D10.9 iPRODUCE Sustainability and Exploitation Plan

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Abstract	This deliverable is the first version of the Sustainability and Exploitation Plan of the iPRODUCE project. It summarizes the potential exploitable project results and qualifies the Key Exploitable Results (KERs). A preliminary analysis is done for each KER, along with the associated Intellectual Property Rights (IPRs)

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Executive Summary

This deliverable is the first version of the Sustainability and Exploitation Plan of the iPRODUCE project. It describes the methodology and the main ideas used in this Plan and moves on to identify and collect all potential exploitable results derived in the project. The exploitable results are then linked to the activities in the project and are categorized in terms of their technology readiness level. The ones with the highest market potential are qualified and further examined with respect to the existing competition and market trends. The IPRs linked to each of the qualified exploitable results (identified as KERs) are examined and summarized in the IPR registry.

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List of Acronyms

CA	Consortium Agreement
cMDF	Collaborative Manufacturing Demonstration Facilities
DIY	Do-It-Yourself
DMP	Data Management Plan
DoW/A	Description of Work/Action
GDP	Generative Design Platform
PC	Project Coordinator
SC	Steering Committee
IEM	Innovation & Exploitation Manager
GA	Grand Agreement
BPMN	Business Process Modelling Notation
ERP	Enterprise Resources Planning
IPR	Intellectual Property Rights
IR	Innovation Results
KER	Key Exploitable Result
NLP	Natural Language Processing
TRL	Technology Readiness Level
PaaS	Platform as a Service
SaaS	Software as a Service
SEP	Sustainability and Exploitation Plan
STEM	Science Technology Engineering Mathematics

1 Introduction

1.1 Purpose of the Document and link to relevant material

This document is the first version of the Sustainability and Exploitation plan and describes the methodology which will be used for the collection and the analysis of the exploitable results reached within the project. A systematic approach is followed for the collection and analysis of the results reached until the delivery date of the report (M18), as well as for those expected to be reached in the project's duration. This analysis will be used in the following months to (a) ensure that the intended audience has been reached by the project's activities and (b) create a guide for the further analysis and qualification of the results as they become more mature.

The contents of this deliverable are linked to the several project activities, beyond the technical scope, which:

- Conduct the analysis of the context for the results reached in the project (T7.1 Analysis of Market Trends and Practices)
- Develop the Business Models for the implementation and growth of cMDFs (T7.2)
- Analyse and stimulate the Ecosystem around the cMDFs (T6.1), including the identification and engagement of the stakeholders
- Engagement of 'early adopters' (T6.3 Ambassador Programme for early adapters), that is engagement of the core users who will formulate the critical mass for further take-up

These tasks act complementary, not only to the technical development, but also to the identification of the stakeholders (along with their value and benefits, with respect to the offerings of the iPRODUCE project), as well as the identification of the exploitation paths, which may be formed by the interaction with the individual end-users. The outcomes from these activities are continuously monitored as they are formulated and will be used complementary to the activities reported in this deliverable.

The results from the relevant activities can be found in these deliverables (produced by the iPRODUCE in parallel to this report):

- D7.1: Analysis of Market Trends and Practices (M18)
- D7.2: Business Models and case development for iPRODUCE cMFDs (M24) – D7.3 (M36)
- D6.1: Engagement and Ecosystem establishment review (M18) – D6.2 (M36)
- D6.5: Ambassador programme for early adapters (M36)

2 Methodology

This chapter presents the approach that was adopted to develop the Sustainability and Exploitation Plan (SEP) that will be used by all partners throughout the IPRODUCE project. IPRODUCE SEP is based on the principles of "Guideline for Innovation Management'' introduced by the European Committee for Standardization/Technical Specification (CEN/TS 16555-1) [1]. This standard provides guidance on establishing and maintaining an Exploitation Management System (IMS) that can be applied to all public and private organizations regardless of their sector, type or size. According to the CEN/TS 16555-1, the SEP is composed by **key elements** (Figure 1) that are summarized below:

- Understanding the context (Section 2.1);
- Identifying and fostering innovation enablers/driving factors (Section 2.2);
- Evaluating and improving the performance of the SEP (Section 2.3);

Considering that the standard is mainly conceived for structured small-medium organisations, some adjustments are made to exploit this specification within the concept of IPRODUCE project (e.g. in terms of leadership, roles and responsibilities that can differ from those usually foreseen for a company).

Therefore, starting from the general SEP key elements presented in detail in this chapter, the next chapters describe the adjusted plan for the scope of the iPRODUCE project.
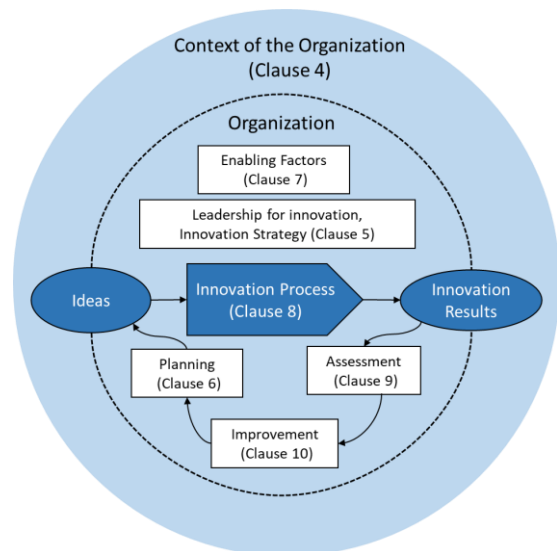
Figure 1 Key elements of the Innovation Management System as described in CEN/TS-1655-15

2.1 Understanding the context

Firstly, a clear understanding of the context should be reached by determining the key internal and external issues relevant to the SEP and the related potential boundaries within which the project will be expected to operate. In more details,

- The **internal issues** consist of all the internal practices used to manage and potentially take up innovation (if any), the main cultural aspects (such as the attitude towards innovation) and the capability aspects within the partner stakeholders.
- The **external issues** consist of several aspects (market, technical, political, economic, and social) that represent some of the main topics that should be regularly taken into consideration in the analysis and influence the market potential and positioning of the project innovations and results.

Moreover, the interested parties should be defined and consulted to identify their needs and expectations. In our analysis, we use the distinction of interested partners to internal and external stakeholders, where:

- **Internal stakeholders** are the main organisation members, while
- **External stakeholders** are considered suppliers, distributors, customers (potential end-users of the developed solutions) and/or public authorities.

As an "Innovation Action", IPRODUCE project has a strong focus on the innovation aspect. The project aims to upscale concepts from the maker community (DIY manufacturing, fablabs & makerspaces) through innovative technology solutions and make them available to multi-stakeholder ecosystems, called collaborative Manufacturing Demonstration Facilities (cMDFs). Both the nature and objective of IPRODUCE are two main drivers to understand its context, i.e. the main internal and external issues and the stakeholders that are mainly impacted by the project success.

Concerning the internal issues of IPRODUCE project (as were defined above), a task dedicated to the innovation management has been foreseen in IPRODUCE work plan. In particular, Task 10.6 "Exploitation Strategy Plan and Activities" of WP10 "Impact Creation" deals with the potential exploitation paths for the project's results. It works in parallel to the activities of WP7 ("Sharing Economy Business Models and Execution Tools") and in particular with the development of Business Model cases and the analysis of Market trends and practices. The coordination with these tasks provides the partners with the knowledge of the competition already in place, the main customer needs and pains. The results of the analysis in these tasks has been used by individual partners to identify their value proposition and drive their tools towards specific customer pains. The results of this analysis are summarized briefly in this Report under Section 3. Relevant to the exploitation activities, the 'Impact Creation' activities under WP10, such as Dissemination (T10.1-10.2) and Impact Activities – Awareness and Outreach (T10.5) have a direct relationship to the material presented in this report.

In addition, the internal stakeholders for the case of IPRODUCE project are mainly project members. IPRODUCE brings together a multidisciplinary team of 20 partners including companies that provide services in the production of consumer goods market sector, research institutions, universities, organizations, large IT enterprises, SMEs, and fablabs. These are driving the project implementation that is considered as input to the development of the innovations by the technical partners.

Moving to the external issues of IPRODUCE project, the main challenges and external conditions concerning the potential success of IPRODUCE innovation plan are mainly related to:

- Market, economic, commercial, or political aspects, such as:
  - o The cost of the IPRODUCE innovative solutions may not be low enough for widespread use.
  - o Competitors may provide alternative products before IPRODUCE solutions are introduced to the market.
  - o Financial crisis in some of the EU countries may be a bottleneck for the exploitation of innovative solutions provided by IPRODUCE project.
  - o Product adaptation strategies resulting from the policy framework at local, national or international level may have difficulties to be implemented.
- Technical aspects, such as:
  - o IPRODUCE solutions may fail in actual operating conditions.
  - o IPRODUCE resilience solutions may be applicable only in the context of the two pilots.
  - o Potential lack of simplicity and usability of the IPRODUCE proposed solutions and platform.

All these challenges are regularly taken into consideration by management, technical and exploitation activities of several tasks of the IPRODUCE project during its entire life, as described in the description of work (DoW).

The <u>external stakeholders</u> can assure that IPRODUCE technical solutions properly address all the end user requirements and they are able to increase the deployability and acceptance of the IPRODUCE solutions at national and/or EU level from the very beginning. Process and product innovation is the basis of the core business and the main driver for most of the consortium industrial partners.

