in the medium and long term.

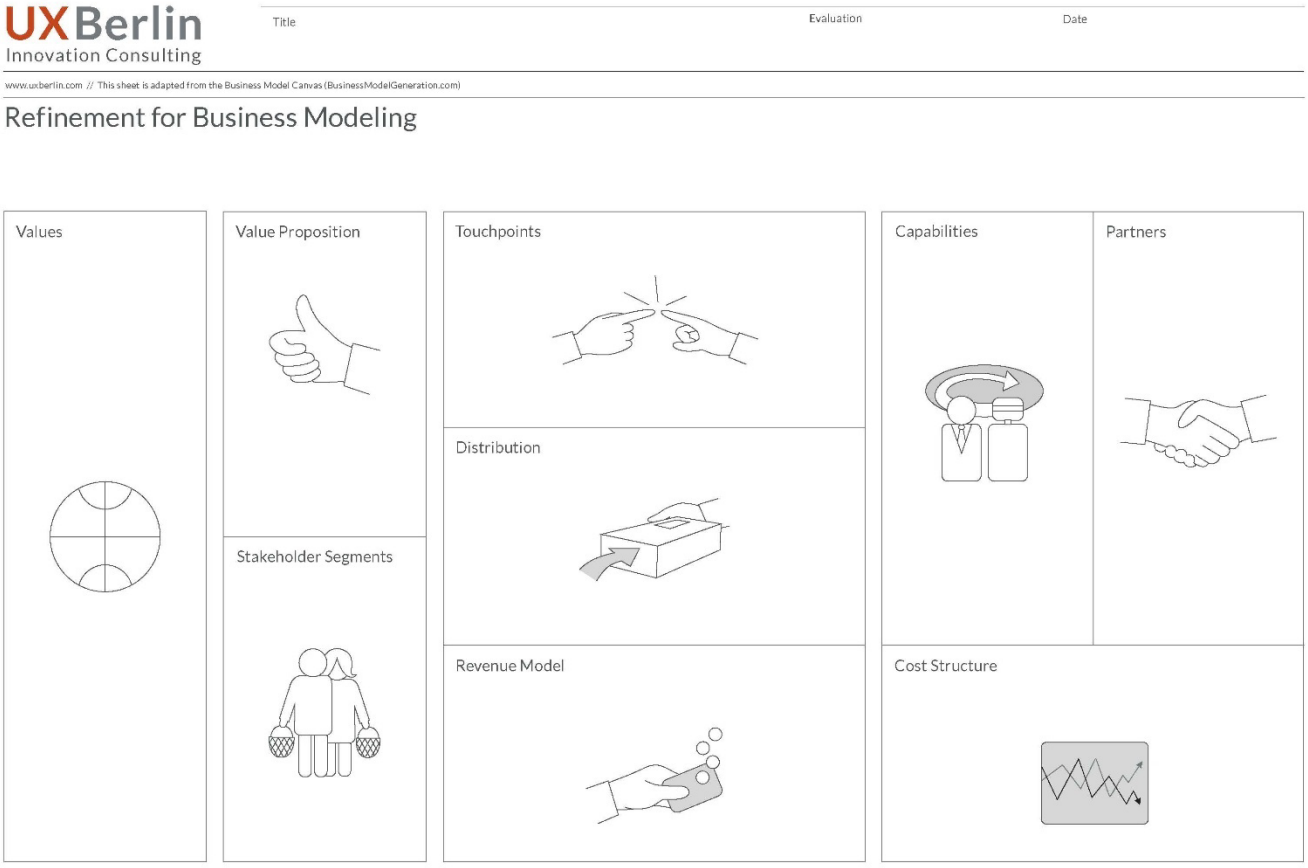

Figure 2. UX Berlin Innovation Consulting's Refinement Sheet for Business Modelling

2.2. BM and Governance Workshop Activities

The activities carried out during the workshops are described in the following subsections.

2.2.1. Introduction and recap of methods and first set of business models

Given the time lapse between the 2 rounds (roughly 1.5 year, see Table 1: Workshop dates), the first part of the workshop focused on recapping the previous work on business models, reviewing its outputs, and ultimately creating a common understanding across the group. This step was also relevant to inform new project collaborators who joined iPRODUCE in between workshops and those that - for assorted reasons - could not be present in the first round of workshops.

2.2.2. Evaluation and revision of first set of business models

Following the introductory part, the workshops participants were divided into small groups of 3-4 people to work in the evaluation and brainstorming of improvement to the first set of business models. Each group was provided with sticky notes, markers and a large-sized Business Model Canvas (BMC) template (see Figure 1), where they could play around with the various elements that build a business model, (e.g., key partners, cost structures, value propositions, customer segments). In the case of workshops with fewer participants, there was no group work but instead the items 2.2.2 and 2.2.3 were combined into one.

2.2.3. Co-creation of pre-final business models

The small-group work was then presented to the whole group, and participants could freely ask and answers questions. This sparked deeper discussions regarding partnership expectations, service and product offers, and promoted fine-tuning among the cMDF partners. The discussions were moderated by CBS staff, which simultaneously combined the work of the small groups and the discussion points and transferred them into a *pre-final* BMC.

The minimum viable product is an exercise to define the core service/ product that grounds the service offering and presents enough value to the market to generate future developments. This exercise helped the partners create a service baseline and a more targeted perspective for their current and upcoming cross-collaboration.

2.2.4. Post-BM workshop activities

The workshop output hardcopies were digitized and made available to the partners, who had the opportunity to add comments and changes to the BMs contents. With the final comments incorporated to the BMs, CBS created the final versions of the cMDFs' BMs and developed the iPRODUCE platform BM. The latter was presented to the consortium partners in March 2023 in an online meeting, when the partners lapidated the model and created the final iPRODUCE platform Business Model.

2.2.5. Governance

For the governance model, a document listing the Regulation, Representation, Procedures and Responsibilities (appendix 1) was created and shared amongst the project partners. During the project meeting in Metz in October 2022 they were introduced and in February 2023 in Thessaloniki, the models were further discussed and initially decided towards the hybrid model.

Following the project meeting in February 2023, an online workshop was organised on March 23rd 2023 to further clarify the hybrid model and the actions required to execute that. To make sure that was democratically approved, we prepared a voting poll regarding the platform governance model and distributed it among the cMDFs.

3. Workshops per cMDF

The second round of workshops built on the results of the first round - performed in 2021 – covering the various aspects affecting the existing processes and offerings of the cMDFs products and services leading to the development of a pre-final business model for each cMDF. Section 3.1 presents the overall results of the workshops' activities and Section 2.2 presents an analysis of the data collected.

The workshops were carried out in person with the Italian, Spanish and German cMDFs, and in hybrid format with the Greek and French cMDFs. The dates, time lapse and location of the workshops are shown in Table 1.The results of each workshop are presented using the actual visual materials produced on each workshop to ensure the highest level of accuracy, followed by the digitized version containing the last input from the cMDF partners.

Table 1: Workshop dates

cMDF	Workshop dates – first round	Workshop dates – second round	Time between workshops	Location – second round
French cMDF	Feb 2, 2021	Oct 6, 2022	20 months	Metz, France
German cMDF	Jan 26, 2021	Oct 4, 2022	20 months	Metz, France
Greek cMDF	Jan 28 & Feb 2, 2021	Oct 3, 2022	19 months	Metz, France
Italian cMDF	Jan 21, 2021	May 4, 2022	16 months	Rovereto, Italy
Spanish cMDF	Jan 21, 2021	May 25, 2022	16 months	Valencia, Spain

3.1. Business Models

3.1.1. First round of Business Models

The anticipated set of BMs demonstrated the diversity and convergence of aspects that currently involve the different partners and stakeholders in the project pilot locations. In the most general perspective, these places have an ongoing number of projects, however, despite their capacity, there were little knowledge or current larger partnerships with industry partners.

Among the value proposition offers, R&D and digital fabrication services together with prototyping in both low and high definition, are key offers to facilitate exploring and testing products. Furthermore, some of the current locations offer opportunities to support the idea development through mentorship programs. In the locations where this is not yet established, there is a clear desire to implement a similar programme or, at least, partner with groups who might already be engaging in these types of consulting services.

Regarding the makerspaces and fablabs involved in the project, the majority of these spaces have a subsistence economy – in other words, they are able to pay few employees and are still developing the business strategy to grow and expand their businesses to become profitable, or in the case on non-

profit SMEs, to have an economically sustainable plan. Regarding the more established companies and research centres involved in the iPRODUCE project, they see the advantages in cross collaborating with makerspaces and fablabs and want to establish and solidify the partnership through defined projects aiming for growth opportunities.

In Section 3.2 we present a summary of the first set of Business Model (the complete set is explained in D7.2), as well as a detailed analysis of the second – and final - set of business models per cMDF.

3.1.2. Second round of Business Models

The second round of the cMDFs business models (BM) focused on defining the main product/service to be the key leading market offer. The workshops and related activities, including the identification and support for Use Cases for Task 9.3, helped streamline and identify which of the use cases and service offers would have both a higher market value due to its uniqueness, and contribute to further strengthening the collaboration among the cMDF partners.

According to Amit and Zott (2010), a novel business model can either create a new market or help companies create and exploit new opportunities in existing markets. In the case of the product offers from the five iPRODUCE cMDFs, there are possibilities for both. For example, while there are already opportunities, albeit with little exploitation, for end customers and small and medium enterprises to engage with fablabs and makerspaces to develop single products, such initiatives are kept to a minimum due to a few variables. Limited knowledge about such spaces, lack of technical expertise, little understanding about production and experience on prototyping (Browder et al., 2019; Keane & Nisi, 2013) are some of the limiting factors for exploiting local production spaces in more effective ways and on a broader scale.

The business model development process initiated with the first round of BM workshops focusing on gathering knowledge about the key areas of expertise of the cMDF partners and how these assets could be exploited towards original and value-generating market offers. This first round of workshops took place at the start of Task 7.2 in M10, at end of the project's first year. The first round of BM workshops focused on macro aspects related to the overall use case opportunities, following a digital manufacturing services market assessment (D7.1). This initial process singled out assets, long-term goals, and ambitions from the different partners of each cMDF to help form a shared understanding about how they could collaborate and exchange knowledge to combine their services and products. The second round of workshops shifted focus to identifying the key long-term values and the unique value proposition of each cMDF as their minimum viable product (MVP) for the current market. This process required each cMDF to contextualize their proposed use cases and related products in a market value analysis.

While there are similar services and related products across the cMDFs, they represent unique local offers that can further develop and cross-pollinate across the iPRODUCE federation. The more a product/service is known in a society, the higher value it might get and therefore, a wider market (hence the number of services offering the same type of products both physically and digitally). In other words, we can suggest that having similar competitive services across the markets increases the visibility of such services, adding value and creating increased demand to such services. For example, experimenting with various stages of product prototyping is currently mostly limited to companies with a budget that can accommodate such practice. If this practice is offered as service, as in the case of some cMDFs' product offer, this service can impact the production and experimentation of various products, making it accessible for smaller companies to develop and test new products through a lower cost than if they had to carry it in-house. Furthermore, when buying or subscribing to such a service, companies

might have a higher gain, profiting from the open innovation approach (Almirall & Casadesus-Masanell, 2010; Helfat, 2011), making use of external expertise towards creating and developing their product.

An intersecting aspect to all the cMDFs is the lack of clear or even existent marketing strategies, which could help them establish themselves in their local markets, if they were to increase their visibility. Another aspect that is also present in across the cMDFs is the topic of sustainability as part of their development. Sustainability is yet to gain a central stage within their current projects and productions. To fulfil upcoming societal challenges, they will need to include sustainability initiatives into their core production processes, while also shifting the production paradigm from a market flood to market demand, possibly leading to a 'deconstruction industry', where the disassembly model is incorporated into the original production model.

To better ground this discussion, we present the results from the CMDFs' BM workshops individually, making a joint analysis of the results, which combined will lay the foundation of the iPRODUCE platform Business Model. This is supported by a PESTEL (**P**olitical, **E**conomic, **S**ocio-cultural, **T**echnological, **E**nvironment and **L**egal) analysis, which is presented in Section 3.3.

3.2. Workshop Activities and Results

3.1.3. French cMDF

The French cMDF lays within the consumer goods industrial cluster, specifically in automotive and mobility sector. The three French cMDF partners are Materalia (SME), Excelcar (Fablab), and FabLab-Vosges (Fablab). The French pilot deployed co-design, co-creation, and open innovation methods and tools to accelerate the time-to-market for product development and to develop new production processes adapted to rapid demand and technology evolution in the mobility sector.

3.2.1.1. Business Model as of first round

The French cMDF's first business model focused on serving entrepreneurs, SMEs, fablabs, and makers by offering training and equipment to enable rapid prototype development as well as matchmaking to facilitate collaborations. The primary revenue streams are from membership fees, dynamic pricing (customized offers), and grants. Its cost structure is primarily composed of fixed costs (machinery, personnel, and utilities). The results of the BMC conducted in the first round of workshops is in Figure 3.

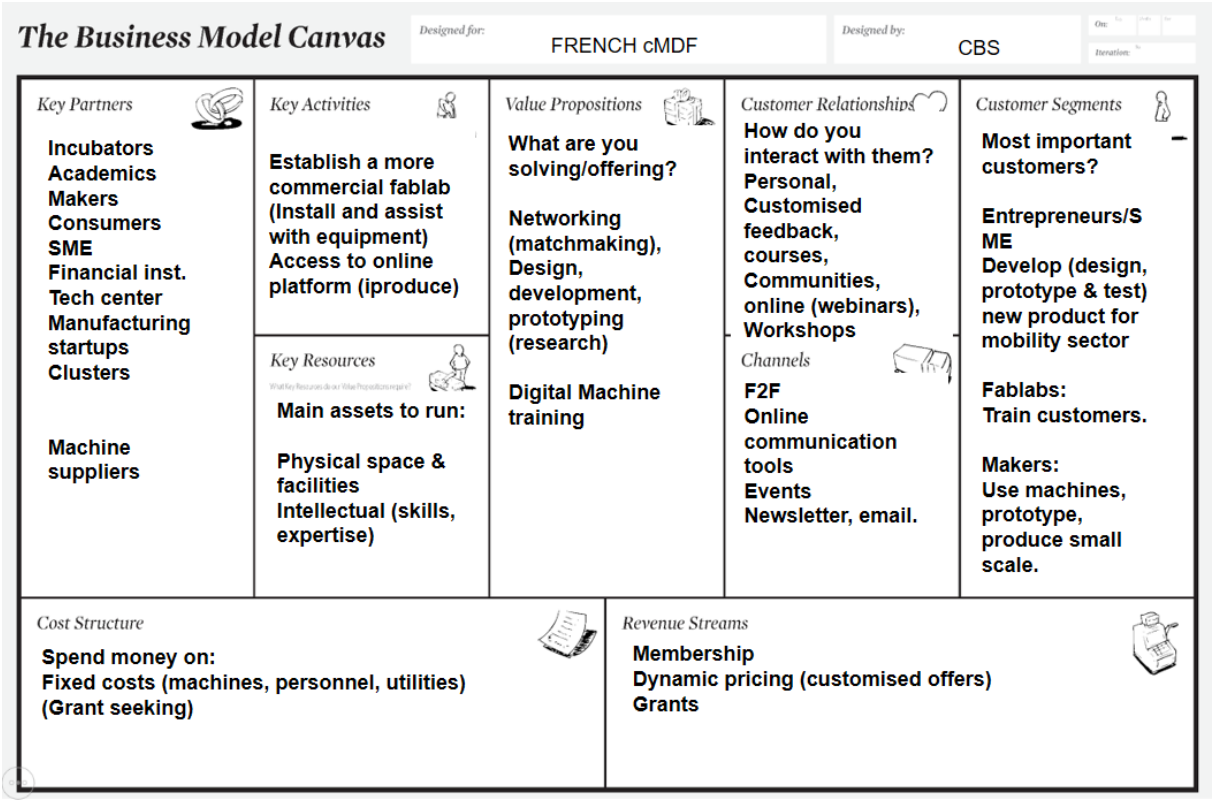

Figure 3. French cMDF BMC as of first round

3.2.1.2. Business Model as of second round

The French cMDF's unique value proposition is assisting DIY mobility-focused accelerated development through a team with varied and complementary skills. Their core service proposition for mobility-focused accelerated development (MFAD) aggregates the mobility, production, and manufacturing expertise of the three cMDF partners. This service is a new market offering for end customers, startups, and established companies developing novel solutions for the evolving mobility market. Figure 4 and Figure 5 are the original and the digitized versions of the French cMDF's BMC conducted during the second round of workshops. They map pathways for the cMDF to exploit market opportunities in this sector.

Figure 4. French cMDF BMC as of second round

UX Berlin BM FRENCH cMDF (2nd round)

iPRODUCE

Values	Value Proposition	Touchpoints (customer relationship)	Capabilities	Partners
Community Carbon neutrality Low emissions Training vulnerable communities	Complementarity (diverse team – skills, capacities) Mobility-focused accelerated development Assisted DIY (guided product development as a service)	SoMe, Fairs, Urban Mobility Days, Partners/Network/Members iPRODUCE Platform	Keep up + advance tech Network management Establish collaborations Intellectual property Market knowledge Equipment	Schools ID4CAR + Materialia Intersection East-West France Tech + needs Local + wider Mobility sector clusters around France Designers (Visual Identity) Software and hardware partners
	Stakeholder Segments Mobility-focused SMEs and StartUps Municipalities (especially Nantes, Rennes, Strasbourg) MMC community Vulnerable communities Students	**Distribution (channels)** Own channels + Project owners		
		Revenue Model Dynamic pricing, Grants Membership, Demo account/freemium Fixed entry fee (when portfolio is in place)	**Cost Structure** HR, energy, maintenance, utilities, marketing	

Figure 5. French cMDF BMC as of second round (digitized)

The number of green mobility solutions (e.g., from electric cars, e-scooters, and e-bikes) from a range of competitors in the European and international market have grown in recent years, looking to capture demand for greener and more efficient urban mobility options (Julsrud & Denstadli, 2020). However, research indicates that, even though there is demand for these solutions, adoption might be lower than expected, due to sustainable mobility services not fulfilling consumer mobility motivations for using these services (Herberz et al., 2020). Moreover, mobility solutions must be inclusive enough to reach a wide enough group of residents to achieve broad adoption if they are to succeed (Szołtysek & Otręba, 2016). Regulation and social perception might also limit the adoption or integration of these mobility services in urban centres (Henderson & Gulsrud, 2019). Customer-driven, citizen-centred solutions in the mobility sector may help overcome these barriers. Developing and testing prototypes in urban environments where they plan to bring the products to market, creates opportunities to address regulatory and experiential concerns early in the development process, which is key to increasing their inclusivity and effectiveness.

The French cMDF concentrates their service offer in the niche, but valuable carbon-neutral/green mobility market. The environmental sustainability aspects are complemented by a focus on vulnerable social groups that can provide immediate benefits through internships assisting in the manufacturing of the prototypes that may lead to further business initiatives by participants after they exit the program. Bringing broad and lasting benefits to the community are key values supporting the long-term features of the cMDF's BM.

The French cMDF recognizes the importance of collaborating with municipalities through their network. In situ collaborations can indicate how mobility solutions fit within existing regulations, if they help cities achieve carbon-neutral goals, and which adaptations need to be in place to accommodate changes in mobility practices. Furthermore, collaborating with cities during the prototyping testing period may ease the permitting process for testing, creating valuable learning opportunities through urban interventions (Angelidou et al., 2020; Fróes & Lasthein, 2020).

The cMDF revenue model relies on membership plans and dynamic pricing of its services. Membership plans are designed for companies to subscribe to its services and use its facilities and expertise when developing their products. Membership also grants access to the cMDF's comprehensive network, which assist in product exploitation in targeted markets. Furthermore, membership provides use of the iPRODUCE platform tools during product development, which integrated work among the project partners spread across France. The dynamic pricing of project-specific services tailored to the client's needs are in addition to the membership fees and services. The iPRODUCE platform if further developed could offer a set of tools for all users however, following a freemium model, some advanced settings of the tools are only available if the user is a member of a cMDF.

Currently the French cMDF partners need to consider the costs of running this collaboration service which include utilities and human resources. Energy use needs to be more carefully priced into the product market value equation to ensure that it accounts for current market fluctuations.

The service offer should provide income for the partners, while national and international grants are something to be considered to fund their continued exploration of advanced technologies. In turn, barter deals may increase awareness about the cMDF and its services in their region.

The primary distribution channels will be the iPRODUCE platform and those of each partner, which already consist of strong relationships with relevant market players. The cMDF benefits from being

nested within the strategic industrial regions of Grand Est and Brittany, which both have strong mobility industry clusters. Additionally, the French cMDF plans to explore possible distribution opportunities that product owners may already have in their other activities.

The French cMDF is looking toward expanding its market reach through its participation in a different EU-funded project. The goal of DECARBOMILE is to develop innovative solutions to solve the last-mile dilemma of turban transportation services (*https://decarbomile.eu/*). Products developed within the French cMDF could feed into testing in this project. Research indicates that green mobility solutions do not evenly equate with the habits or perceptions of urban drivers (Julsrud & Denstadli, 2020). Cohesive solutions to help cities achieve zero emissions goals must align the business models of number of logistic service provider (LSP) stakeholders with urban regulations and user demand for efficient and fast deliveries. Therefore, the French cMDF's services may help bridge the market gap key stakeholders while also creating opportunities for user-driven innovation in the mobility sector.

3.1.4. German cMDF

The German cMDF is nested within the IoT tech development scene in Germany. This pilot relies on open consultation, collaborative product development, and collaborative learning to enhance the co-creation capacity of manufacturing SMEs for consumer product innovation. It is composed of three partners: ZENIT (cMDF), Makerspace Bonn (Fablab), and Fraunhofer Institute - FIT (Research).

3.2.1.3. Business Model as of first round

According to the first business model canvas, the German cMDF (Figure 6) serves entrepreneurs, startups, makers, and SMEs through Guided Product Development as a service, machine operations training, and by enabling co-creation opportunities. To do so, the cMDF provides physical space with the necessary design and prototyping equipment supported by its community of knowledge to train to enable innovative product development. The primary revenue streams come from private memberships fees, customized service offers, public grants, and company memberships. The cost structure is mostly composed of fixed costs such as machinery, personnel, utilities, and materials.

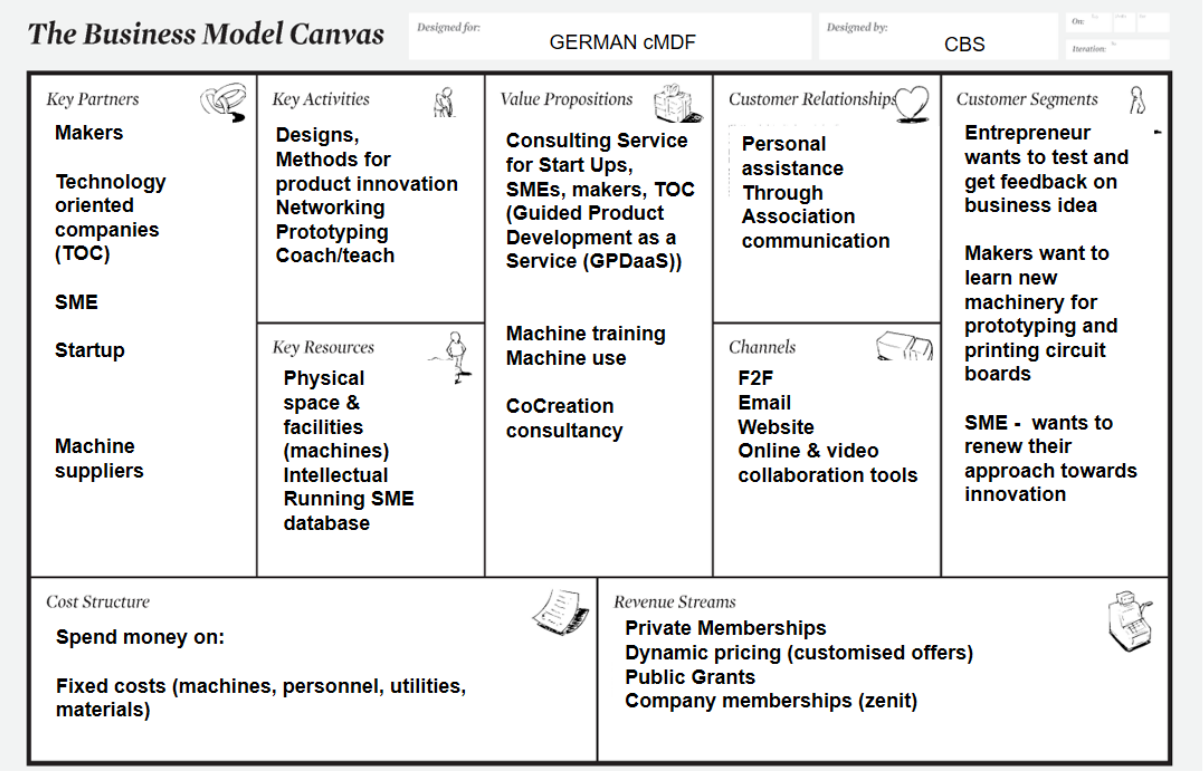

Figure 6: German cMDF BMC as of first round

3.2.1.4. Business Model as of second round

The German cMDF's key value proposition is providing opportunities for sustainable product development based on circular economy principles to reduce waste through re-use and recycling. To help create a common identity in the market for its partner firms, they named their service Product Forge. The service consists of three products: a facilitated design thinking process for concept development, prototyping and training in machine operations, and go-to-market strategy creation. These products can be bought together as a package or separately depending on customer need. Promoting the cMDF's core service through a single identity adds value to marketing initiatives as individual services are owned by different partners. The service also creates opportunities to educators and tinkerers in resources efficiency though its sustainability focused design development process. Figure 7 and Figure 8 are the results of the German BMC which illustrate this service and strategy.

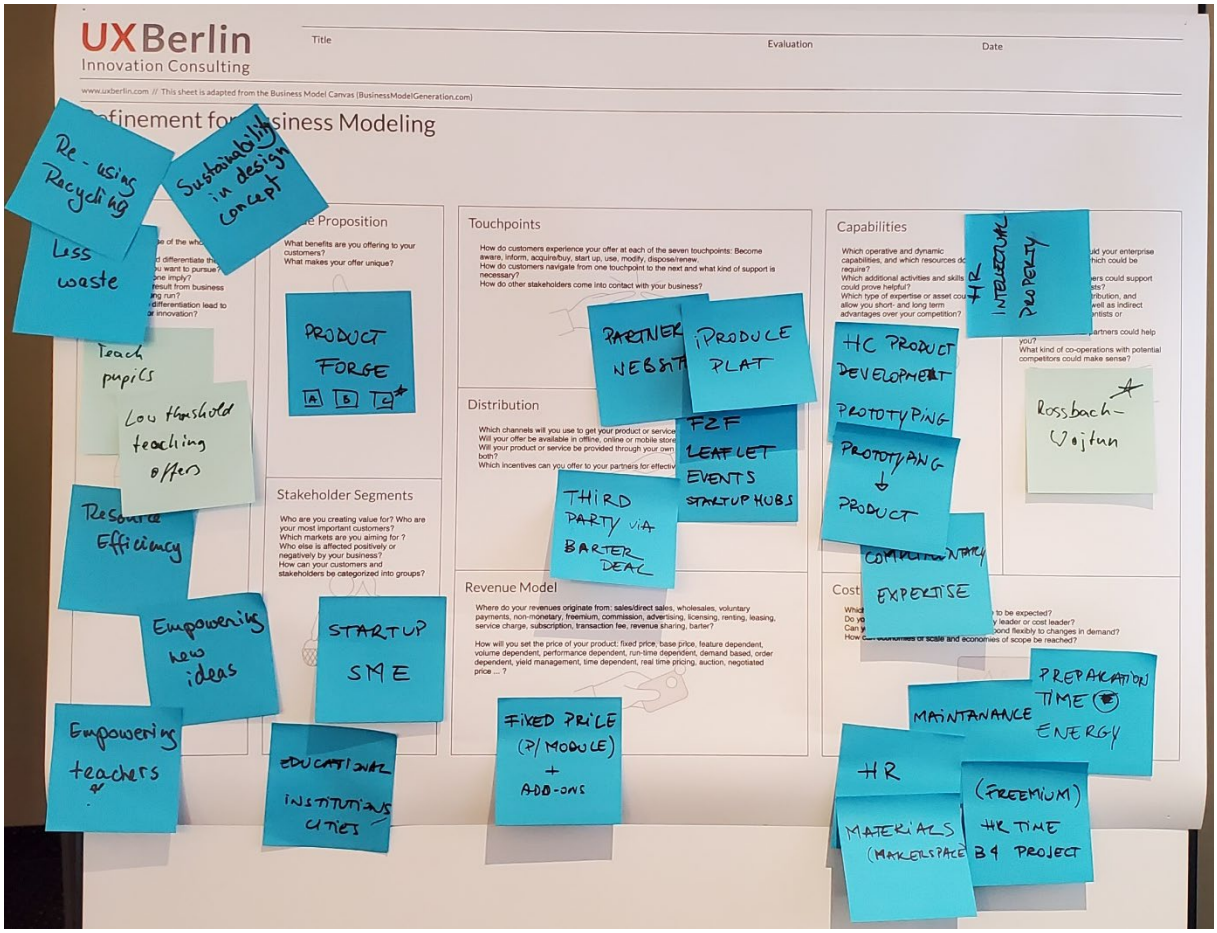

Figure 7. German cMDF BMC as of second round

UX Berlin BM GERMAN cMDF (pre-final)

Values	Value Proposition	Touchpoints (customer relationship)	Capabilities	Partners
Sustainbility in design concept Reuse Recycle mindset Less waste Low threshold teaching offers Teach pupils Empowering teachers Empowering new ideas Resource efficiency	Product forge	iPRODUCE platform Partnerships, website F2F, leaflets, events, startups hubs	HC product development Prototyping>Product HR Intellectual Property Complementary expertise	Rossbach-Wojtun
	Stakeholder Segments StartUp SMEs Educational Institutions	**Distribution (channels)** F2F, leaflets, events, StartUp Hubs Third party via barter deals		
		Revenue Model Fixed price (per module + add ons)	**Cost Structure** HR, materials (makerspace), maintenance, preparation time, energy and utilities HR time before project	

Figure 8. German cMDF BMC as of second round (digitized)

The Product Forge service is similar to the French cMDF's baseline service, but it is broader than the French cMDF's on mobility focus. Product Forge is open to working with as many customers' ideas as possible. The service has three adaptable pillars that can be applied to a range of products.