2.2 Identifying and fostering innovation enablers/driving factors

Section 2.1 presented the assignments of the roles, the responsibilities of all partners (especially the responsibilities of the innovation and exploitation manager) and the operational planning of IPRODUCE project to meet all the innovation objectives. Apart from these driving factors there are some other key innovation enablers that should be covered by IPRODUCE project and summarized below:

- **Resources**. They are needed for the establishment, implementation, maintenance and continual improvement of the SEP (e.g. human resources, equipment, facilities and budgets);
- **Competences**. The resources working with innovation activities and the development of them should have the proper competences;
- **Awareness**. The importance of a realistic innovation should be understood by the resources working with innovation activities, by having clear the innovation vision and strategy together with the importance of their contribution to make the SEP more effective. A strong innovation culture could support this;
- **Communication**. Internal and external communication relevant to the SEP should be established taking into consideration aspects such as "what to communicate", "when", "to-" and "by whom", together with the provision of communication channels and the intended feedback;
- **Collaboration**. A defined policy for internal and external collaboration should be elaborated, so that ideas and knowledge can be shared across different persons, groups and units that will be encouraged to collaborate, develop ideas and share knowledge;
- **Strategic human resources**. The SEP should incorporate a strategic approach to human resources that should among others: (i) foster creativity, learning and dissemination of knowledge; (ii) encourage open interactions, trust, diversity and tolerance; (iii) allow persons' access to relevant information from management;
- **Intellectual property (IP) and knowledge management**. A policy should be outlined in order to regulate the produced innovation.

2.2.1 Resources and competences

All IPRODUCE partners are responsible to provide resources, expertise, competence and operational capacity to achieve the innovative objectives of the project. A detailed description of each partner, its key persons including the persons that are involved in the innovation management, resources (e.g. human resources, equipment, facilities and budgets) and competences (e.g. publications, relevant products, projects) is provided in the DoW. According to this description, it is evident that IPRODUCE partners will ensure the achievement of the innovation goals. In fact, the equilibrium between industrial and research partners, in conjunction with their demonstrated experience, will guarantee that the project will innovate and achieve all its objectives with high impact.

In addition, to guarantee the success of IPRODUCE innovation plan, the validation plan of IPRODUCE project (described in WP9) that will realize the pilot demonstrations in the local ecosystems has been

designed to be led by both development and industrial partners. In this sense, all the clusters that will be composed for each demo-site will include all the needed resources and competences and will provide a positive synergy among the partners of the consortium.

2.2.2 Communication, awareness and collaboration

Communication, awareness and collaboration concepts are intrinsically connected and tend to overlap; thus they are discussed together in this section. Communication, awareness and collaboration actions can be divided in two categories: the **internal** and the **external**. All these actions aim to maximise the knowledge-sharing and present the results of the innovation process within the consortium.

Concerning the internal actions, iPRODUCE possesses a well-defined structure (Figure 2) specially created to maintain a thorough communication and collaboration among the partners, with a scope also to increase the synergy to ensure the quality of the results. The main channel of the communication structure between the partners of the consortium is the Project Coordinator, who receives or prepares the information of different nature (reports, minutes, etc.) and is responsible to spread the information to the rest partners. This is achieved by different means, such as:

- Collaborative web based tools to facilitate the coordination between partners and the sharing of relevant information (Google Drive & Slack/ Skype are used in iPRODUCE).
- Regularly e-meetings/conference calls to keep the partners updated on the going status of WPs in order to monitor and share the progress and the quality of the project outputs.
- Workshops to align the developed work in IPRODUCE with stakeholders' interests and feedbacks (virtual workshops are currently implemented due to the COVID related restrictions).

Concerning the external actions, IPRODUCE promotes its innovation output through two distinct but complementary approaches:

- Dissemination and Communication Plan ('Content Marketing and Growth Hacking Playbook') as presented in D10.1 that is part of WP10 "Impact Creation". This deliverable describes the strategy and plan to drive content marketing, grow the project's target groups and communicate the project results. This goal is approached not just through a monolithic dissemination approach, but the project seeks also to find synergies with similar research activities, as well as the partners' networks. This action is realized in T10.3 Clustering and Cooperation with relevant initiatives – with the early results documented in D10.4 (Report on Cooperation Activities).
- Exploitation Plan The exploitation strategy and relevant activities of the IPRODUCE project are planned to be enhanced throughout the project lifetime, while its progress will be presented in this document, as well as the second version of this Deliverable - D10.10 iPRODUCE Sustainability and Exploitation Plan 2.
- In more detail, the exploitation plan has been fully aligned with IPRODUCE Business Models and case Development for cMDFs (T7.2), which proposes early business cases for each of the pilot ecosystems. Details on early alliances within the partners and with other organisations will be identified and described in the exploitation plan reports.

The overall structure of IPRODUCE will allow to reach key audience with the main messages to promote the innovation action and its results and to foster a continuous internal and external collaboration.

2.2.3 Intellectual Property (IP) and Knowledge Management

IPRODUCE results foresee a generation of new products and knowledge (e.g. software). Hence, specific measures should be applied by the partners to ensure the effective management of the Intellectual Property Rights (IPR) and the innovations that will result. For this reason, DoW addresses the concept of IPR and Knowledge Management. In general, IPRODUCE will adhere to three principal goals of IPR management: (i) fostering a focused project approach towards generating IPR as one of the main drivers of the project work, (ii) evaluating project results to identify opportunities for IPR protection, and (iii) avoiding premature disclosure, which could compromise the ability to secure patents.

First of all, the IP Management is also correlated to the Data Management Plan (DMP) that was presented in D1.5 "Data Management Plan". The DMP details the data that will be collected and generated, how this data needs to be handled, classified and stored to comply with data protection regulations and good practices, and which data can be shared or need to be protected/restricted. The DMP will evolve during the lifetime of the project and according to the status of the project reflections on data management and security.

Moreover, the IPRODUCE Consortium Agreement (CA), which has been based on the DESCA template, defines all IPR related issues and enhances the Consortium's capacity to exploit the results of the project. The purpose of the CA is to establish a legal framework for the project to provide clear regulations for issues within the consortium related to the work, IP-Ownership, Access Rights to Background and Results and any other matters of the consortium's interest. It will also allow partners, collectively and individually, to pursue market opportunities arising from the project's results. The following general rules will apply concerning the IPR management in IPRODUCE project:

• Pre-existing know-how will remain the property of the partner having brought it into the project.
• Pre-existing know-how will be made available, by their owners, as required for the implementation of the project needs. Usage outside the project will be decided among the owners and the potential users on a case-by-case basis in accordance with the terms of the CA.
• Knowledge will remain the property of those partners who were involved in its generation / production.
• Knowledge jointly generated (without possibility to identify the individual share of work) shall be the joint property of the concerned partners.

According to H2020 rules for participation, the CA will cover dissemination, access rights and use of knowledge and intellectual property. To make sure that these terms are followed, to avoid disputes and to facilitate business planning, the exploitation and innovation manager of IPRODUCE project will maintain an IPR Registry (see Section 3.6 for more details) throughout the lifetime of the project. This document will list all items of knowledge relating to the work of the project (both pre-existing know-how and results developed in the project), and make explicit for each item: (a) the owners, (b) the nature of knowledge and the potential for exploitation and (c) the currently agreed status of the item concerning plans to use the knowledge in exploitation, or plans to disseminate it outside the consortium. The Registry will be regularly updated and made available to all partners. It will form a key tool to enable knowledge management. Moreover, the Steering Committee (SC) with the support of the Project Coordinator (PC) will continuously verify these guidelines and provide recommendations for improvements, or solution of problems.

2.3 Continuous update of the SEP

To ensure the suitability, adequacy and effectiveness of SEP, a continuous evaluation and improvement should take place to identify potential bottlenecks and propose specific solutions. IPRODUCE aims to continuously track the performance of SEP by:

i.   Continuously monitoring the progress of the innovation and exploitation activities. The leader for this task will be the Innovation and Exploitation Manager (partner: ED) as was described in DoW, but he will also be supported by the other members of the Steering Committee and the Project Coordinator.

ii. Regularly updating the IPR Registry (see Section 3.6) and the reports concerning the exploitation of results as was described in the DoW. The final version of the Registry will be submitted in the final version of this report, namely iPRODUCE Sustainability and Exploitation Plan 2 on M36.

3 IPRODUCE innovation and exploitation management plan

Taking into account the output of the methodology as was presented in Section 2, in this serction we illustrate the innovation and exploitation management plan that will be adopted in IPRODUCE project and should be followed by all partners during the entire duration of the project to finally ensure the achievement of the demanding innovation and exploitation goals that were set by the consortium. Figure 2 presents the main phases of this plan as were also described in [1].
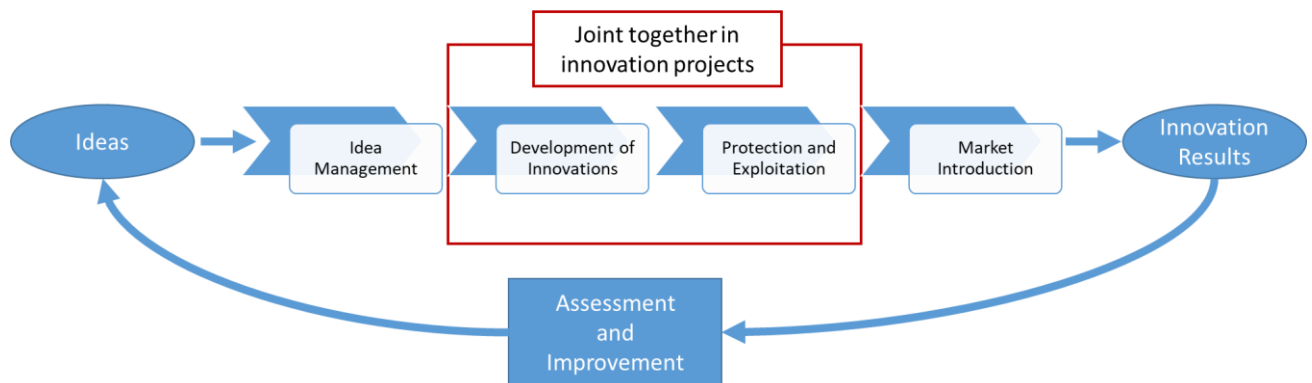
Figure 2 Schematic representation of the innovation and exploitation management process of IPRODUCE