Crowdfunding sites such as Kickstarter and Indiegogo have helped increase consumer-driven innovation of manufactured goods. These sites support producing a product if backed by sufficient demand. Products without sufficient pre-production demand are not produced. Many of the products that reach the funding threshold face production delays and geographical limitations (Mollick, 2014). The model of these sites requires that product designers have either a well-crafted video prototype or an actual prototype as the centre of their crowdfunding campaign. Product Forge builds on this consideration and is a unique market offer for individuals and companies launching a crowdfunding campaign. Product Forge would support production of a high-fidelity prototype with a low initial investment, while also transitioning to produce of a limited sample run or scale up to local mass production.

Learning about possibilities and costs of creating prototypes and production runs can initiate discussions about how to transition producing more goods locally. The costs incurred in local production notwithstanding, which are typically higher for goods produced in Europe rather than internationally in locations with lower labour costs, locally produced goods offer benefits such as tighter control of supply chains, reduced emissions through shorter shipping routes, and the social impact of creating local jobs. Profit margins of locally produced goods might be constrained by higher costs (primarily in higher wages), the return of investment still has the potential to be higher over the long run because of the close connection between ideation and production. The opportunity to create prototypes and larger production runs locally might gain traction in the years to come after recent experiences of fragile supply chain through the Covid-19 pandemic and Russia's invasion of Ukraine. The German cMDF's service fosters economic and social resilience at the local and regional level, with the possibility of scaling to having a Europe-wide reach through the iPRODUCE platform.

The German cMDF's revenue model is based on a fixed price per product module with supplementary services depending on client need. The service targets SME's, start-ups, and incubator programmes. Learning from other cMDFs across the iPRODUCE project, it could also be offered as an educational programme and to professional groups, possibly in the medical or mobility sectors. The costs of the service are linked to the maintenance and continued development of the cMDF partners, which need to account for materials and human resources.

The German cMDF distribution channels align with the French cMDF through the iPRODUCE platform. The partners also retain their prior distribution channels, they can dedicate staff to participate in events and give face to face (F2F) presentations at incubators and start-up hubs, which are all good distribution pathways.

It is possible that income generated by sales of its service can supplemented by grants funding technological development at national and international levels. The cMDF should also seek out barter arrangements with relevant entities to increase awareness about its services in other regions. The German cMDF and its partners can also collaborate with organisers of local challenges or competitions focused on innovation in relevant sectors to increase its visibility and to attract future customers. Revenue generated by early sales might best be invested in targeted marketing campaigns to reach and attract more customers. This campaign could be included as part of an initial investment launching the iPRODUCE platform.

3.1.5. Greek cMDF

3.2.1.5. Business Model as of first round

The first business model canvas identified the Greek cMDF (Figure 9) serving medical doctors and makers through the research and development of customized medical devices. Its R&D process includes collaborative ideation and prototyping with patient participation and the use of digital tools in production such as IoT and 3D printing. Additionally, the cMDF reports its findings to the (medical) community, contributing to knowledge about increasing patient wellbeing through the product monitoring systems. The cMDF joins the equipment, raw materials, and physical space for prototyping with expertise in product development, commercial development, and sales channels. The main revenue streams come from pay-per-use and dynamic pricing through customized offers while the cost structure primarily consists of fixed costs (e.g., machinery, personnel, licencing, marketing, and utilities) and dynamic costs (e.g., conferences, clinical trials, and travel). Figure 9 depicts the Greek cMDF's first round BMC.

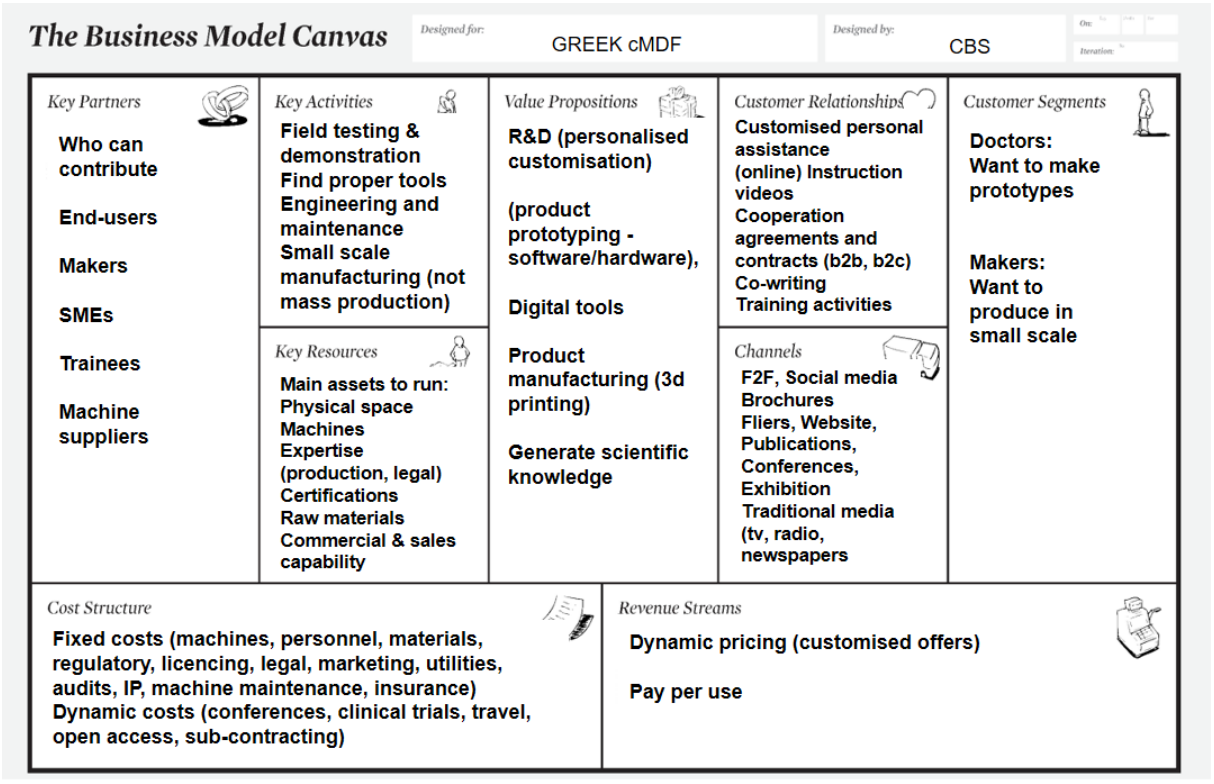

Figure 9: Greek cMDF BMC as of first round

3.2.1.6. Business Model as of second round

The Greek cMDF core value proposition is developing customized medical devices, specifically in smart braces that improve patient experiences during their recovery process as compared to current solutions on the market. The Greek cMDF BMC is shown in Figure 10 and Figure 11. Research documents that novel products and solutions emerge when a set of needs and qualified experts in the health sector and digital fabrication are brought together (Sedini et al., 2021; Svensson & Hartmann, 2018). According to the OECD there is a need for health systems to be reoriented to place people at their centre (OECD, 2018). The Greek cMDF's service meets this need through its collaboration with health professionals designing custom braces. Existing literature suggests that joining digital manufacturing and health sector

can increase in situ user driven innovation. These innovations can take the form of improved health treatments for patients through customised devices and a better work environment for medical staff in through efficient data access and distribution (Sedini et al., 2021; Svensson & Hartmann, 2018). Co-creation processes are also relevant in this context as they made lead to new products and services by joining the cross-disciplinary expertise required to solve limitations encountered in the healthcare sector. Figure 10 and Figure 11 depict the Greek cMDF's BMC.

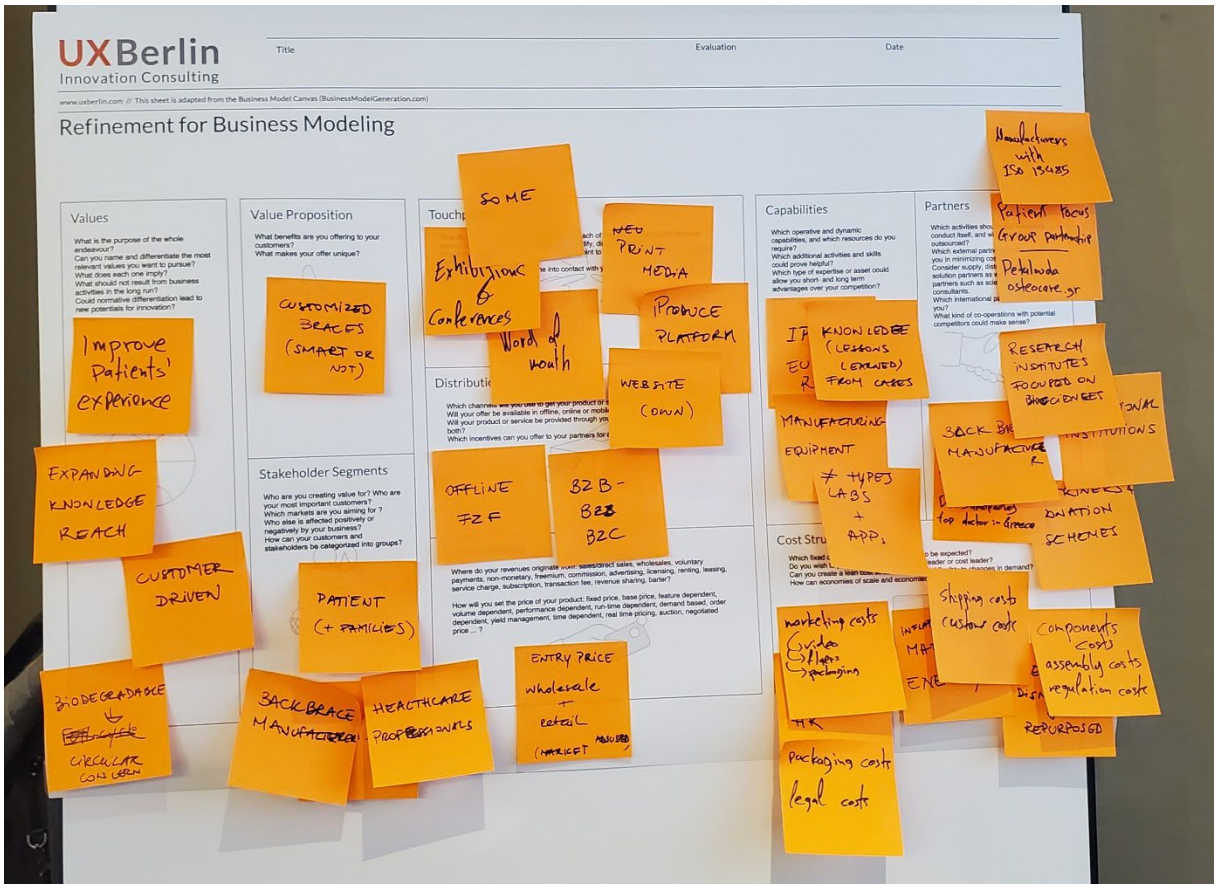

Figure 10. Greek cMDF BMC as of second round

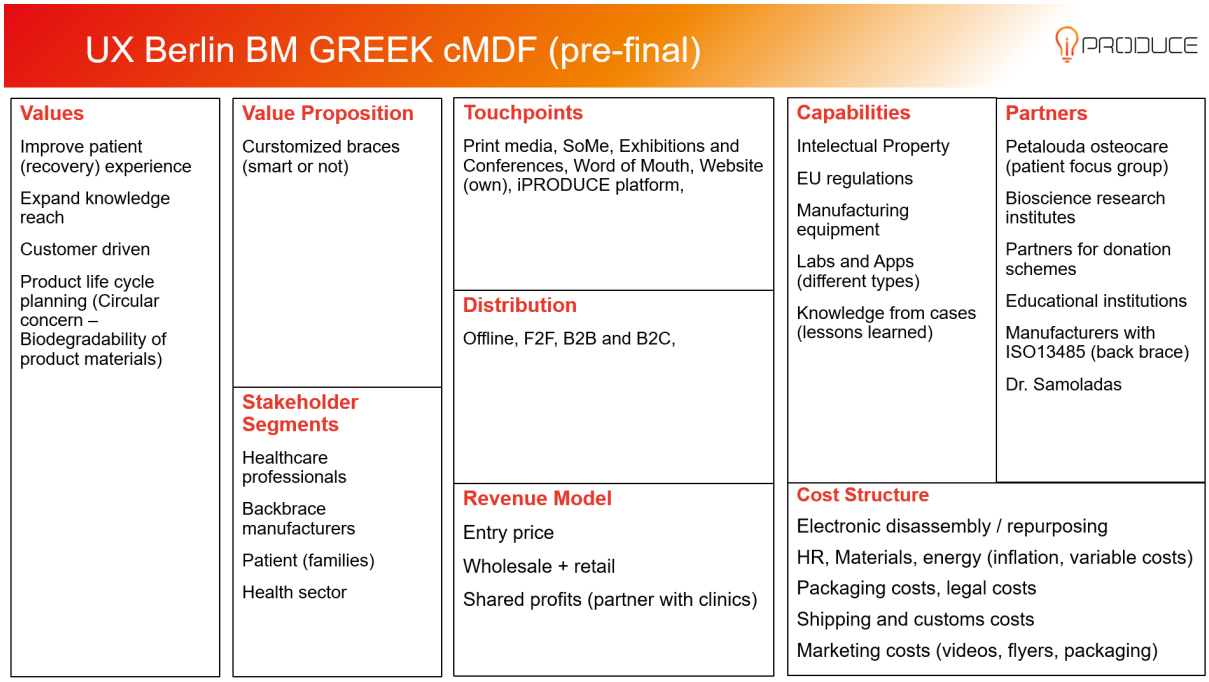

Figure 11. Greek cMDF BMC as of second round (digitized)

The Greek cMDF service proposition builds on this opportunity validated by research, offering a service aimed at assisting healthcare professionals develop customised braces for their patients. This service follows a B2B2C model. The initial service targets physicians. Patients are the end-customers with the cMDF positioned in between physicians and patients. The Greek cMDF's values are improving patient recovery experiences and the life-cycle assessment of the materials used to construct the braces. This approach incurs in the costs of running the service including material recovery and electronic disassembly. However, it might prove result in a positive return of investment (ROI) over time if it produces a degree of autonomy in the electronics in their supply chain. The initial investment in materials, packaging, shipping, customs, marketing, and the legal costs associated with offering the service locally as well as internationally also need to be factored in.