All the phases of the innovation and exploitation process are strongly interlinked. Next we describe the phases of the process:

- **Phase 1 – Idea Management** includes the generation, capturing, evaluation and selection of the new ideas. This phase was carried out and completed at the very early stages of the proposal, where the development of IPRODUCE 's idea and potential was articulated and presented.
- **Phase 2 and Phase 3 – Development of Innovations, Protection and Exploitation**. These two phases are strictly linked in H2020 innovation projects. Development of Innovations is the phase where the implementation of the idea takes place following a dedicated methodology. For the IPRODUCE case, the methodology was depicted in the overall work plan presented in Section 2. Also during this phase, all the actions and measures needed for the implementation of the project take place. Finally, during the phase of development several end-users and the project advisory board members are actively involved to deliver high level advice. During the Protection and Exploitation phase, all the results coming from the development phase either from each individual partner or from the entire system must be protected. All partners of IPRODUCE project are committed to protect their results and are restricted to follow the European Commission regulations concerning the protection of results by signing the IPRODUCE Grant Agreement (GA). Moreover, special care and actions for the protection of results will be taken by the exploitation and innovation manager and the project coordinator of the project. Concerning the innovation output of IPRODUCE, the exploitation and innovation manager is responsible to regularly review, revise, and refine the partner-specific and joint/collaborative exploitation plans. Furthermore, all the exploitation and innovation outcomes of IPRODUCE will be monitored, evaluated, and documented (D10.9 and D10.10) during the entire life of the project.
- **Phase 4 – Market introduction**. The introduction of markets during this phase is of major importance as it increases the chances for finding additional clients. For this reason, in

IPRODUCE dedicated business model are deployed at the early stages of the project (D7.2), several workshops will be organized with several participants from the broader area of the maker community, while the evaluation of the project in multiple maker ecosystems (cMDFs), which provide a realistic view of the current market, is expected to further augment the interest from new end-users.

- **Phase 5 – Innovation results**. In this phase, the actual assessment of results takes place. Depending on the output of the assessment, further actions are adopted to improve the innovation management process and the impact of the results. In the IPRODUCE project, all the potential innovation results for all the work packages will be firstly identified and classified according to their maturity level (TRL). Next, the innovation results with relatively low TRL (such as preliminary scientific studies, publications in conferences or journals) will be further investigated to identify the possibility of increasing their maturity level by adopting new actions. Furthermore, for the innovations with higher TRL, a stepwise approach will be adopted to ensure their maximum exploitation. The exploitation steps that will be followed for all the exploitable results of IPRODUCE project are presented in Figure 3.
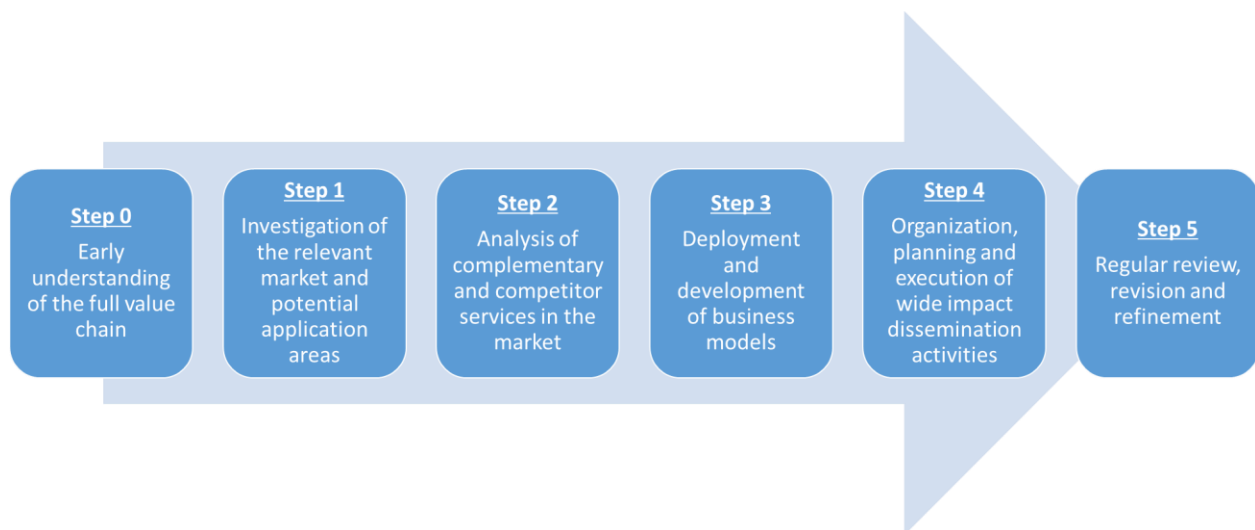
Figure 3 IPRODUCE exploitation steps

IPRODUCE project aims to exploit all its innovative results at both consortium and partner level as it is presented in Sections 3.1 and 3.2 respectively. The preliminary innovation/exploitation plan and its principles that will be followed by IPRODUCE are presented in the rest of this chapter. Note, that the proposed plan will be continuously monitored and updated throughout the project's life and especial through the activities of WP10.

3.1 Innovation/exploitation plans at consortium level

The consortium intends to commercialise the outcomes of the project through alliance agreements with the partners led by the partner ED, that is the innovation and exploitation manager of the project. In this case the integrated platform with all or some of the individual solutions will be offered accompanied by several license terms, services to install, tools for customisation and CMDFs' end users' training material. Finally, these **alliance agreements** will outline the roles, responsibilities and costs among the partners that developed the system components. The joint exploitation plan will be modelled in the Business Model Canvas [2]. Figure 6 presents a preliminary template of the Business Model Canvas that will be followed by all partners during iPRODUCE project.
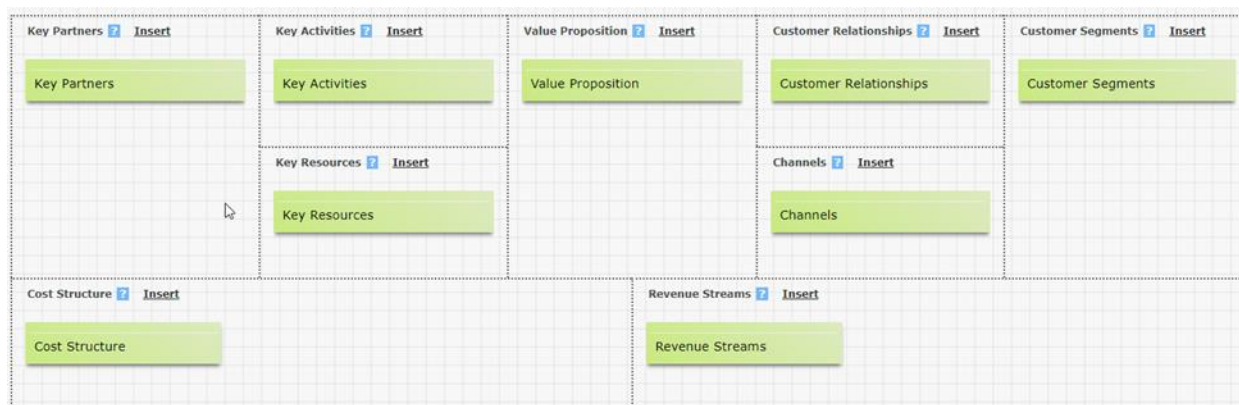
Figure 4 Preliminary template of the Business Model Canvas that will be used in iPRODUCE for the joint exploitation of the achieved results

3.2 Innovation/exploitation (initial) plans at partner level

Apart from commercialisation of the complete system, each outcome per partner module could be exploited by those who own the specific technology. In that case, each partner or partners involved in the development of the specific technology could seek commercial exploitation of their intellectual property on their own. For this, each individual partner has already defined some preliminary innovation/exploitation plans that are described in Table 1 below:

Table 1 Innovation and exploitation plans for each individual partner

Partner	Individual exploitation plan
AIDIMME	AIDIMME's exploitation plan focuses on the development of expert profile in smart factory and digital manufacturing domains and also knowledge and technology transfer to the industry through ongoing and new consultations and collaboration programs. <u>Commercial exploitation know-how</u>: AIDIMME expects that its participation in iPRODUCE will open doors to attract a significant amount of enterprises and establish different approaches of technology transfer. The project results will be applied through the collaboration with different industries. <u>Scientific exploitation</u>: AIDIMME aims at publishing research results originating from the project in different conferences and journals. It is intended to attend to at least one conference and provide 2 publications in journals.
LAG	As an industrial partner, LAG will primarily focus on commercial exploitation of the iPRODUCE results. LAGRAMA's exploitations channels will be: (i) direct integration of iPRODUCE results into the production facilities of LAGRAMA (ii) direct integration of iPRODUCE results into the LAG supply chain – through promoting the uptake and utilisation of iPRODUCE solutions by supplier companies and product designers.
VLC	Main objectives: FABLAB VLC will exploit the results of iPRODUCE both directly and indirectly. Direct exploitation will be achieved through the protection of the knowledge created by FABLAB VLC in the course of the project (foreground knowledge) through copyright, etc. Indirect exploitation can be carried out by increasing the visibility of FABLAB VLC in its technological area (digital manufacturing) and research (citizen science and social innovation) at European level. <u>Technical knowledge of commercial exploitation</u>: FABLAB VLC expects that the technologies validated in iPRODUCE will attract the interest of companies, professionals, makers and general citizenship (for example, children and young people, university students, entrepreneurs) and can start new collaborations with industrial partners towards the transfer of technology (and grant licenses for its use or collaboration) and its commercialization. No. of records: 1 (for the technology asset kit Fablab). <u>Scientific exploitation</u>: it is expected that the participation of FABLAB VLC in the

	iPRODUCE project together with the results of the relevant projects will increase the research capacity of the organization, in which we participate with the Universitat Politècnica de València, which leads with part of the financing to make an agreement related to the university. In addition, the exploitation of the results of the project from a scientific / research point of view will be carried out in terms of new findings and publications (3 publications in conferences and 2 in journals), which will increase the critical mass of research results produced within of the organization. Other: the increase in workload is expected to fund the placement of 2 full-time research assistants and postdoctoral researchers with the additional objective of advancing the experience of organizations in the field.
FIT	Main exploitation objectives: Fraunhofer FIT seeks to establish itself in agile working environments with a focus on user experience design, user-centered design and design thinking. To follow this goal, Fraunhofer FIT will install in the means of the iPRODUCE project a Fablab as well as the fitting workshops meant for knowledge exchange between end-users and employees of SMEs. The envisioned services are: ‣ General consultancy regarding user centered methods and end-user involvement in the product development cycle. ‣ Providing training courses and workshops for end users and employees of SMES on the application of co-creation and DIY techniques. ‣ Consultancy for public authorities and stakeholders from the industrial sector and the maker scene. ‣ Working space/Fablab for knowledge exchange, creative idea generation and agile working methods. Commercial exploitation know-how: FIT expects that the services and methods created will attract the interest of startups and SMEs as well as end-users to engage in co-creation and knowledge exchange over the design of future products. Scientific exploitation: As a research institute, Fraunhofer FIT is interested in generating academic output, such as journal papers or presentations on scientific conferences. FIT will use the lessons learned from elaborating and evaluating their design thinking expertise to generate impact for scientific contributions. Furthermore, FIT's Ph.D. candidates will be able to input their research into the project and to generate further insights from applying it in iPRODUCE . Other: FIT expects to create a set of workshops and teaching methods for further application in the business/SME and end-user context.
ZENIT	Main exploitation objectives: ZENIT will exploit the iPRODUCE results especially for the use of its clients, the SMEs, universities and other relevant organizations and create an added value for them. Furthermore, it is planned to create synergies between the project iPRODUCE and ZENITs activities as connecting SMEs with regional Fablabs and makerspaces. Other: The increase of workload is not expected to finance additional personnel but to provide already existing consultants a better insight into the German cMDF ecosystem.
MSB	MakerSpace Bonn (MSB) will grow in number of users and visitors as well as in relevance as a local hub with a focus on product development, creation, making things and demystifying the technology used in the modern world via education and trainings. Momentarily, our premises are only open in the afternoons/evenings. Hiring a part time employee due to the project allows us to establish opening hours during the day which in turn allows us to cooperate with the local SMEs and enables their staff to use MSB facilities during their working hours. By participating at the project, new machines and resources can be made available to the community, allowing the fabrication of even more advanced products and immersing into the exploration of further fields of technology. Furthermore, the MSB will match SMEs and the maker community, allowing both sides to benefit in tackling problems that arise during product and idea development as well as finding novel, creative, and collaborative approaches to solve them. By participating at the project, new machines and resources can be made available to the community, allowing the fabrication of even more advanced products and immersing into the exploration of further fields of technology.

MAT	The aim of the cluster is to facilitate the development of new projects. The results of IPRODUCE and the knowledge gained during the project will be exploited within the consortium but will also be used as baseline/database in order to develop and improve the quality of other projects in the cluster consisting of 300 members, about two thirds of them are companies. With the project results the cluster will: (a) organize workshops for industries/manufacturers and research organization about innovative and collaborative design, (b) enhance the visibility of its members through the participation in IPRODUCE (c) stimulate innovation: facilitate the development of new projects and collaborative work through the platform.
Vosges	Main exploitation objective: The FabLab Vosges will exploit the project's digital open innovation space to develop a social manufacturing framework on a local scale at first, and being a representative on the national level. Other: The FabLab Vosges would like to be a "showroom" of AR solutions in the "Grand Est" of France for hobbyists, makers and industrials, in order to demonstrate the possibilities of AR in industries and SMEs, to show customers real time advancement in customer's needs.
Exelcar	Main exploitation objectives: Excelcar will exploit the results of the iPRODUCE project with its expertise in user-oriented industrial design and the addition of its service catalog. Excelcar will exploit IPRODUCE results both directly and indirectly. Direct exploitation will be achieved through knowledge valorization in new services and exploiting new facilities for Exclecar's stakeholders (companies and end users). Indirect exploitation will be achieved through the upscaling of Excelcar activities in its ecosystem and at EU level though the network of cooperative manufacturing hubs. Commercial exploitation: Excelcar will gain new technologies in IPRODUCE which will be used by companies in other goods manufacturing industries beyond the current stakeholders involved (agriculture, health and maritime industries). This will provide additional gains and a new business model for Excelcar. In addition, the networking at EU level will also bring new EU users for Excelcar platform and hub. Scientific exploitation: Excelcar participates in the main events on "industry 4.0" and new collaborative production modes. Communication of the findings and outcomes of the project will be made during these events in Europe, and in Canada and USA where contacts are already active. Papers and pitch will be published for these events, and will be exploited by Excelcar R&D partner laboratories as basis for further R&D. Other: Through its platform, Excelcar will facilitate and support the creation of startup around the new mobility solutions ideas tested and co-created by the companies in cooperation with the end users. Excelcar IPRODUCE outcomes will also be used to train the stakeholders for developing collaborative manufacturing methods and tools.
E@W	Commercial exploitation: algorithms and tools resulting from the iPRODUCE will be used to enhance and complete the offer, both in terms of services and products, which will actively build the E@W's portfolio. Hence, E@W's will have both direct advantages, related to the specific technologic and innovation benefits coming from iPRODUCE , such as patents and IPs, and indirect advantages, related to the improved position of E@W in its expertise area on a European scale. Furthermore, iPRODUCE will be an opportunity for E@W to improve its network of relationships, therefore increasing the number of potential partners, and opening the road to new opportunities for innovation in terms of both services and products. Scientific exploitation: as a non-profit Organization, E@W will actively benefit from the contact with relevant Academic and Industrial Research stakeholders, with the specific aim to transfer the knowledge acquired during the iPRODUCE project. Other: E@W is a fast-growing SME, hence, thanks to solid investments, it intends to develop marketable and competitive services starting from the research results and patents achieved throughout its history.
TS	Main exploitation objectives: through this project, TS will broaden the scope of its technologies and business. In addition, TS will be able to test and adopt new co-creation methodologies coming from the partnership. As a private company with a public mission (TS is the local development agency of the Autonomous Province of Trento), it will also be able to foster technology transfer and the iPRODUCE approach within the industrial groups, SMEs and research centres within the Trentino region. Commercial exploitation: TS expects that the use cases developed during the project (via

	the open competition challenges and the pilot phases) could be added to the portfolio of its ProM Facility Lab (the mechatronic and additive Facility built up with the support of ERDF funds and run by Trentino Sviluppo), with the possibility of new commercial exploitation. Other: The co-creation experience gained in iPRODUCE will effectively enlarge the collaboration network of TS. Furthermore it will contribute to find out new business models related to its ProM Facility.
CBS	Main exploitation objectives: CBS will exploit iPRODUCE 's results through direct and applied knowledge acquisition, application and improvement of methods and tools towards business development. Scientific exploitation: CBS envisions publishing research articles, attending local and international events presenting iPRODUCE processes and outcomes. Development of educational materials and/or ad-hoc trainings; engage in further research related to iPRODUCE topics. Other: Another key exploitation refers to CBS networking and liaising with external organisations and projects, engaging in preparing new projects building on iPRODUCE knowledge and/or outcomes; embedding iPRODUCE concepts, methods and results in other projects related to circular economy and novel business developments.
betaFact ory	Main exploitation objective: betaFACTORY will exploit iPRODUCE 's process and results through deploying urban production with the Mobile Betafactory Unit both directly and indirectly. Directly by creating, developing and securing knowledge through trademarks and indirectly by increasing our organisation's knowledge and competences. Other exploitation: betaFACTORY expects that the know-how created in the project will attract interest of relevant stakeholders producing both market and commercial value in the urban production fabric. The iPRODUCE project process and results will augment existing partnerships among current and future stakeholders.
AidPlex	Main exploitation objectives: AidPlex will leverage the iPRODUCE 's results both directly and indirectly. Direct exploitation will involve resulting in a design, provisional or utility patent to protect the knowledge gained and the final solution. Indirectly AidPlex will be able to fully characterize and measure the results of the co-creation process, adjust it accordingly and apply the methodologies and activities in future product development, as well as future research programs participation. Commercial exploitation: AidPlex expects that the back brace solution resulting from the co-creation process under iPRODUCE will be adapted and subsequently added to its portfolio of product offerings, attract the interest of wholesalers in the Medicare sector and used as a driving argument in future funding rounds with Venture Capitals, required for supporting the R&D activities of the company and certification and commercialization of its products. Scientific exploitation: It is expected that AidPlex's participation to the iPRODUCE project in conjunction with outcomes from internal R&D activities will enhance its research portfolio and product range leading to an estimated 1.500.000 € in funding over the next two years and over 3.000.000 € in partnerships and sales related activities. Other: The provided budget is expected to finance AidPlex's current personnel and an additional full-time researcher with strong knowledge in the medical field (bioinformatics or other) to enhance the skillsets of the team.
CERTH	Main exploitation objectives: CERTH will exploit the iPRODUCE 's results both directly and indirectly. A direct exploitation will be achieved by means of protecting the knowledge created by CERTH in the course of the project (foreground knowledge) through e.g. by patents or copyright, etc.. Indirect exploitation may be realised by increasing CERTH's leadership in the respective technology areas of research on a European scale. Commercial exploitation know-how: CERTH expects that the technologies validated under iPRODUCE will attract the interest of relevant enterprises (e.g. IoT & service providers, AR/VR developers, etc.) and can initiate new collaborations with industrial partners towards technology transfer (and granting licenses for its use or collaboration with industry) and commercialisation. Scientific exploitation: Exploitation of the project results from a research/ scientific point of view will be done in terms of new findings and publications (4 publications in

	conferences and 3 in journals) thus increasing the critical mass of research outcome produced within the organisation. Other: The increase in workload is expected to finance the placement of 7 full-time research assistants and post-doctoral researchers with the additional aim to advance the organisations expertise in the field further.
ICE	ICE sees three strategic motivations in the iPRODUCE project. Firstly, deep involvement in the collaborative manufacturing platforms and community will allow us to test and validate our own solutions such as the ICE process environment, analytic suite and also ICE Data Platform (data harmonisation). This will allow quicker development of new technologies with better quality and more focused to target user domain. The validation of these will enhance our ability to 'sell' these developments to clients, and thus reduce the time to market. In particular, iPRODUCE will bring the digital manufacturing more into line with our core research and commercialisation focus areas. In the longer term we are interested in using a fully operational agile network creation and condition monitoring toolkit as part of our digital manufacturing platform offering. Finally, tools developed for e.g. data harmonisation, monitoring, self-service analytics and prototyping will be adapted to fit within the realm of ICE Data Platform.
SAG	Through this project, SAG will broaden the scope of its technology and business. In addition, SAG will be able to test and adopt new methodologies coming from the partnership. As a large enterprise, SAG will also be able to foster technology transfer and the iPRODUCE approach within the industrial groups, SMEs and research centres internationally.
EDLUX	EDLUX is a leading innovative IT company, acting internationally, which is constantly seeking to enlarge its current activities. EDLUX has proven in its long history that it can successfully launch new products and services in the international market, and this is proven by the number and the importance of its clients (see profile). In terms of iPRODUCE , EDLUX is very interested to enlarge its products and services with real needed solutions for the manufacturing industry continuing on the advancements of I4MS project L4MS and DIH2. EDLUX will exploit the project results in two ways: A. To enlarge its technical know-how, and services from the manufacturing towards SME manufacturing and crafting, which actually a new market. The marketplace tools will be exploited in the future for research and more importantly for commercial projects. B. To repurpose EDLUX's existing product suit to new and innovative as well as competitive products and solutions for the specific domain of manufacturing and crafting. This will enable EDLUX to operate in this domain and expand its services and activities through alliances with other players of the consortium the relevant markets. The fact that is already operates internationally is giving a good starting point and ensures the potential success of iPRODUCE in the commercial world. C. To further extend its visibility in new domains through the project dissemination activities.
F6S	F6S exploitation strategy is based on the enlargement of F6S network and outreach. F6S community has +3.0million users and this a good opportunity to move towards new communities and users (FOF, researchers, companies, …). Therefore, increase the F6S users network in the domain Factories of the Future, while positioning F6S as the platform to connect innovators, entrepreneurs, researchers, startups… is the main objective of F6S within iPRODUCE . F6S is constantly testing new monetization models with its users. So, increasing the F6S outreach and footprint in H2020 projects will end up increasing our commercial options.
WR	Main exploitation objectives: WR is already active in the field of social research and social innovation applied in the urban context, also in the frame of bottom-up and collaborative production processes such as DIY initiatives, makers' communities, FabLabs, etc. The company seeks to gain additional expertise, experience and insights for the transfer of these methodologies to industries and SMEs as well as for the development of Open Innovation processes in the collaborative production and the industrial field. Commercial exploitation know-how: WR is keen to apply the emerged knowledge and assets to its day-to-day commercial activities. The iPRODUCE methodologies, structures and tools will strengthen the capacity and arsenal of WR, who will actively seek to exploit

them for supporting open innovation and collaborative production endeavors both of the public (e.g. municipal, regional) and private sector clients. Exploiting the network of the SMEs, consumers and the makers' communities that will be engaged during the project will also provide new opportunities for further collaboration or joint exploitation with regards to the collaborative production methodologies of the project (e.g. supporting business set-up, access to further funding, innovation management, etc.).
<u>Scientific exploitation</u>: WR is already leading market research and business development interventions in the circular collaborative urban production domain and in the makers' movement, under EU-funded projects (i.e. POP-MACHINA). Thus, through its involvement in iPRODUCE , WR will acquire further evidence-based knowledge in collaborative production and the transfer of bottom-up production processes to the industry sector coming from real cases, which will lead to further exploitation of the project's knowledge and assets in follow-up projects.

3.3 Identification of preliminary innovation results per work package

In Table 2, we summarize some preliminary and indicative innovation results (IR) per work package of iPRODUCE project as they come from the DoW and the partners' input by M18. This table presents all innovation results that have been identified, irrespectively of their maturity level. Each row of this table consists of: (a) the WP in which the IR was developed, (b) a short description of the IR, (c) the partners that contributed to the development of the IR, and (d) a unique ID of the IR. This table will be continuously updated and populated through the project's life.

Table 2 Preliminary Innovation Results (IR) of IPRODUCE according to the DoW and the partners' input on M18.

Work Package	Innovation Result (IR)	Contributors	IR No.
2	iPRODUCE Social Manufacturing Vision and Reference model	CERTH, cMDFs, WR	IR.2.1
3	Workflow automation - orchestration of the design and production process	ED, AIDIMME	IR.3.1
	Software interface to the production machines inside the iPRODUCE CMDFs	ICE	IR.3. 2
	Digital twin development tool	ICE	IR.3.3
	AR Training Toolkit	CERTH	IR.3.4
	Training Support Tool	CERTH, SAG, ICE, (FIT coordinating)	IR.3.5
4	Data structures for the description of makers, consumers and products in the context of social manufacturing	ICE, SAG, CERTH, ED	IR.4.1
	IDP & Semantic Reasoner	ICE	IR.4.2
	OpIS data repository	ICE, CERTH	IR.4.3
	Marketplace for open innovation and user interaction	ED	IR.4.4
	Matchmaking tool & Agile Network creation	ICE, CERTH,WR	IR.4.5
5	Live Prototyping Service	FIT, MSB	IR.5.1
	GDP as social community	SAG	IR.5.2
	NLP for verbal interaction with users (in Math Modeling)	SAG	IR.5.3

	Application of Generative Design to 3D / 2D Layouting	SAG	IR.5.4
	Video Intelligence	SAG	IR.5.5
	AR/VR tool	CERTH	IR.5.6
	Data Analytics tool	E@W	IR.5.7
	Guidelines on waste reduction tools	AIDIMME, FIT, MATERALIA , VLC, BetaFactory, MAT	IR.5.8
6	Mobile application for the collection of user's feedback for open innovation propositions	ED,WR	IR6.1
	Mobile Betafactory Unit (MBU)	Betafactory	IR6.2
7	Business Models and case development for cMDFs	CBS	IR7.1
	Riccardian Toolkit	CERTH	IR7.2
8	Demonstration of federated cMDFs models	VLC, cMDFs	IR8.1
9	Evaluation methodology for cMDFs services	AIDIMME	IR9.1
10	iPRODUCE ecosystem	WR, cMDFs, AIDIMME	IR10.1

The results of Table 2 will be evaluated periodically (yearly) for their maturity level. The innovation results which result in high TRL will be analysed further with a view for their positioning in the market. These will be then called Key Exploitable Results (KERs). The Innovations results with lower TRL will still be monitored and fed to the dissemination tasks in order to promote them in the research and scientific community.

All the KERs (innovation results with higher TRL) have been further analysed in Table 3 in terms of: (i) the partners that have contributed in the development of this KER, (ii) the partners that are responsible to take actions to exploit the results, (iii) the way that the result is planned to be exploited (e.g. Software, Software as a Service, Consultancy, Material for Courses, Publication, Patent, Know-how, use by public stakeholders), and (iv) a unique ID that will be used for identification purposes. The detailed exploitation plans for each KER will be updated throughout IPRODUCE 's life and presented in this document and D10.10.

3.4 Early Analysis of the Exploitable Results

The following table summarizes the Key Exploitable Results in IPRODUCE and structures them in terms of the responsible activity in the project (WP), main contributors and exploitation responsible, their potential exploitation form and their Technology Readiness Level. Each Key Exploitable is assigned with the unique identifier which is used in the analysis of each of the results in the following sections.