Having a market-ready service offer bolsters the cMDF's prospects of attracting financing from venture capital or angel investors. It needs capital to invest in materials and to design a target market campaign, including visuals materials and participate in events to increase visibility of its service in the relevant communities. Customisation and local digital fabrication are emerging production modalities that have the potential of creating novel baselines for treatments requiring braces.

The cMDF is initially targeting private sector health care professionals to transfer continued development costs to patients and families who can pay for customised treatment. However, it wants to pivot toward broader access, including public health systems, after the market is established to more fully align with its values. Continued private sector sales should provide a large enough profit margin to support narrow margins in the public sector. Following this scenario, the revenue model proposes a general service entry value. Additional variable fees dependent on the time needed to complete the necessary customisation accompany entry value.

The service's initial point of contact with potential customers are the iPRODUCE platform, the media platforms of each cMDF partner, and its participation in topic related conferences and events.

Distribution channels are primarily through in person meetings with potential clients where partners present and discuss the service. The initial process requires significant dedicated human resources with little digitalisation because of the user-driven features of the service. Over a longer time, horizon service could transition to digital where initial contact would be through a website or app where health professionals could provide patient information and upload images (x-ray, MRI) to streamline the service.

Partnering with international digital fabrication spaces should be considered as the service expands internationally to reduce shipping and customs expenses. The initial phase of the service would still be centralised through the Greek cMDF with international meetings would be facilitated through digital meeting tools. Fabrication, however, would happen locally, after makerspaces/fablabs received approval and entered into service agreements with the Greek cMDF partners.

3.1.6. Italian cMDF

The Italian cMDF aims to enable collaborative engineering between microelectronics manufacturing companies, the cMDF, and Fablabs by bringing together a community of experts, makers, start-ups, and SMEs through the iPRODUCE tools and methods to improve and create products. The Italian cMDF has three partners: PROM Facility (manufacturing), MUSE (FabLab) and Noitech (makerspace).

3.2.1.7. Business Model as of first round

The first business model canvas identified the Italian cMDF (Figure 12) serving engineers, designers, and inventors looking for assistance industrialising their patents. Additionally, it serves students and employees seeking operational training for production machines and prototyping equipment. It also offers its expertise through specialised advising. The cMDF provides combines a physical space and facilities with in-house expertise to support its customers. It also provides support for clients seeking financing to advance products along the development process and matchmaking services to foster collaborations. Its primary revenue streams are from pay per use fees, fixed and dynamic pricing of services, and public grants. The cost structure primarily consists of fixed costs (e.g., machinery, personnel, and utilities).

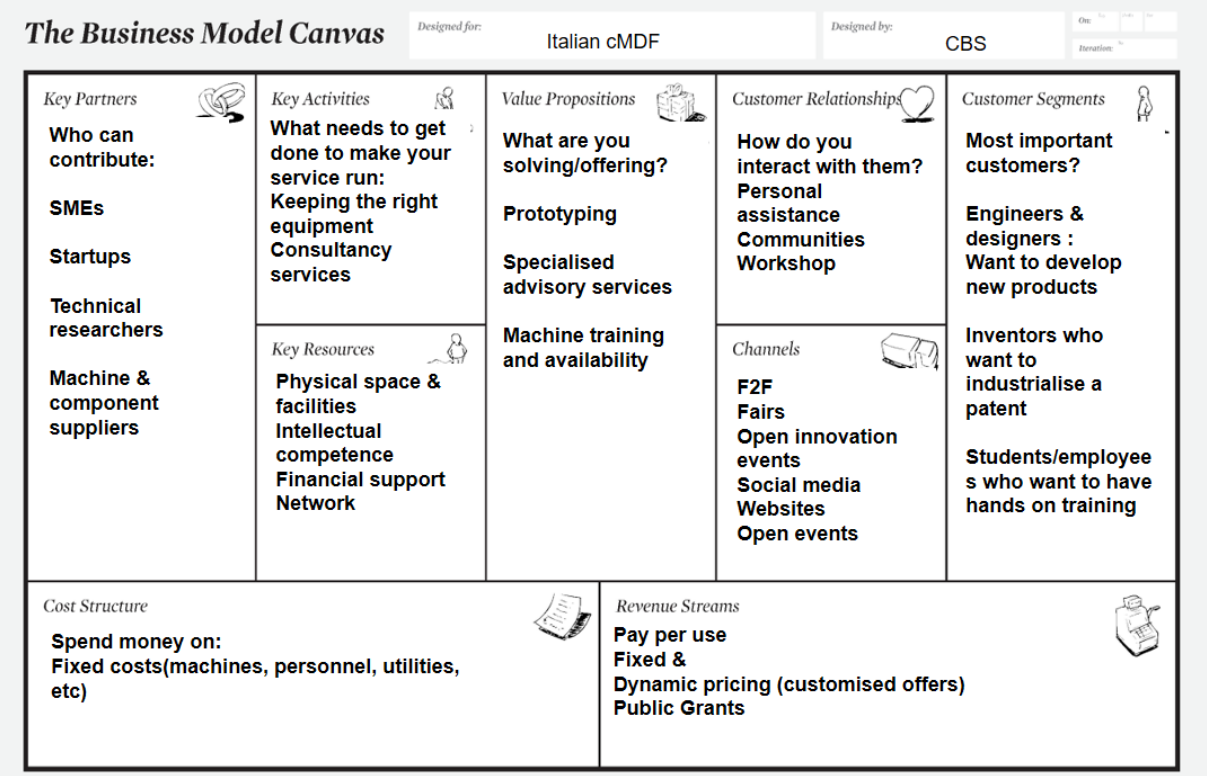

Figure 12. Italian cMDF BMC as of first round

3.2.1.8. Business Model as of second round

The Italian cMDF service offers aligns with that of the German cMDF by offering an integrated approach to innovation. The Italian cMDF supports innovative product development from ideation to final production, including services to help protect intellectual property created by clients. Its business model depends on increasing its research profile and applying for local and international grants to fund projects that explore recent technologies and expand its research impact. It provides a range of services including producing parts for the medical sector and bespoke production. There are clear untapped business opportunities in collaborating with doctors and hospitals creating realistic surgical training

models. This is a market area in its infancy that could be highly impactful in the local and international health care sector. The final BMC of the Italian cMDF is shown in Figure 13 and Figure 14.

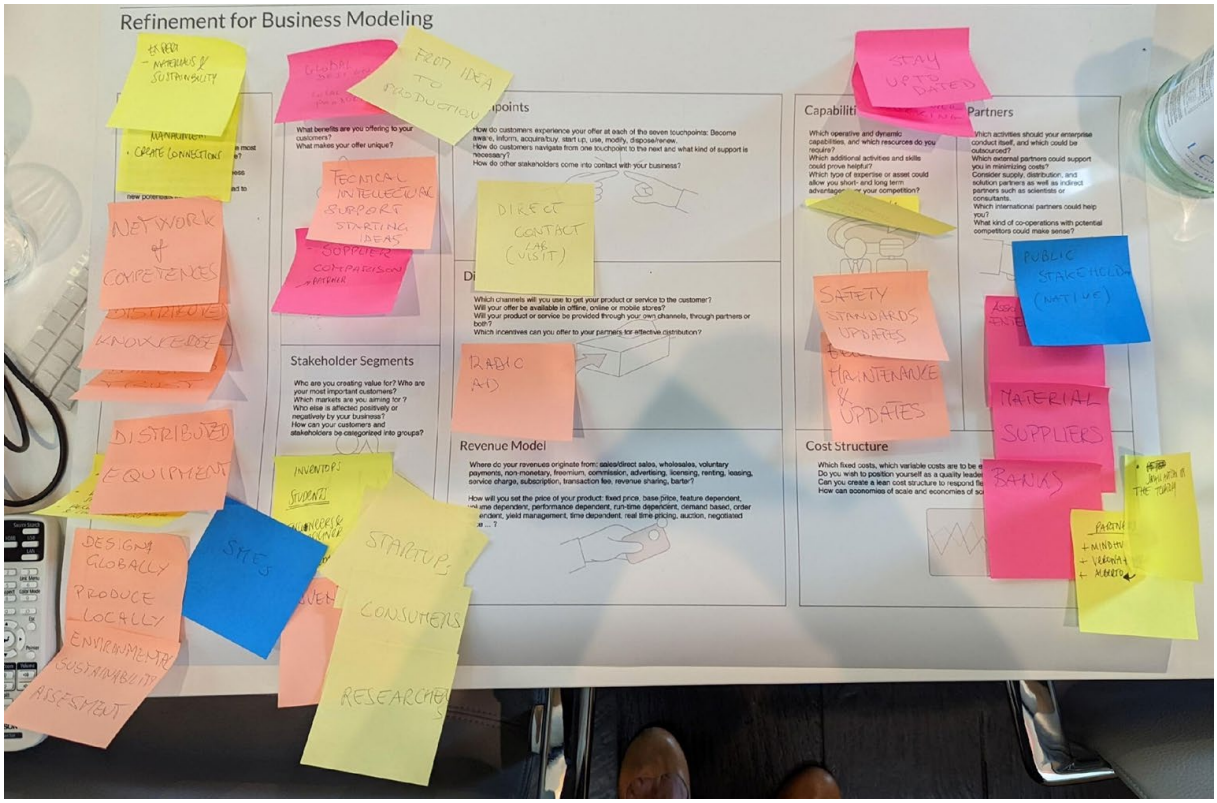

Figure 13. Italian cMDF BMC as of second round

UX Berlin BM Italian cMDF (pre-final)

iPRODUCE

Values	Value Proposition	Touchpoints	Capabilities	Partners
Design globally Produce Locally Expert Materials & Sustainability Network of Competences Advisory Service + project management Create connections Building Trust Distributed Equipment Distributed Knowledge Transparency of the process Keep trace of the steps Regulate agreements & collaborations Environmental Sustainability Assessment	From idea to production Global Design Local products Supplier Comparison → Partner Technical intellectual support starting ideas	Direct contact (lab visit) iPRODUCE platform Radio Advertising	Keep network working Stay up to date Create reliable connection Give impartial guidance Protect intellectual properties Equipment Maintenance and Updates Safety Standards Updates	Public Stakeholder Material Suppliers Asso Enterprises Small artisan on territory Partners x Watering Systems (Mindhub, Verona FabLab, Alberto)
	Stakeholder Segments Inventors, Students Engineers, Designer Shops, Companies Researchers, SMEs Consumers, Start Ups Companies' R&D	**Distribution** Actual Lab		
		Revenue Model Public grants Dynamic pricing - project based	**Cost Structure** Equipment Personnel Utilities	

Figure 14. Italian cMDF Business Model as of second round (digitized)

The iPRODUCE platform could valuably contribute by providing a location for health care professionals to exchange knowledge and facilitating the local production of these models through its matchmaking features. The partners are interested in continuing their collaboration initiated in the iPRODUCE project, which created novel market opportunities to be explored once the platform is fully established.

The first step in laying the groundwork continued collaboration is creating an internal agreement formalizing their knowledge exchange and cooperation process. The agreement should include clear language on how hour/project/prices will be calculated so the partners can cover their costs. Costs include personnel for operating and maintaining the machines, in additional to the continued training of employees through participation in courses, conferences, and events to keep the team up to date in the latest developments to keep the lab at the forefront of digital fabrication.

The Italian cMDF partners support creating a transparent and traceable material supply chain as part of their core values. The partners want to standardize environmental assessment of their design and production practices. This marks a step toward acquiring the knowledge to reach their sustainability goals.

Revenue currently relies primarily upon public funds, which might be feasible to continue in the near term. However, to secure its long-term future, the cMDF must offer its services more broadly to increase revenue, considering fewer projects of higher value for money, instead of a wide range of projects of lower value that might overburden the current staff without bringing a financial impact. However, projects of lower financial value but with high visibility/exposure value should be considered and used as 'marketing investment'. Rates are planned to be based on hourly costs and the time required to execute the service.

Costs primarily consist of machines, materials and others supplies, utilities, and personnel. The equipment of the partners is at the initial stages of its expected lifespan and new machine purchases are not expected to be a significant future cost.

The primary touchpoints with customers are the ProM lab facility (*www.promfacility.eu*) in Rovereto, Italy, the iPRODUCE platform, and radio campaigns. They need to increase collaborations with Startup incubators, participate in fairs and conferences, and increasing their SoMe output to increase the visibility of their service. Distribution takes place at the lab.