Table 3 Summary of Key Exploitable Results of iPRODUCE

Work Package	Key Exploitable Result (KER)	Contributors	Exploited by	Potential exploitation form (patent, know-how, publication etc.)	TRL (Start-Finish)	KER No.
3	Workflow	ED, AIDIMME	ED, AIDIMME	Software, SaaS,	4-7	KER1

	automation - orchestration of the design and production process			Know-how		
	Software interface to the production machines inside the iPRODUCE cMDFs	ICE	ICE	Know-how	5	KER2
	Digital twin development tool	ICE	ICE	Software, Know-how	5	KER3
	AR Training Toolkit	CERTH	CERTH	Product, service, publication	6-8	KER4
	Training Support Tool	CERTH, SAG, ICE, FIT	CERTH, SAG, ICE, FIT	Product, service	4-7	KER5
4	Data structures for the description of makers, consumers and products in the context of social manufacturing	ICE, SAG, CERTH, ED	ICE, SAG, CERTH, ED	Know-how	6	KER6
	IDP & Semantic Reasoner	ICE	ICE	Product, software as a service	7	KER7
	OpIS data repository	ICE, CERTH	ICE, CERTH	Software	4-6	KER8
	Marketplace for open innovation and user interaction	ED	ED	Product, PaaS, Know-how	4-6	KER9
	Matchmaking tool & Agile Network creation	ICE	ICE, ED	Software as a Service	4	KER10
5	Live Prototyping Service	FIT	FIT	Know-how, Service, Publication	0-5	KER11
	GDP as social community	SAG	SAG	Software	0-5	KER12
	NLP for verbal interaction with users (in Math Modeling)	SAG	SAG	Software	1-5	KER13
	Application of Generative Design to 3D / 2D Layouting	SAG	SAG	Software	2-5	KER14
	Video Intelligence	SAG	SAG	Software	3-5	KER15
	AR/VR tool	CERTH	CERTH	Product, service, publication	4-7	KER16
	Data Analytics tool	E@W	E@W	Product	3-6	KER17
	Guidelines on waste reduction tools	AIDIMME, FIT, MATERALIA , VLC, beta Factory, MAT	AIDIMME, FIT, MATERALIA , VLC, beta Factory, MAT	Know-how, Publication	N/A	KER18
6	Mobile application	ED	ED	Product, PaaS,	3-7	KER19

					Know-how		
	Mobile Betafactory Unit	Betafactory	Betafactory	Service,	0-8	KER20
7	Business Models and case development for cMDFs	CBS	CBS	Service, Publication	0-7	KER21
	Riccardian Toolkit	CERTH	CERTH	Product, service, publication, patent	3-6	KER22

3.4.1 KER 1: Workflow automation - orchestration of the design and production process

	KER 1
Innovation introduced, compared to already existing products/ services	Process automation tool that orchestrates the collaboration (co-creation) process and/or the actual production process and allocates tasks to each participating human or non-human agent (i.e. machine). It adopts workflow technologies and a process modelled in Business Process Modelling Notation (BPMN)-standard that initially designs the main prototyping and production phases in a multi-actor collaboration or the co-production process and then executes them in run-time. During execution in run-time, the users interact in a structured way with the ability to exchange the required information (including files) and oversee the entire process in a single environment. The machines receive machine orders to execute tasks and report when tasks are completed. The tools are customized for several end-users' use case.
Target customers	CMDFs and their co-operating partners, stakeholders and /or customers. Multi-actor (human and machine agents) production schemes from the consumer products manufacturing industry, collaborative manufacturing in makerspaces
Market Trends/Public Acceptance	The maker community is taking up and there is a lack of end-to-end process automation tools that can orchestrate all the actors involved. There is no standard approach in the maker-community (actor coordination is based on ad-hoc communication which is insufficient and long and prone to errors). As customers are increasingly more interested in this maker products, the community has to re-establish itself and adopt new modern technologies to become more competitive and more effective. <u>Established competition in the production industry</u>: Platforms usually aim to provide holistic solutions and integration with other systems (for example ERP). Competitive edge of current solution is on being lightweight, customizable and tailored to actor specific processes
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	There are no ethical or legal restrictions.
Competitors	Established competition from platform vendors: - Solutions are offered as an IT-platform, which requires expert knowledge (process owners, dev-ops) to model the process and build the usable application (the business automation tools

	primarily target big industry/ large companies) - Primary focus of the platforms is on coordinating the business aspects of the process (business analytics, creation and interaction via forms), as opposed to supporting collaboration for product creation (design & product prototyping). May be difficult to integrate the production–part ('making of') of the process - Inability/ difficulty to customize the user interface of the usable app - Propositions are commercial. Flexible plans may be in place, but require commitment from the company – may not be ideal for small business, or individual makers
Time to market	> 1yr after the project
Foreseen Product/Service Price	N/A
Status of IPR: Background (type and partner owner)	Platform development, setting up of the IT infrastructure, process modelling and development of the user interface belong to ED's know-how Open-Source tool Camunda.
Status of IPR: Foreground (type and partner owner)	The foreground to be owned by ED (technical development), AIDIMME and other partners (definition of the process model)
Exploitation: Sources of financing foreseen after the end of the project	N/A

3.4.2 KER 2: Software interface to the production machines inside the iPRODUCE cMDFs

	KER 2
Innovation introduced, compared to already existing products/ services	Software interface to the communicate commands to and status of production machines inside the iPRODUCE cMDFs
Target customers	System Integrators, Manufacturing Companies, Software Solution Providers, IoT Solution Providers
Market Trends/Public Acceptance	Interfaces with physical assets (e.g. machines and sensors) is needed for monitoring and control. Standardised interfaces and communication protocols exist for interacting with well-established manufacturing assets (e.g. PLCs, sensors etc), however data extraction and utilisation (e.g. for monitoring and control) requires specialised integration and data processing capabilities.
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	N/A
Competitors	Many software companies and system integrators operating in the digital manufacturing and IoT domain provide such capabilities. The solution developed in iPRODUCE will be built-upon open source solutions and custom requirements of the user partners
Time to market	Developed in the project
Foreseen Product/Service Price	Open source
Status of IPR: Background (type and partner owner)	N/A - New solution

Status of IPR: Foreground (type and partner owner)	Open Source
Exploitation: Sources of financing foreseen after the end of the project	Through publishing on the open source repositories

3.4.3 KER 3: Digital Twin Development Toolkit

	KER 3
Innovation introduced, compared to already existing products/ services	Digital Twin Development Toolkit for fast and virtual prototyping of open innovation ideas. It creates a library of common tools, which can be used as the brick-blocks for the creation of new ideas.
Target customers	Fablabs, Makerspaces, SME Associations, Training and Learning Providers
Market Trends/Public Acceptance	Increasing need for training workforce on digital manufacturing solutions and advance manufacturing infrastructures. Digital Twins can be used to provide training about manufacturing activities (e.g. machine operations, interfacing with robots etc) in a virtual environment
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	N/A
Competitors	Many digital manufacturing solution providers (e.g. Siemens, GE, Emerson etc) offer digital twin solutions, however their solutions are costly, come with strings and require advance know-how of digital tools
Time to market	1 year after the project
Foreseen Product/Service Price	Open Source
Status of IPR: Background (type and partner owner)	ICE owns the background, which is built-up open source technologies
Status of IPR: Foreground (type and partner owner)	Open Source
Exploitation: Sources of financing foreseen after the end of the project	Publishing on open-source libraries

3.4.4 KER 4: AR training Toolkit (cMDF Training Platform)

	KER 4
Innovation introduced, compared to already existing products/ services	A complete cMDF Training Platform (Display, Management, Flow) offering 3D animated training procedures through mobile devices and AR glasses, AR remote assistance and an authoring tool.
Target customers	maker communities, SMEs, manufacturers, creative industries, Industry4.0
Market Trends/Public Acceptance	The global augmented reality market size was valued at USD 17.67 billion in 2020. It is expected to expand at a compound annual growth rate (CAGR) of 43.8% from 2021 to 2028. The COVID-19 outbreak has been a primary catalyst to revolutionize the training industry by using augmented reality (AR). Governments of countries across the world have imposed lockdowns to curb the spread of the disease. Hence, organizations are adopting AR in training as well as in other

	enterprise functions. This is projected to boost the global AR in training market.
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	Planned to be compliant with existing standards
Competitors	Yeppar, RE'FLEKT GmbH, InfiVR, VIRNECT CO., LTD., Hurix, Accenture plc, Microsoft Corporation, Samsung Electronics Co., Ltd., Sony, Alphabet (Google, Inc.), Magic Leap, Inc., Wikitude GmbH The added value of AR/VR Tool is the interconnection with the other tools from OpIS platform to promote lean co-creation and co-production activities, in order to infuse trust in the open innovation value chain and exchange knowledge, services, and products.
Time to market	< 1 year after the end of the project
Foreseen Product/Service Price	15,000€
Status of IPR: Background (type and partner owner)	CERTH
Status of IPR: Foreground (type and partner owner)	CERTH
Exploitation: Sources of financing foreseen after the end of the project	Service, Pay per use, Other

3.4.5 KER 5: Training Support Tool

	KER 5
Innovation introduced, compared to already existing products/ services	Highly intuitive and self-motivating tool to convey training material. Integrates the functionalities of AR training toolkit, video intelligence and digital twin development tool in a single software application. Users gain direct access to all these subcomponents and administrators gain the option to easily share training material among different platform users.
Target customers	Fablabs, Maker Spaces, also applicable to other organisations who want to train the operation of machines
Market Trends/Public Acceptance	The underlying problem occurs to many of the fablabs and maker spaces: Introduction to machinery has to be done repetitively and often. No standard solutions available. The demand for trainings in general has continuously increased in the last decades.
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	N/A
Competitors	BigBlueButton, Padlet, TaskCards, Lino, Wakelet, LearningView, GotoTraining
Time to market	1 year after the end of the project
Foreseen Product/Service Price	N/A
Status of IPR: Background (type and partner owner)	CERTH, SAG, ICE
Status of IPR: Foreground (type and partner owner)	CERTH, SAG, ICE, FIT
Exploitation: Sources of financing foreseen after the end of the project	Investors, Spin-off, Licensing