A recent collaboration between one of the cMDF partners and a group of healthcare professionals presented a previously unexplored opportunity. The partners could work with healthcare practitioners to create low-cost 3D printed prototypes that aid training and pre-surgical practice. These models might have additionally functionality as teaching models. This opportunity builds on research-validated case studies in other regions documenting collaborations between digital manufacturing and the medical sector (Marshall & McGrew, 2017; Sedini et al., 2021; Svensson & Hartmann, 2018). These collaborations could potentially be expanded to other untapped opportunities such as prototyping solutions for urban agriculture, architecture, etc. creating opportunities for cross sector user-driven innovation.

3.1.7. Spanish cMDF

The objective of this pilot is to enable collaborative engineering among furniture manufacturing companies, the cMDF and the FabLab jointly with the community of experts and makers, allowing them to develop customer-driven products with complex specifications that the furniture producer cannot

tackle on his own. The Spanish cMDF comprises three partners, namely, AIDIMME (research), Lagrama (furniture manufacturer) and Océano Naranja (FabLab).

3.2.1.9. Business Model as of first round

According to the first business model, the Spanish cMDF (Figure 15) serves students, teachers, designers, makers, engineers and R&D/procurement managers through prototyping, R&D services and machine training and availability. To do so, the cMDF offers a physical space equipped with machinery as well as expertise in these fields. The main revenue streams come from grants, dynamic and fixed pricing, membership fees and pay per use, while the cost structure is mostly composed of fixed and ad-hoc expenditures such as machinery and personnel.

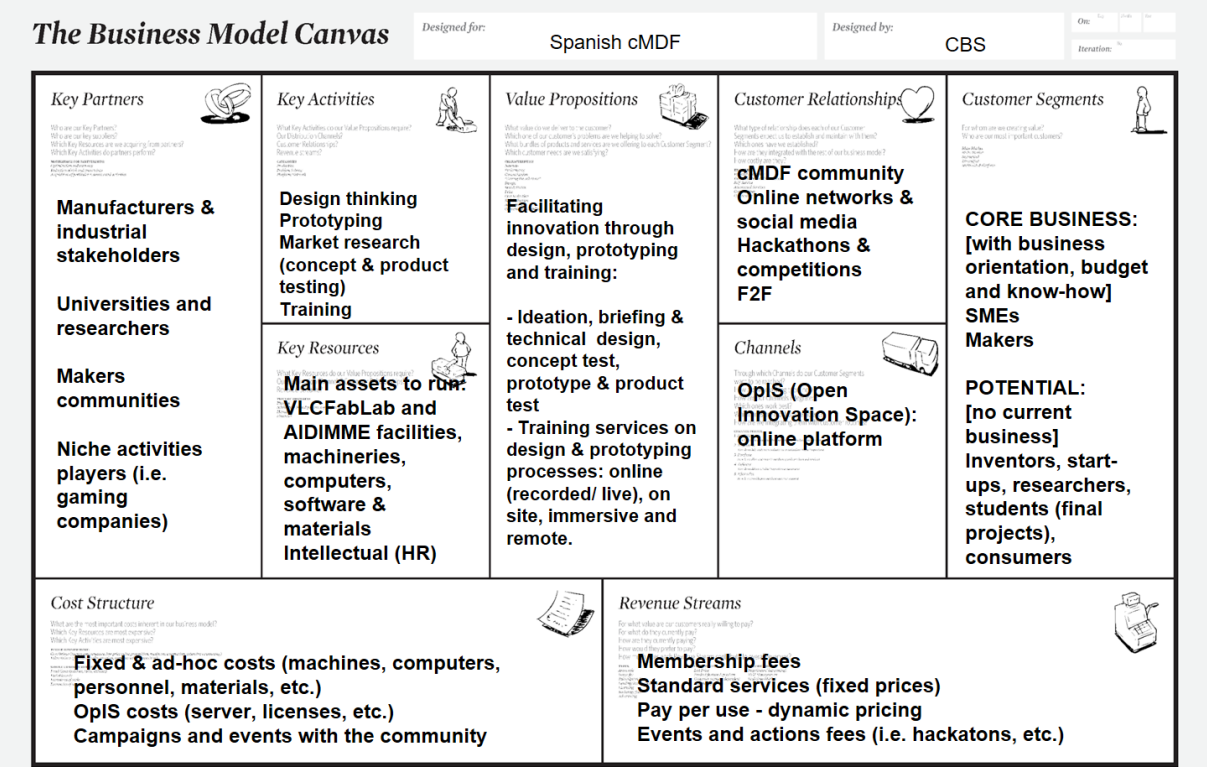

Figure 15. Spanish cMDF BMC as of first round

3.2.1.10. Business Model as of second round

The core values of the Spanish cMDF meeting sustainable development goals by slowly transitioning to a sustainable supply chain. Their primary value proposition is consulting in the consumer goods sector. Their market focus is manufacturers. They provide a highly specialized service that offers opportunities to go beyond production to pre-launch product testing of consumer goods.

Their core capabilities include expert knowledge of machines, health and safety product specifications, and market regulations. The Spanish cMDF can be a great asset in the iPRODUCE platform as their testing and validation services for the products developed are of use to all partners. The Spanish cMDF's BMC is shown in Figure 16 and Figure 17.

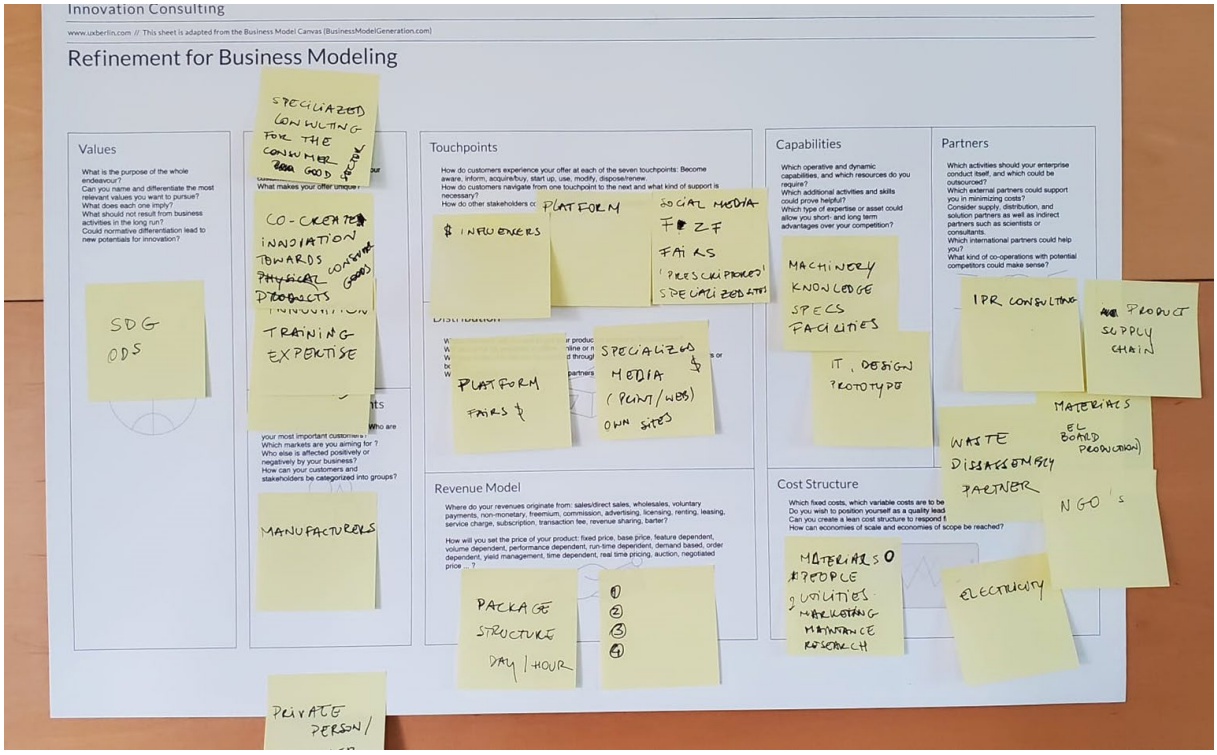

Figure 16. Spanish cMDF BMC as of second round

UX Berlin BM Spanish cMDF (2nd round)

iPRODUCE

Values	Value Proposition	Touchpoints	Capabilities	Partners
Sustainable Development Goals Sustainable supply chain Local manufacturing	Specialized Consulting for the consumer good sector Co-create innovation towards consumer goods Innovation training expertise Physical products **Stakeholder Segments** **Manufacturers** Designers Makers	Influences F2F, prescribers, stakeholders iPRODUCE Platform Social Media Specialized websites **Distribution** iPRODUCE Platform Fairs (High cost) Specialised media (print/web) (High cost) Own sites **Revenue Model (B2B)** Package structure (testing products) day / hour (using facilities) Dynamic price (per project)	Whole product design coverage (market research, conceptual design, engineering, health and safety, prototyping) Facilities Machinery and processes knowledge (Specs, materials, constraints, etc.) IT - Design Prototyping	IPR Consulting Product Supply Chain Waste Disassembly Partner Materials (Electric Board Production) NGOs
			Cost Structure Materials, People, Utilities, Marketing, Maintenance, Research	

Figure 17. Spanish cMDF BMC as of second round (digitized)

The primary customer touchpoints of the Spanish cMDF include both online and offline outlets such as the iPRODUCE platform, specialised websites, social media channels, face-to-face sales

representatives, and influencers. Distribution channels are the iPRODUCE platform, fairs, the websites of participating partners, and specialised media.

The cMDF partners are currently funded through their consulting work and public funds. Continued collaboration can provide both access to a wider network and market, which may increase the financial sustainability of the partners, while contributing to the financial strength of SMEs in the network. The partners need to formalize their partnership through an agreement that stipulates in detail their contribution to the products being developed with hour/price averages to accurately price products with enough of a profit margin to achieve long-term financial stability,

The primary costs of the cMDF are materials, maintenance, research, and personnel. The Spanish cMDF's services, which are B2B, have different values for each part of the service. For example, product testing is almost entirely charged at a flat determined rate, however, with the increase in energy prices and these values will need to be adjusted accordingly to cover costs and maintain their market position. Prices for product ideation and development align with the other cMDFs and are based on hourly rates yet are dynamic according to account for the complexity of projects.

The Spanish cMDF is connected to a strong network of external partners covering a range of roles from providing materials and components for their facilities to IPR consulting and waste disassembly.

The Spanish cMDF is exploring valuable product developments through the consumer goods use cases, which show opportunities to gain market traction. Their smart connected bed headboard is relevant in the hospitality and medical sectors. Their smart game chair has potential in the ever-growing gaming sector. Both are good examples of the types of products produced through the collaborations in the Spanish cMDF. It is essential that the partners set partnership agreements to secure the interdisciplinary assets specific to each of the cMDF partners.

3.2.2. iPRODUCE Business Model

3.2.2.1. iPRODUCE Business Models as of first round

The first round of business models put in evidence shared elements across the cMDFs' business models as well as specific elements of each pilot. While the specific elements are often context-specific (referring to e.g., type of industry, regional markets and ecosystems), the common elements often refer to the overarching market dynamics and trends (e.g., innovation, sustainability, open-innovation, technological development, the maker and prosumerism scene) that stretch over the six countries and beyond.

The anticipated iPRODUCE business model (Figure 18) highlights all cMDFs, their SME partners and suppliers as key partners, who will benefit from matchmaking, models and human resources (e.g. library of knowledge, design and open-innovation) provided by the platform, as well as embedded online/in-person training (e.g. prototyping, machine operation) and facilitated partnership forming via Ricardian contracts. To do so, iPRODUCE offers a platform with production resources (e.g., design and engineering) where investors and makers can share and co-create online training tools and tutorials to develop digital fabrication skills, as well as guidance and the road mapping for patenting and IPR. The main revenue streams come from pay-per-use and dynamic pricing (customized offers) while the cost structure is mostly composed of fixed costs (e.g., maintenance and upgrades, domains and server costs for the platform operation), and marketing initiatives to prospect and retains users.

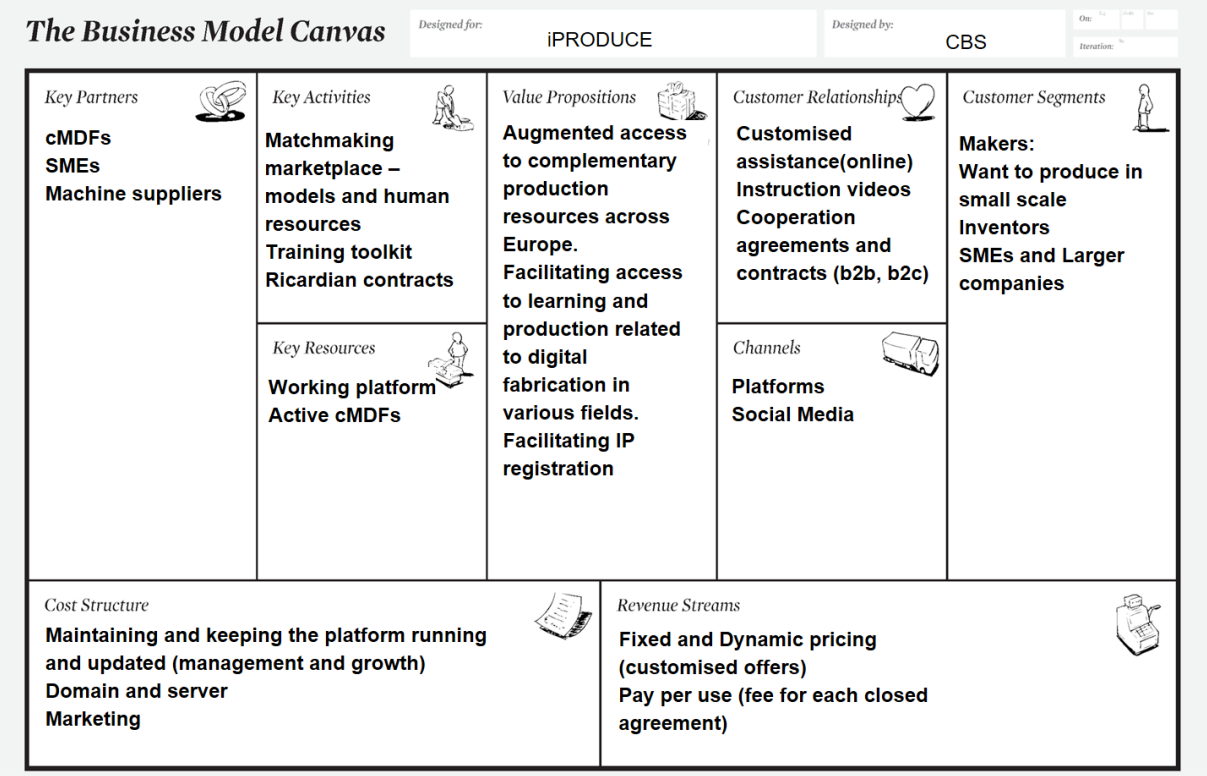

Figure 18: iPRODUCE BMC as of first round

3.2.2.2. iPRODUCE Business Model as of second round

Building on the cMDFs use cases, the iPRODUCE platform needs its own business model assessment. The platform enters a market with proliferating options for the user-driven sector. This model builds on the market research done for D7.1, where we covered a number of resources and platforms currently available. The iPRODUCE platform most relatable competitor would be MakeWorks (*https://make.works/*) and MFG (*https://www.mfg.com/*), both are equivalent to the matchmaking and marketplace offers of the platform. The platform is built on two complementary business models. First is the Produce on Demand business model, within the framework for Environmental impact (Whisnant & Clinton, 2014), where the product is only produced after being agreed on or purchased. The second is an alternative marketplace business model, towards diverse impact, where the cMDFs engage in modes for collaboration and transaction to expand and foster untapped opportunities (ibid). The BMC for the PRODUCE platform is depicted in Figure 19.

The iPRODUCE platform novelty lies in allowing for a range of customer groups to engage with the platform in various capacities helping build a new marketplace: as a regular customer, through the marketplace, they can just purchase a product; as a customer able to customise an existing offered product to cater to their specific needs; and as a company wanting to develop a specific product, looking for possible locations and/or help to produce it.

The platform's core value proposition offers an opportunity for on demand product development through local matchmaking with existing companies and resources, while also providing a marketplace for the developed products. However, for developed products, there is a wide number of platforms/sites offering products, either in the form of crowdsources products or just as a general niche market as those described in D7.1.

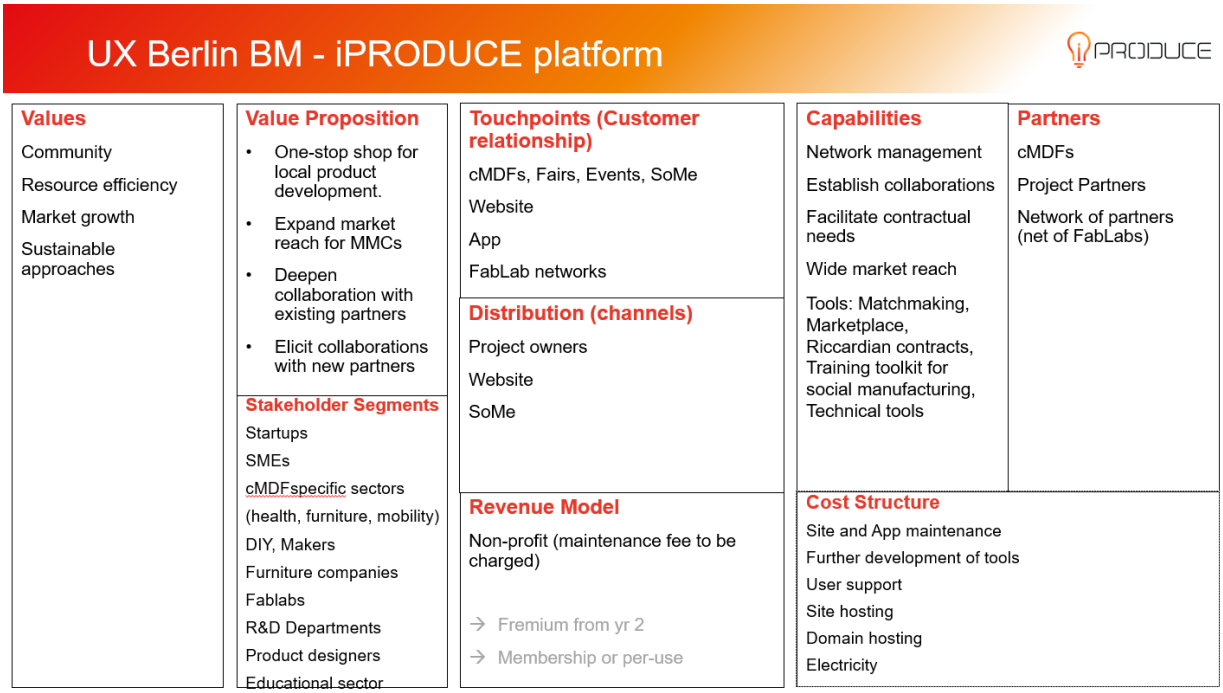

Figure 19. iPRODUCE platform Business Model

The platform key touchpoints are its own early members, such as the cMDF partners. Several events, fairs, social media and related websites and apps can help make the platform more visible. The iPRODUCE platform offers a set of tools for all users however, in a long-term perspective, following a freemium model, some advanced settings of the tools might be available if the user is a member of a cMDF.

While the bulk of the cost structure would have lied in the platform implementation this aspect has been covered by the iPRODUCE project, to keep it running post project completion is dependent on maintenance costs. Therefore, although the platform's initial goal is to be non-profit, it still requires charging a small fee for its services, if it is to continue offering them post project.

Regarding the modes for financial sustainability, most of the SME partners, including the makerspaces, are able to continue with the public and private funds. However, to truly secure their position and create some growth, it would be highly valuable to find a couple of more established local companies as direct and consistent partners, where they could develop a long-term business relationship. As earlier described in the individual business models, some of the industries in constant development might not be the usual or initially expected industries, such as engineering and industrial large manufacturing factories, but as an example, medical and construction sectors. These are pressured sectors, in high need for innovation and with ongoing demand and budgets, however many times lacking opportunities to challenge their practice through the integration to open innovation initiatives.

Among the core values linked to the platform, community building and resource efficiency are key aspects to develop new local production markets. By developing a market scale prototype locally, the prosumer can assess aspects related to the supply chain, costs, environment impact, etc. Including a resource efficiency assessment early in the design and development process could provide a more sustainable and resilient production model, if the product is ever to be mass-produced.

Overall, the platform offers a unique value proposition, however it needs to establish itself in the market by gaining visibility and consumers/prosumers engaging with it. The increase in access needs to be

combined with a consistent service, as it is only by the users' positive experiences that the platform can expand its market and create a true impact in the open innovation field.

3.2. Cost-benefit analysis

A high-level cost-benefit analysis is a method used to evaluate the positive and negative impacts of a project or policy on society and the economy. It involves taking in consideration economic aspects associated with implementing the project or policy with the benefits it is expected to generate. The aim is to determine whether the benefits outweigh the costs and whether the project or policy is economically and socially viable.

As in the case of iPRODUCE, the focus lies on addressing Open Innovation as an opportunity to facilitate distributed manufacturing, while also becoming a possible catalyst for the shift required towards more sustainable and circular practices in the manufacturing industry. Therefore, the cost benefit analysis carried out, does not carry exact values, as these fluctuate with geopolitical conflicts, pandemics, etc. Instead, the analysis gives an overview of the cMDFs markets, which, together with the business models, might help towards shaping their growth and development strategies.

3.2.1. FRANCE:

1. Costs:

- Labour Costs: Manufacturing consumer goods often requires a significant workforce, and the cost of labour plays a crucial role. France has a well-developed labour market, but it is known for relatively high labour costs compared to some other countries. This could impact the profitability and competitiveness of companies operating in the manufacturing industry and the inclusion of smaller SMEs, and thus challenging to incorporate OI in their established processes.
- Regulatory Compliance: France has stringent regulations regarding labour, safety, environmental standards, and product quality. While these regulations aim to protect consumers and the environment, they can also increase compliance costs for manufacturers. The cost of regulatory compliance needs to be factored into the cross-collaboration/partnerships among companies.
- Energy Costs: Energy expenses can be a substantial cost factor in manufacturing operations. Assessing the energy costs, including electricity and fuel, specific to the consumer goods manufacturing industry in France is important to determine its impact on the overall cost structure.
- Raw Material Costs: Consumer goods manufacturers rely on various raw materials to produce their products. The cost of these raw materials, which can fluctuate based on global market conditions and availability, needs to be taken into consideration. Therefore, collaboration across industries should look into opportunities within material development firms within France and across Europe to counteract some of these challenges.

2. Benefits:

- Skilled Workforce: France has a highly skilled workforce, which can be advantageous for the consumer goods manufacturing industry. Skilled labour can contribute to higher productivity, quality output, and innovation, leading to a competitive advantage.
- Infrastructure: France has well-developed infrastructure, including transportation networks, logistics hubs, and access to international markets. This infrastructure can facilitate the movement of goods, reduce costs, and improve supply chain efficiency.

- Market Access: The French consumer market is significant, offering opportunities for domestic consumer goods manufacturers. Additionally, France's membership in the European Union provides access to a broader market of over 500 million consumers.
- Brand Perception: "Made in France" products often enjoy a positive reputation for quality, craftsmanship, and innovation. This perception can be advantageous in attracting customers both domestically and internationally, potentially leading to higher sales and market share.
- Government Support: The French government provides various incentives and support programs to promote industrial development, innovation, and export activities. These initiatives can help reduce costs, improve competitiveness, and foster growth within the consumer goods manufacturing industry.

3.2.2. GERMANY:

1. Costs:

- Labour Costs: As in France, labour costs in Germany are relatively high compared to many other countries within Europe. The industry requires skilled and qualified labour, leading to higher wages. The cost of employee benefits, such as social security contributions, healthcare, and pensions, also contributes to the overall labour cost.
- Energy Costs: Energy costs have been a concern for German manufacturers due to the country's shift towards renewable energy sources. While this transition has long-term environmental benefits, it has initially increased energy prices. The consumer goods manufacturing industry, which often relies on energy-intensive processes, may face higher costs as a result.
- Regulatory Compliance: Germany has stringent regulations regarding labour standards, environmental protection, and product safety. Compliance with these regulations can entail additional costs for manufacturers. Ensuring compliance may require investment in technology, training, and monitoring systems.
- Infrastructure and Logistics: Germany's well-developed infrastructure and logistics networks are generally an advantage for manufacturers. However, expanding or maintaining these networks incurs costs. Transportation, warehousing, and distribution expenses are significant factors to consider, especially for companies operating in remote areas.

2. Benefits:

- Skilled Workforce: Germany is known for its highly skilled and well-educated workforce. The consumer goods manufacturing industry can benefit from access to a pool of qualified professionals, fostering innovation, productivity, and quality.
- Strong Supply Chain: Germany's strong supply chain networks enable efficient sourcing of raw materials, components, and machinery. This contributes to reduced lead times, better inventory management, and overall cost optimization.
- Innovation and Research: Germany has a robust research and development (R&D) ecosystem, including public institutions, universities, and private companies. The consumer goods manufacturing industry can leverage this ecosystem to drive innovation, develop new products, and improve manufacturing processes.
- Export Opportunities: Germany is a major exporter of consumer goods, with a reputation for high-quality products. The country's central location within Europe, along with its trade

agreements, provides access to a large consumer market. Exporting goods can generate revenue and expand market reach for manufacturers.

- Strong Domestic Market: Germany has a large and affluent domestic market with high purchasing power. This creates opportunities for consumer goods manufacturers to cater to the domestic demand, ensuring a stable customer base.

Overall, the consumer goods manufacturing industry in Germany faces various costs and benefits. While labour costs, energy costs, and regulatory compliance pose challenges, the presence of a skilled workforce, strong supply chains, innovation opportunities, export potential, and a robust domestic market provide significant advantages.

3.2.3. GREECE:

1. Costs:

- Labour Costs: Greece has a relatively low minimum wage if compared to some other European countries, which can impact positively labour costs for manufacturers. However, social security contributions and other benefits need to be added to the overall labour expenses.
- Energy Costs: The cost of energy, including electricity and natural gas, can be a significant expense for manufacturers. Greece's energy costs are quite higher than the European average[2], which can be a disadvantage to the profitability of consumer goods manufacturing.
- Raw Material Costs: Greece is highly dependent on external sources for raw and processed materials used in the manufacturing sector. The prices of raw materials, such as metals, plastics, and textiles, can fluctuate based on global market conditions and manufacturers, large and small, need to consider these costs while analysing profitability. Furthermore, Greece is yet to develop a strong manufacturing profile beyond textiles and food.
- Regulatory Compliance: Consumer goods manufacturers must comply with various regulations and standards related to safety, environmental protection, and product quality. Meeting these requirements often involves additional costs for implementing processes, testing, and obtaining certifications.
- Transportation and Logistics: Greece's geographical location may present challenges in terms of transportation costs, especially for exporting goods to international markets. Companies may incur higher expenses for logistics, shipping, and distribution.

2. Benefits:

- Skilled Workforce: Greece has a well-educated workforce with skills in engineering, technology, and design. This talent pool can provide manufacturers with a competitive advantage in producing high-quality consumer goods.
- Strategic Location: Greece serves as a gateway to both European and Mediterranean markets, making it an attractive base for manufacturers looking to expand their reach. Access to these markets can lead to increased sales opportunities.
- Tourism Potential: Greece's popularity as a tourist destination presents opportunities for consumer goods manufacturers. Tourists are exposed to novel products and this openness to novelty might help Greek produced goods to gain visibility beyond its borders, which can drive demand and boost sales in the long run.

[2] *https://greekreporter.com/2023/01/04/electricity-greece-most-expensive-europe/; https://www.euronews.com/next/2023/03/29/energy-crisis-in-europe-which-countries-have-the-cheapest-and-most-expensive-electricity-a*

- EU Membership: As a member of the European Union (EU), Greece benefits from access to the EU's single market. This facilitates trade and provides opportunities for manufacturers to export their goods to other EU countries without significant trade barriers.
- Government Incentives: The Greek government may provide incentives, such as tax breaks, grants, and subsidies, to attract and support manufacturing companies. These incentives can help offset some of the operational costs and improve the industry's viability.

It is important to note that the specific costs and benefits will vary depending on the sub-sector within consumer goods manufacturing (e.g., textiles, electronics, food and beverages) and individual company circumstances.