3.4.6 KER 6: Data structures for the description of makers, consumers and products in the context of social manufacturing

	KER 6
Innovation introduced, compared to already existing products/ services	Data structures for the description of makers, consumers and products in the context of social manufacturing
Target customers	Technology developers (mainly of software applications) for customizable consumer products; members of the maker community who extend the functionality of existing resources (for example available through fablab.io)
Market Trends/Public Acceptance	Standardised data models are needed to support integration of tools and services.
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	N/A
Competitors	Data models for different types of entities exist in various shape or form. The models developed in iPRODUCE will be tuned to the specific needs of the stakehodlers and activities in the social manufacturing domain
Time to market	Developed in the project
Foreseen Product/Service Price	N/A
Status of IPR: Background (type and partner owner)	N/A - New solution
Status of IPR: Foreground (type and partner owner)	Open Source
Exploitation: Sources of financing foreseen after the end of the project	Through publishing in public deliverables

3.4.7 KER 7: IDP & Semantic Reasoner

	KER 7
Innovation introduced, compared to already existing products/ services	The tool makes possible the complete data interoperability and integration of different applications through a dedicated GUI. Connectors to industrial 500+ systems for capturing data through the GUI. The connectors target machinery, technologies found in makerspaces (3D printers, CAD models, etc.)
Target customers	System integrators and ICT solution provider companies.
Market Trends/Public Acceptance	Global need for data interoperability and integration. Good fit with growing trend in microservice based architecture where software is provided by different providers and with data coming in different formats and standards.
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	There are no legal or ethical restrictions with the use of this solution.
Competitors	Many software solutions and platforms offer such functionality. 1. DOMO – Modern business intelligence platform which offers data integration and analytic functionalities. However, the maps cannot be exported as services.

	2. LOBSTER – NoCode data integration and process automation toolset allows data interoperability and maps to be developed and executed within the LOBSTER environment. ALTERYX – Data prep blending and analytic platform offering integration of multiple industry systems. Primarily focussing on analytic workflows business processes.
Time to market	1 year after project completes
Foreseen Product/Service Price	License fee per user is currently being formulated.
Status of IPR: Background (type and partner owner)	IDP is built upon open-source Talend technology. The enhancements and additions integrated by ICE in the open-source technology constitute (what is called) the IDP and what can be seen as background in the iPRODUCE project. ICE own the complete background IPR
Status of IPR: Foreground (type and partner owner)	The foreground in the iPRODUCE project will include the functionalities for semantic reasoning, semantic alignment of concepts and implementation of data security protocols in the data maps. ICE will own the developed functionalities
Exploitation: Sources of financing foreseen after the end of the project	Company resources, venture capital (where needed).

3.4.8 KER 8: OpIS Data Repository

	KER 8
Innovation introduced, compared to already existing products/ services	Fast and scalable data Repository that can store and process different types of real-time data from multiple software components, allowing users to perform data ingestion, harmonization and interoperability operations at very high rates and in an efficient manner, enabling agile collaborations and open-innovation.
Target customers	maker communities, SMEs, manufacturers, creative industries, industry 4.0
Market Trends/Public Acceptance	The Global Data Management Market is expected to reach USD 5 billion by 2023 growing with 15% CAGR during the forecast period 2018- 2023
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	Planned to be compliant with existing standards
Competitors	IBM, Amazon, LeanXcale, Aerospike, Knack, ArangoDB, Oracle Corporation, Microsoft Corporation, Cisco Systems The added value of OpIS Data Repository is the interconnection with the other tools of the OpIS platform, to promote co-creation and co-production activities, in order to infuse trust in the open innovation value chain and exchange knowledge, services, and products.
Time to market	1-3 years after the end of the project
Foreseen Product/Service Price	30,000€
Status of IPR: Background (type and partner owner)	Joint development by CERTH and ICE
Status of IPR: Foreground (type and partner owner)	Joint development by CERTH and ICE
Exploitation: Sources of	Licensing, Service, Pay-per-Use, Other

financing foreseen after the end of the project	

3.4.9 KER 9: Marketplace for open innovation and user interaction

	KER 9
Innovation introduced, compared to already existing products/ services	IT-platform with the primary goal to enable and facilitate user-interaction, primarily targeting the maker community. Provides the space for the display/ promotion of products, commenting, messaging, 'transaction' and redirects users to the respective tools (of the OpIS platform) to facilitate further the collaborative creation. Investigation of the appeal of products is also enabled via interaction with the mobile app
Target customers	Members of the maker community
Market Trends/Public Acceptance	Growing demand – scaling up with the growth of the maker community
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	N/A
Competitors	Not a lot of efforts for the entire community (*https://distributeddesign.eu/*, *https://www.fablabs.io*); Available platforms are community or academia driven/ supported, content may not be curated/ maintained, central administration of the platform may not be in place.
Time to market	>1yr after the end of the project
Foreseen Product/Service Price	N/A
Status of IPR: Background (type and partner owner)	Know-how in the development of IT-platforms
Status of IPR: Foreground (type and partner owner)	IT-platform and know-how for the scale-up of the platform (deployment of multiple instances of the marketplace) (ED)
Exploitation: Sources of financing foreseen after the end of the project	N/A

3.4.10 KER 10: Matchmaking tool & Agile Network creation

	KER 10
Innovation introduced, compared to already existing products/ services	Competitors offer limited features in the market with no direct equivalent in the SME matchmaking domain. iPRODUCE offers a specific solution for enabling agile SME collaborations
Target customers	SMEs, Individual makers and large companies.
Market Trends/Public Acceptance	NA
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	None as no business sensitive data is stored by this component. Matchmaking and Agile co-creation are integrated behind the OpIS Marketplace, as such the Marketplace is responsible for handling user interactions and implementing relevant guidelines that address the legal and ethical requirements.
Competitors	There are no direct competitors. The closest offering is focussed on ideas and no products. As a result, is a very simple system which is not comparable.

Time to market	One year after project ends
Foreseen Product/Service Price	A business model based on SaaS principles will be developed for this component during the project. Pricing schemes are not available yet
Status of IPR: Background (type and partner owner)	As this is a new component, no specific background exists for this component
Status of IPR: Foreground (type and partner owner)	During the project, the Matchmaking solution will be offered as open source in the OpIS platform. Beyond the project, the Matchmaking solution will be offered under the licencing scheme – to be developed during the project (ICE)
Exploitation: Sources of financing foreseen after the end of the project	Business contracts with digital platforms and online marketplaces will be established to support the development and integration of the innovative functionality

3.4.11 KER 11: Live Prototyping Service

	KER 11
Innovation introduced, compared to already existing products/ services	Consulting and coaching services for supporting human-centric design processes, collaborative innovation processes and co-creation
Target customers	SMEs, also larger enterprises
Market Trends/Public Acceptance	Human-centric development processes and topics have become very prominent, such as Design Thinking, UX, Usability, Co-Creation, Co-Design
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	NA
Competitors	Big players in human-centered methodologies are IDEO, d.school, Board of Innovation, Namahn, Airbnb Design
Time to market	6 months after the end of the project
Foreseen Product/Service Price	NA
Status of IPR: Background (type and partner owner)	NA
Status of IPR: Foreground (type and partner owner)	FIT, MSB
Exploitation: Sources of financing foreseen after the end of the project	Consulting services paid by effort of fixed price

3.4.12 KER 12: GDP as social community

	KER 12
Innovation introduced, compared to already existing products/ services	The Generative Design Platform (GDP) will be implemented as a social community enabling different user groups to communicate with each other and share or influence one another's product designs/plans. The target is to promote the usage of generative algorithms with engineers, designers, and customers in an intuitive user interface, while combining social aspects (rate, comment, share) with gamification (competitions and real time simulations).
Target customers	Maker community, education institutions, SME manufacturer, end customers of the customer good sectors

Market Trends/Public Acceptance	Emerging technology: There is a growing demand and few offerings are available
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	Planned to be compliant with existing standards
Competitors	Established competition: e.g., https://www.thingiverse.com/, https://www.tinkercad.com/. But none with a proposition like the one addressed by GDP
Time to market	> 3 years after the end of the project
Foreseen Product/Service Price	NA
Status of IPR: Background (type and partner owner)	SAG
Status of IPR: Foreground (type and partner owner)	SAG
Exploitation: Sources of financing foreseen after the end of the project	Licensing (platform subscriptions), sponsors/ investors, proposed as part of a consulting service (fixed price)

3.4.13 KER 13: NLP for verbal interaction with users (in Math Modeling)

	KER 13
Innovation introduced, compared to already existing products/ services	Chatbot component Mathematical Modeling will be introduced in Generative Design Platform to guide a user while making design decisions. NLP engine ensures spatial data detection, manipulation, and their structured recording.
Target customers	Maker community, industries, education institutions
Market Trends/Public Acceptance	Emerging technology: There is a growing demand and few offerings are available
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	Planned to be compliant with existing standards
Competitors	Established competition: diverse chat bots. But none with a proposition like the one addressed by Mathematical Modeling
Time to market	> 3 years after the end of the project
Foreseen Product/Service Price	NA
Status of IPR: Background (type and partner owner)	SAG
Status of IPR: Foreground (type and partner owner)	SAG
Exploitation: Sources of financing foreseen after the end of the project	Licensing (e.g., subscriptions), sponsors/ investors, spin-off