3.2.4. ITALY:

1. Costs:

- Labour Costs: While Italy has a skilled workforce, it also has average labour costs compared to some other European countries. This can impact positively the overall cost structure of manufacturing operations, potentially reducing profit margins.
- Regulatory Environment: Italy has regulations and compliance requirements related to labour, environmental standards, and product safety. While these regulations aim to protect consumers and workers, they can add compliance costs and administrative burden to manufacturers.
- Energy Costs: Italy has higher energy costs compared to European average, which can impact the cost of manufacturing operations. Consumer goods manufacturing requires significant energy inputs, so this can be an important consideration in the product and market prices.
- Competition: The consumer goods manufacturing industry in Italy faces competition from both domestic and international manufacturers. This can exert pressure on prices and profit margins, potentially affecting the overall profitability of businesses.

2. Benefits:

- Market Demand: Italy has a significant domestic market for consumer goods, with a large population and a high standard of living. This provides opportunities for consumer goods manufacturers to cater to a large customer base.
- Export Potential: Italy has a strong reputation for manufacturing high-quality consumer goods, such as fashion, luxury items, furniture, and food products. This can lead to export opportunities and access to international markets, enhancing revenue potential.
- Skilled Workforce: Italy has a skilled labour force, particularly in sectors like design, craftsmanship, and engineering, which are important for consumer goods manufacturing. Skilled workers contribute to product quality and innovation, providing a competitive advantage.
- Infrastructure: Italy has well-developed transportation networks, including ports and roadways, which facilitate the movement of goods within the country and for exports. This helps in reducing logistical costs and improving market access.

Additional Factors:

- Innovation and R&D: Investment in research and development (R&D) can lead to product innovation, improved efficiency, and cost reduction in the long run. Considering R&D costs and potential benefits should be highly considered as an impacting factor for the Italian manufacturing sector.

- Sustainability and ESG Factors: Increasingly, consumers and investors are prioritizing sustainability and environmental, social, and governance (ESG) factors. Integrating sustainable practices can contribute to long-term competitiveness and brand reputation.
- Economic Outlook: Assessing the overall economic conditions and market trends in Italy, including factors such as GDP growth, consumer spending patterns, and inflation rates, can provide insights into the future prospects of the consumer goods manufacturing industry.
- Trade Agreements and Tariffs: It is essential to consider the impact of any trade agreements or tariffs on the consumer goods industry in Italy, as these can affect the cost of imports and exports, market access, and competitiveness.

3.2.5. SPAIN:

1. Costs:

- Labour Costs: The cost of labour in Spain is relatively high compared to some other countries. While this may increase production costs, it also implies a skilled workforce, which can contribute to higher product quality and innovation.
- Materials: The availability and cost of materials required for manufacturing consumer goods can significantly impact production costs. Depending on the specific products being manufactured, Spain may import certain raw materials, which can affect overall costs. However, among Spain 10 top exports are electrical machinery, equipment; plastics and plastic article, iron and steel, all which also feed into and from the manufacturing industry. This can be an asset in the production of consumer goods and impact domestic and export prices positively.
- Energy Costs: Energy costs play a crucial role in manufacturing operations. Spain has been investing in renewable energy sources, which may contribute to more stable and competitive energy prices. However, the overall cost of energy, which tends to be lower than the European average, can still vary depending on market conditions and government policies.
- Infrastructure: Adequate transportation, logistics, and telecommunications infrastructure are essential for efficient manufacturing operations. Overall Spain has a well-developed infrastructure network, but specific regions may have variations in terms of accessibility and costs.

2. Benefits:

- Market Access: Spain is part of the European Union (EU), providing manufacturers with access to a large consumer market within the EU and the possibility of participating in trade agreements negotiated by the bloc. This can offer significant growth opportunities for consumer goods manufacturers.
- Skilled Workforce: Spain has a well-educated workforce with expertise in various fields. Skilled workers can contribute to the development and manufacturing of high-quality consumer goods, leading to improved competitiveness and customer satisfaction.
- Proximity to Suppliers and Markets: Spain's geographic location offers proximity to both European and African markets, which can be advantageous for exporting goods. It reduces transportation costs and allows for faster response times to customer demands.
- Tourism and Domestic Consumption: Spain is a popular tourist destination, attracting millions of visitors each year. This boosts the demand for consumer goods, particularly in sectors like hospitality and retail. Additionally, domestic consumption by the Spanish population contributes to the overall market potential.

- Supportive Business Environment: Spain offers various incentives and support programs for businesses, including tax benefits, grants, and R&D funding. These initiatives aim to encourage investment, innovation, and job creation, benefiting the consumer goods manufacturing industry.

Factors such as market competition, product differentiation, regulatory environment, and technological advancements should be examined in-depth to obtain a comprehensive analysis of the consumer goods manufacturing industry in Spain.

3.3. Joint Perspectives

Due to recent rise in energy prices, energy costs need to be carefully considered as part of incurring costs. Makerspaces and fablabs, due to their energy dependency, should consider ways of retrofitting their spaces, using their own technology expertise to promote modes of generating, if not all, at least some of the energy they need to run their spaces. One way is looking at creative solutions for taking advantage of the heat released by the machines to be converted into a resource for their own consumption; also collaborating across the cMDF federations to generate solutions that can advance such adaptations. An industrial symbiosis or by-product synergy approach could be from interest here.

It became clear from the BM's workshops results that there are good synergies across the partners, which can promote a long-term collaboration and contribution to the iPRODUCE platform. However, the collaborations need to be consolidated, so the services defining the main value propositions of the business models can be offered and benefit from the cross-disciplinary expertise of the involved partners. In this sense, a broader analysis of the ecosystems where iPRODUCE will operate can provide valuable insights into how the platform and the cMDFs can best position their products and services and gain traction for a long-lasting and successful exploitation. A PESTEL analysis (Shatskaya et al., 2016) suits this purpose by providing a structured overview of six relevant elements of these ecosystems, namely **P**olitical, **E**conomic, **S**ocio-cultural, **T**echnological, **E**nvironment and **L**egal and how they can – and most likely will – influence iPRODUCE's operation, longevity, and success. The PESTEL analysis carried out for the iPRODUCE business models is grounded on four macro and highly impactful phenomena, namely, ongoing armed conflicts, global shifts in geopolitical dynamics, the COVID19 crisis and the climate crisis. The macro analysis is complemented and refined by regional and local perspectives on the iPRODUCE case.

Political: The current political scenario in Europe and worldwide experiences uncertainty and tension due to the four phenomena mentioned above. For instance, the emergence of new markets - such as China - leads to changes in power dynamics, in political influence and in socio-cultural paradigms (Grant & Barysch, 2008). The ever-changing geopolitical scenario affects supply chains and commerce flows among nations, requiring businesses to adapt to new supply and demand markets (Maihold, 2022). This offers both threats and opportunities to iPRODUCE. For instance, there can be disruptions to the supply of materials as well as increased demand for local fabrication and product design services that were once provided from afar. Furthermore, the COVID19 crisis shed light onto the need to develop resilient systems of provision that can help local and regional communities to better endure such shocks. Furthermore, the climate crisis touches upon every aspect of human life on Earth, making political decision and action a necessary element for counteracting Earth systems' collapse and creating conditions for climate adaptation (Dolšak & Prakash, 2018; Lehmann, 2016; Selin & VanDeveer, 2015). iPRODUCE offers a robust toolkit and creates opportunities for industries, innovators, entrepreneurs, and societies to develop solutions catered to their local and regional challenges. An opportunity that arises could be the movement of political actors, who may take advantage of this scenario to promote

the development of local and regional industries and economies. Such development could aid in lowering the dependence on global and large-scale supply chains, increasing agency on local levels and improving systems resilience (Folke et al., 2010; Novak et al., 2021; Wieland, 2021). In this scenario, European countries and regions will be better equipped to endure and bounce back from economic, political and sanitary shocks.

Economic: Just as the political scenario, the European and world economic dynamics are heavily impacted by the above-mentioned four macro phenomena. Capital flows are impacted by such shocks. For instance, COVID19 caused capital outflows from low- and middle-income countries and inflows to well-regulated financial systems and established industries and regions (OECD, 2020). Additionally, the COVID19 pandemic and the risks posed by climate change shed light onto the frailties and risks inherent to resource-intensive global systems of provisions (Berchin et al., 2017; Zakeri et al., 2022). On the other hand, ongoing armed conflicts have unleashed an energy crisis in Europe with a domino effect on international governance and politics as well as on businesses who now struggle (even more) to survive due to higher production and maintenance costs that cannot be easily transferred to the customer (*Energy Prices: Businesses "struggling to Survive" as Bills Rise - BBC News*, 2022; Zakeri et al., 2022). The current economic scenario is then a puzzle of counterbalancing elements. While there are expectations that the learnings from the pandemic may nudge political and economic movements towards local and region strengthening and resilience - one example is the Recovery plan for Europe (Amanatidis, 2022) - there are cultural, informational and technological barriers to implementing more sustainable economies and systems of provision (Foxon, 2014; Milbrath, 1995). In this scenario, iPRODUCE can take advantage of the already-established partners' networks to gain traction and stability while being alert for market opportunities and partnerships that may arise. In the case of nurturing political and economic conditions for increased local production and (user-driven) innovation, iPRODUCE benefits from its federated business model, its technical expertise and adaptability, which make it scalable by design and technically relevant for local and regional economic development.

Socio-cultural: As reported on D2.4 and D7.1, there is a growing socio-cultural movement towards prosumerism and user-driven/user-led innovation. This movement is accompanied by the corresponding methods, tools and technological advancements (Eckhardt et al., 2019; Halassi et al., 2019; Kotler, 1986). In addition, consumers and societies at large are increasingly becoming aware of sustainability issues and engaging in sustainable practices that can positively impact their communities and the environment (Deloitte, 2022). iPRODUCE is designed to support and boost the movement by offering a platform for exchange, collaboration and open innovation that benefits from a robust set of tools and methods as well as expertise in various industries and processes. Yet, this socio-cultural movement operates on a niche level, while the average European citizen is still drawn to a consumption culture based on linear systems and immediate and ephemeral fulfilment. As the paradigm shifts to more sustainable consumption and production patterns - which is currently being supported by EU policy (Amanatidis, 2022) - several market opportunities that fit the iPRODUCE model and offerings may arise. In this scenario, and as mentioned in the economic section above, iPRODUCE is scale-ready, which grants it a competitive advantage to occupy novel market spaces and grow.

Technological: Together with a solid knowledge base, technological advances are the basis and enablers of iPRODUCE. The speed and sophistication with which this development takes place in unparalleled in history. Opposite from the uncertainties reported in the economic and political sections above, there is robust evidence that new technologies will continue to be developed and penetrate the markets at ever-increasing paces (Roser et al., 2022). This presents opportunities for iPRODUCE by allowing for new production methods and materials, new innovative outputs and opening more room for

creativity and innovation. On the other hand, the tsunami-like development of new technologies requires the iPRODUCE partners to keep up with a fast-paced development process and to possibly invest on infrastructure, which can be costly. To do so, specialized and dedicated personnel as well as effective investment planning are required.

Environment: Humanity is at the brink of disrupting Earth-systems and consequently the life-supporting ecosystem services that enable modern societies' lifestyles and systems of provision (Steffen et al., 2015). Since the publication of the Brundtland report in 1987 (United Nations, 1987), businesses slowly but steadily learned that adopting sustainable practices can lead to competitive advantage, improve financial performance and mitigate risks that may threaten their own existence in the medium and long terms (Friede et al., 2015; Whelan et al., 2021). Furthermore, individuals became more aware and active regarding sustainability (Deloitte, 2022). In this scenario, iPRODUCE offers the market a full range of tools and methods to support business sustainability transition through support in the innovation process - from idea to prototyping and production. The opportunities for reusing and recycling within iPRODUCE are also a valuable opportunity for promoting circularity in substitution to linear and waste-rich systems. Local production and sourcing through iPRODUCE may also contribute to lowering GHG emissions related to supply systems - which are especially heavy in global supply chains (Burchardt et al., 2021). In short, the environmental crisis offers opportunities for iPRODUCE to partner with businesses and individuals for developing products and solutions that can help tackle climate change and other environmental problems. It is important, however, to highlight that these opportunities are latent and not yet fully explored nor anchored in the iPRODUCE DNA. Strategies to root sustainable principles and practices into iPRODUCE are – but are not bound to – designing supply and production processes, governance systems and decision-making guidelines that take environmental sustainability into account.

Legal: The legal aspects of iPRODUCE are twofold: (1) local and country-specific regulations and (2) EU binding prescriptions. Because the iPRODUCE partners have expertise in their own regions and industries' legal affairs, this analysis will focus on one macro legal aspect that can impact the platform and the federated network, namely, environmental regulation. The EU is strongly invested in creating policies and regulations to ensure that European businesses and consumers move towards more sustainable practices. With binding and highly impacting legal instruments such as the recently published EU taxonomy and the corporate sustainability reporting directive (CSRD), as well as more established measures in the realms of pollution, human and labour rights, and agriculture (Amanatidis, 2022). Entrepreneurs and SMEs as well as larger businesses are more than ever required to innovate in their production processes to ensure transparency, compliance and traceability. While this brings opportunities to iPRODUCE, it requires the federated network to not only work towards compliance for its own processes, but also to continuously adapt its services and products to cater for the businesses nested within this ever-changing legal setting.

4. iPRODUCE Federation & Platform Governance Model

In D7.2, we performed a detailed analysis of D3.1 – Lean Operational Model for cMDFs' Federations and identified three main contributions to iPRODUCE business models, namely, the Governance Model, the Lean Operational Model, and the Implementation Roadmap of the iPRODUCE Federation. Among these three, the Governance Model is particularly relevant to the iPRODUCE BM, as the coherence and compatibility between them is paramount for enabling smooth service provision. Therefore, we resume the analysis performed in D7.2 to finalize the development of the iPRODUCE Governance Model considering the iPRODUCE Business Model presented in Section 3.2.2.2.

As reported on D3.1, the cMDFs considered three types of **Governance Models for the iPRODUCE Federated Network during the project**, namely a centralized model, a decentralised model, and a hybrid model (See D3.1 for more details). Upon careful evaluation of the advantages and disadvantages of adopting each of the three models, the cMDFs unanimously voted for the adoption of a hybrid model. To confirm if the hybrid model still stands as an optimal configuration for iPRODUCE post-project, we looked to answer two questions:

1. Has the iPRODUCE Federated Network suffered any significant changes since M24 – which is D3.1's submission date, which would justify the development of a new governance model?
2. Have we observed any indication of uncertainty about or opposition to the hybrid model throughout the second round of BM workshops?

Upon careful evaluation of the developments that took place in iPRODUCE since M24, especially those during the second round of workshops, we could not find indication that the hybrid model has become obsolete or unfit for the iPRODUCE Federated Network.

4.1. Project and Platform Governance Model

It is important to highlight that the Federated Network and the iPRODUCE Platform are not the same. While the Federated Network refers to the collection of actors/partners that execute and run iPRODUCE network, the platform is the technological enabler of iPRODUCE, functioning as the backbone of the Federated Network. What is more, the platform is a complex entity by nature, given its wide variety of tools, technologies, developers, users, and purposes. Therefore, defining governing terms for the iPRODUCE platform becomes as important to the exploitation of iPRODUCE as the Governance of the Federated Network.

A Governance Model for the iPRODUCE platform was co-developed by all the cMDF partners. To this end, a set of three different models were pre-selected as starting point for the development of the platform's governance model, namely, centralised, distributed and individualised models. They describe single and shared responsibilities, how to share information among project partners and the organization structure to be followed.

4.2. Platform Governance Model

As the iPRODUCE platform is an IT platform with initially a non-profit profile, it is recommended that the governance framework allows for a collaborative process, however characterized by specific aspects related to the integration and responsibilities in the platform. To better define the responsibilities, forms of representation, procedures and basic partnership regulations.

All the pre-selected governance models (appendix 1) cover distinct aspects of the platform, such as:

- Regulation
- Representation
- Procedures
- Responsibilities

4.3. Choice of platform's governance model

The wide and clear differences among the pre-selected models are intentional, as to spark deep analyses across the spectrum of arrangements and configurations, thus laying the grounds for the creation of a tailored governance model for the iPRODUCE Platform.

As expected, a preliminary assessment by the project's coordination indicated that none of the pre-selected models was suitable for the iPRODUCE platform, but instead, a mix-and-match of their elements would be more appropriate. Based on discussions with the team coordination, a fourth option was created as follows:

4.3.1. Hybrid Governance Model

Regulation: Regulation will be governed by a contract signed by cMDF partners stipulating the terms of their agreement. Each cMDF elects one representative a year to serve on the governing board.

Representation: The cMDFs (currently composed of core group and founding members) will be presented as a joint federation to external parties, however, members have the power to change this constellation to adapt to future challenges or the needs of the members. Additionally, external firms may contact cMDF member firms independently through the matchmaking tool. In this event, the member firms agree to preference work with their federation partners. External firms may also contact the cMDF though the through the representatives. A preference mechanism will be implemented through the platform interface to organize this type of engagement.

Procedures: Platform representatives will meet once a year. The cMDFs will hold annual local meetings to elect their representative to the platform. The cMDFs will hold regular local meetings to discuss upcoming opportunities on a need-based schedule set by the local participants.

Responsibilities: The primary responsibilities of platform governance are 1) to keep the local cMDF partners updated about ongoing and upcoming opportunities arising from the platform 2) inform cMDF partners about platform updates and status 3) keep contact information on the platform updated 4) remove information/products that are no longer viable 4) assist clients with uploading their products to the platform. Each member firm is responsible for keeping their contact information updated and for removing their information or product offerings that are no longer viable.

4.3.2. Choice of iPRODUCE platform's governance model

The four models (appendix 1) were presented to the partners in a general (online) meeting on March 24, 2023, with participants of all cMDFs. This was followed by a Q&A session to fill possible gaps in the presentation of concepts and structures, and to ensure ample understanding of the models. A few changes were made to small but key elements of the proposed model. They are highlighted in blue in Figure 20.

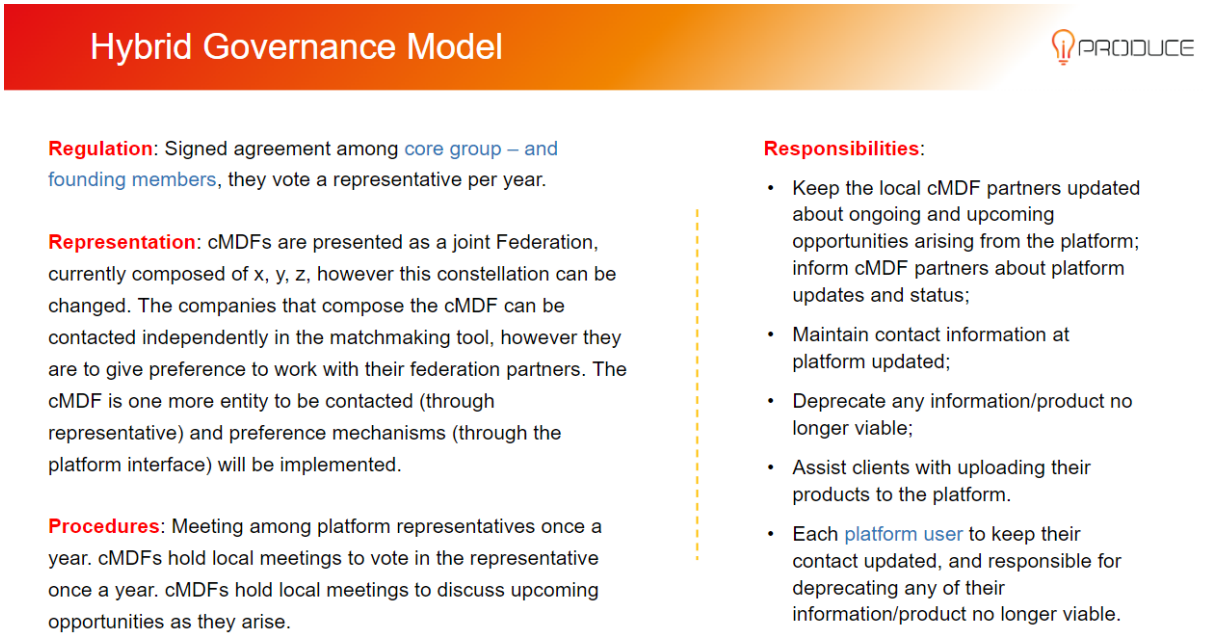

Figure 20. Reviewed Governance Hybrid Model

Following the meeting, all partners received the minutes via e-mail and were given a week to discuss the proposed Hybrid Governance Model internally. An online voting system was set up and made available to all iPRODUCE partners. A total of eleven votes were recorded: eight approvals and three disapprovals. Those voting no raised important questions about the governance model committing their firms to allocate undefined future resources. To remain agile in the face of future changes, participants retain the procedural power to amend and adapt the business model through the established form of platform governance.

Considering the approval by a strong majority and that the issues raised by the disapproving voters have been addressed as informed above, the Hybrid Governance Model as described in Figure 20 will govern the iPRODUCE Platform post-project.

5. Recommendations and outlook

This section contains an assessment of the progress and fulfilment of the recommendations presented in D7.2, a list of further recommendations, and an outlook for the exploitation of iPRODUCE.

5.1. Recommendations from D7.2

Seven key recommendations for the further development of the iPRODUCE business were presented in D7.2. Here we recap those recommendations and assess their fulfilment, as well as make new recommendations as needed.

The key recommendations are summarized below and accompanied by a brief explanation of their status.

1. Creation of an iPRODUCE Business Model that defines a high-level cross-contextual uniform business while also allowing for flexibility to suit the cMDFs specificities, ensuring focus on consumer driven design and production;
2. Celebration of agreements defining the responsibilities and work distribution among partners;
3. Setup of collaborations with a corresponding service portfolio to optimally harness business opportunities;
4. Further development of a network coupled with the definition of a marketing strategy to make iPRODUCE and its services more broadly known;
5. Development of a monetization structure (cooperative, freemium, etc.) accompanied by financial recommendations for each cMDF.

The status of implementation of the five recommendations are presented below:

Regarding the first recommendation, the iPRODUCE BM is finalised and presented in Section 3.2.2.2. It was created to align with the iPRODUCE platform's structure and functionalities and complements the cMDF's BMs. Flexibility lies in the core of the platform, as its main service proposition refers to on demand use/customer-driven product development with ample cross-industry suitability and geographical reach.

The Governance Model presented in Section **Error! Reference source not found.** establishes rules and frameworks for collaboration that function as agreements for the exploitation of the Federated Network and the tools within iPRODUCE. This arrangement is a solid starting point for the further celebration of agreements (item II)

Recommendations 3, 4 and 5 have been met through the development of the Business Models and the support services performed within Task 9.3. Together, these activities polished the portfolio by validating the Use Cases and preparing the business package (e.g., communication strategy, target group, and promotion) for launching the services and products into the market.

5.2. Recommendations for cMDFs & iPRODUCE exploitation

The second round of workshops was successful in polishing the cMDF's BMs to create fitted models for each cluster, as explained in detail in Section 3. As a result, the ample similarities that were present in D7.2 gave room to differentiation and focused BM elements among cMDFs. One example is the

narrowed focus of the German and Greek cMDFs on channels and stakeholders of the mobility and medical industries respectively. This is proof that the cMDFs have become more mature and have better seeded their offerings and purpose into their individualised ethos along the project. Yet, iPRODUCE is a Federated Network that requires collaboration among cMDFs to operate successfully. The setup of the iPRODUCE Business Model is an appropriate mechanism to facilitate such collaboration, ensuring the required flexibility and allowing for perceived joint benefits such as community building and resource efficiency. The importance of collaboration post-project breeds the first and a main recommendation, namely, the need to maintain strong bonds among cMDFs to ensure that the exploitation phase delivers on the potential competitive advantages of iPRODUCE.

A second recommendation refers to the sustainability potential of iPRODUCE. Currently, sustainability is an existing value of iPRODUCE. Yet, the anchoring of sustainable practices differs across cMDFs. This means that there are latent sustainability opportunities to be explored within the Federated Network and towards the service offerings. As explained in the PESTEL analysis (see Section 3.3), sustainability is an ever-increasing societal demand that is gradually becoming part of policies on national and EU levels. iPRODUCE detains a real competitive advantage for a successful market penetration given that its model and services are ready to meet such demands. Therefore, we recommend that the cMDFs seek to align their sustainability positioning in the market and to integrate sustainability into the service offerings and in new service designs. Areas of special interest in iPRODUCE refer to product design (e.g., circular design, lifecycle assessment), material sourcing (e.g., certified materials, local sourcing, reuse of materials), and rounded after-sales (e.g., durability, eliminate programmed obsolescence, ensure fixability).

A third – and more practical but equally important – recommendation resides in the need to celebrate agreements among partners and cMDFs for the sustainability of the federated model. Although this has been started with the definition of the Governance Model (Section **Error! Reference source not found.**), a legal instrument may offer even more security in the exploitation phase, defining rights and obligations, and ensuring their fulfilment.

Lastly, the definition of management routines and processes for iPRODUCE post-project is crucial for the smooth operation of the Federated Network. For instance, the definition of election dates, organization of board meetings, assignment of responsibilities (e.g., internal communication, secretariat, documentation, platform content management, customer feedback triage and assessment) and other administrative tasks.

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7. Appendix 1

iPRODUCE Governance Models to be assessed by cMDFs

To create a cohesive experience in how to best proceed with the maintenance and support of the iPRODUCE platform among the many project partners, beyond project completion, we have suggested three possible approaches to be voted by the partners. Each approach represents possible ways of exercising the managing and maintenance of the platform.

The platform governance describes single and shared responsibilities, how to share information among project partners and the organization structure to be followed. As the iPRODUCE platform is an IT platform with a non-profit profile, we suggest a governance framework allowing for a collaborative process, however characterized by specific aspects related to the integration and responsibilities in the platform. To better define the responsibilities, forms of representation, procedures and basic partnership regulations, we suggest a set of novel governance models: centralised, distributed or individualized.

All three suggested governance models cover distinct aspects of the platform, such as:

- Regulation
- Representation
- Procedures
- Responsibilities

a. Centralised

Regulation: Signed agreement among cMDF partners, they vote a representative per year.

Representation: Platform displays cMDFs as a Federation, with only one representative from each cMDF being the key contact person and responsible for the communication and support for their own developed tools.

Procedures: Meeting among platform **representatives** once a year. cMDFs hold local meetings to vote in the representative once a year. cMDFs hold local meetings to discuss upcoming opportunities as they arise.

Responsibilities: Keep the local cMDF partners updated about on-going and upcoming opportunities arising from the platform; inform cMDF partners about platform updates and status; maintain contact information at platform updated; deprecate any information/product no longer viable; assist clients with uploading their products to the platform.

b. Distributed

Regulation: Signed agreement among cMDF partners

Representation: cMDFs are presented as a joint Federation, currently composed of x, y, z, however this constellation can be changed. The companies that compose the cMDF can be contacted independently in the matchmaking tool, however they are to give preference to work with their federation partners.

Procedures: Meeting with platform lead once a year. cMDFs hold local meetings to discuss upcoming opportunities as they arise.

Responsibilities: Each company to keep their contact updated, platform lead to keep all partners informed about platform updates and status; each company responsible for deprecating any of their information/product no longer viable;

c. Individualised

Regulation: No signed agreement.

Representation: The cMDFs' companies are displayed independently and each will have their own contact information.

Procedures: Meeting with platform lead once a year. cMDFs might or might not hold local meetings to discuss upcoming opportunities as they arise.

Responsibilities: Each company to keep their contact updated, platform lead to keep all partners informed about platform updates and status; each company responsible for deprecating any of their information/product no longer viable;

d. Hybrid

Regulation: Signed agreement among cMDF partners, they vote a representative per year.

Representation: cMDFs are presented as a joint Federation, currently composed of x, y, z, however this constellation can be changed. The companies that compose the cMDF can be contacted independently in the matchmaking tool, however they are to give preference to work with their federation partners. The cMDF is one more entity to be contacted (through representative) and preference mechanisms (through the platform interface) will be implemented.

Procedures: Meeting among platform **representatives** once a year. cMDFs hold local meetings to vote in the representative once a year. cMDFs hold local meetings to discuss upcoming opportunities as they arise.

Responsibilities: Keep the local cMDF partners updated about on-going and upcoming opportunities arising from the platform; inform cMDF partners about platform updates and status; maintain contact information at platform updated; deprecate any information/product no longer viable; assist clients with uploading their products to the platform. Each company to keep their contact updated, and responsible for deprecating any of their information/product no longer viable.

PRODUCE

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