3.4.14 KER 14: Application of Generative Design to 3D / 2D Layouting

	KER 14
Innovation introduced, compared to already existing	Generative Design Platform will introduce a new procedure for the exploring of the solution space to enable the engineer / designer and

products/ services	user to innovatively, engagingly "breed" the final, personalized solution. This procedure is "borrowed" from biology (dominant, recessive gene selection and breeding)
Target customers	Maker community, industries, education institutions
Market Trends/Public Acceptance	Emerging technology: There is a growing demand and few offerings are available
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	Planned to be compliant with existing standards
Competitors	Patchy, no major players. Generative design is included into CAD systems like Solid Edge, Fusion 360, but very different than that proposed by the GDP
Time to market	Between 1 and 3 years after the end of the project
Foreseen Product/Service Price	NA
Status of IPR: Background (type and partner owner)	SAG
Status of IPR: Foreground (type and partner owner)	SAG
Exploitation: Sources of financing foreseen after the end of the project	Licensing (monthly/yearly subscriptions), sponsors/ investors, spin-off

3.4.15 KER 15: Video Intelligence

	KER 15
Innovation introduced, compared to already existing products/ services	A number of Artificial Intelligence technologies brought together: Natural Language Understanding (NLU), Natural Language Processing (NLP), Image Classification, Neural Networks, Object Detection and Knowledge Graphs. A combination of these technologies will be used in iPRODUCE to set up a pipeline of knowledge digitalization and transfer.
Target customers	Maker community, training companies, video-conference providers
Market Trends/Public Acceptance	Emerging technology: There is a growing demand and few offerings are available
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	Planned to be compliant with existing standards
Competitors	Established competition: YouTube, MS Teams, Coursera, other conferencing service providers. But none with a proposition like the one under investigation
Time to market	Appr. within 1 year after the end of the project
Foreseen Product/Service Price	NA
Status of IPR: Background (type and partner owner)	SAG
Status of IPR: Foreground (type and partner owner)	SAG
Exploitation: Sources of financing foreseen after the end of the project	Licensing (monthly/yearly subscriptions), sponsors/ investors

3.4.16 KER 16: AR/VR Tool

	KER 16
Innovation introduced, compared to already existing products/ services	Collaborative VR/AR-based Real-time Social Manufacturing Toolkit. Consumer/designers can view 3d products in their environment through AR and VR and co-design/co-create them to their preferences. Users can share the same view in real time through their mobile devices/HMDs.
Target customers	maker communities, SMEs, manufacturers, creative industries, Industry4.0
Market Trends/Public Acceptance	The global augmented reality (AR) and virtual reality (VR) market is projected to account for a revenue of $1,274.4 billion in 2030, rising from $37.0 billion in 2019, progressing at a robust CAGR of 42.9% during the forecast period (2020-2030).
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	Planned to be compliant with existing standards
Competitors	Alphabet Inc., EON Reality Inc., Magic Leap Inc., PTC Inc., Wikitude GmbH, Qualcomm Incorporated, HTC Corporation DAQRI LLC, Seiko Epson Corporation, Vuzix Corporation, Facebook Technologies LLC, Himax Technologies Inc. Samsung Electronics Co. Ltd., Microsoft Corporation, Sony Corporation The added value of AR/VR Tool is the availability of a digital tool and the interconnection with the other tools from OpIS platform to promote lean co-creation and co-production activities to diverse users, in order to infuse trust in the open innovation value chain and exchange knowledge, services, and products in an AR/VR environment.
Time to market	1-3 years after the end of the project
Foreseen Product/Service Price	30,000€
Status of IPR: Background (type and partner owner)	CERTH
Status of IPR: Foreground (type and partner owner)	CERTH
Exploitation: Sources of financing foreseen after the end of the project	Licencing, Pay per use, Other

3.4.17 KER 17: Data Analytics tool

	KER 17
Innovation introduced, compared to already existing products/ services	The Agile Data Analytics and Visualization Suite will provide the possibility for the makers and producers to obtain decision support for their activities thanks to the Dashboard for interactive data insight visualization component that will provide modern business analytics over traditional data sources as well as modern big data systems. Features such as data aggregation, mash-up, data/text mining and advanced data visualization will enable comprehensive support for rich and multi-source data analysis.
Target customers	Members of the maker community; manufacturing companies with direct interaction with the customer
Market Trends/Public Acceptance	Emerging technology: There is a growing demand and few offerings are available

Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	Planned to be compliant with existing standards and GDPR
Competitors	Several major players with strong competencies, infrastructure and offerings
Time to market	Between 1 and 3 years
Foreseen Product/Service Price	NA
Status of IPR: Background (type and partner owner)	E@W
Status of IPR: Foreground (type and partner owner)	E@W
Exploitation: Sources of financing foreseen after the end of the project	Investors, Spin-off, Licensing

3.4.18 KER 18: Guidelines on waste reduction tools

	KER 18
Innovation introduced, compared to already existing products/ services	Integrated approach to waste reduction in productive environments such as fablabs, cMDFs and other collective facilities.
Target customers	Fablabs, Makerspaces and cMDFs, and their communities. Mainly the management bodies of the MakerSpaces/cMDFS, which are the ones managing the waste and material flow, but also users that can take advantage of the knowledge in other scopes of their activity.
Market Trends/Public Acceptance	Fablabs and MakerSpaces are well known for an efficient use of resources. cMDFs, consequently will share this approach. Waste management and zero waste approaches are a ell stablished trend in society.
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	Although based on an stablished corpus, this very specific knowledge will be easily transferable to similar environments.
Competitors	There are no ethical or legal restrictions.
Time to market	Environmental consultancy companies. Other Fablabs could be considered as eventual competition, but they usually do not have resources enough to transform their knowledge into training/consultancy material, and their experience is limited to their scope.
Foreseen Product/Service Price	
Status of IPR: Background (type and partner owner)	Right after the end of the Project
Status of IPR: Foreground (type and partner owner)	Proportional to the average consultancy hour in each country. Two training/transfer modules foreseen: generic and generic + customized guidelines
Exploitation: Sources of financing foreseen after the end of the project	Existing knowledge

3.4.19 KER 19: Mobile application for the collection of user's feedback for open innovation propositions

	KER 19
Innovation introduced, compared to already existing products/ services	Mobile app and backend system integrated with the Marketplace. Enables makers to create quickly surveys that target focused audience of the maker community, with regard to new ideas for consumer products.
Target customers	Members of the maker community; manufacturing companies with direct interaction with the customer
Market Trends/Public Acceptance	Established competition for the creation of generic questionnaires and surveys. The solution proposed in iPRODUCE enables the direct communication between members of the community and is integrated with the Marketplace (web-platform that presents the maker-creations)
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	No standards applicable. GDPR compliance is covered during the registration of users to the platform
Competitors	Established competition (surveymonkey, surveyplanet, limesurvey, etc.). The solutions provide general tools for the most common surveys and are available as an offering to the general public (no specification in terms of target audience). The proposed solution is integrated with the marketplace and provides direct access to the products and the members of the platform.
accTime to market	> 1 year after the end of the project
Foreseen Product/Service Price	N/A
Status of IPR: Background (type and partner owner)	Know-how about the development of Mobile-apps and development of the backend
Status of IPR: Foreground (type and partner owner)	Application (mobile app and backend) for the development of surveys, based on predefined templates (ED)
Exploitation: Sources of financing foreseen after the end of the project	To be considered in conjunction with the Marketplace

3.4.20 KER 20: Mobile Betafactory Unit

	KER 20
Innovation introduced, compared to already existing products/ services	The Mobile Betafactory Unit (MBU) is a makerspace manufacturing unit built into a 40" container. Building on our experience with digital manufacturing we aim to deploy mobile manufacturing capabilities with the Mobile Betafactory Unit to a broad range of users. Educational institutions can use the MBU as a mobile makerspace for STEM learning. Companies and consumers can have their furniture made on-site in a co-creation process allowing for both flexibility and speed.
Target customers	Educational Institutions, Construction companies, Festivals and other temporary events.
Market Trends/Public Acceptance	There is a growing trend where customers and consumers would like to have influence on their products. Using the MBU we can co-design e.g. furniture directly on site together with the client,
Legal or normative or ethical	The MBU will need to adhere to work health and safety standards.

	requirements (need for authorizations, compliance to standards, norms, etc.)	
Competitors	There are currently no competitors offering mobile manufacturing solutions in Denmark.
Time to market	> 1 year after the project.
Foreseen Product/Service Price	Approx. 6.5000DKK per day
Status of IPR: Background (type and partner owner)	The MBU does not qualify for IPR.
Status of IPR: Foreground (type and partner owner)	The MBU does not qualify for IPR.
Exploitation: Sources of financing foreseen after the end of the project	N/A.

3.4.21 KER 21: Business Models and case development for cMDFs

	KER 21
Innovation introduced, compared to already existing products/ services	Academic article presenting processes and results from the existing use-cases and how they can set new standards and considerations towards empowering makers and further developing local production partnerships.
Target customers	Academic audience, related industry
Market Trends/Public Acceptance	Comparative analysis of existing initiatives and how they align or diverge from the new suggested Business models.
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	N/A
Competitors	N/A
accTime to market	N/A
Foreseen Product/Service Price	N/A
Status of IPR: Background (type and partner owner)	N/A
Status of IPR: Foreground (type and partner owner)	N/A
Exploitation: Sources of financing foreseen after the end of the project	Academic support for publications

3.4.22 KER 22: Ricardian Toolkit

	KER 22
Innovation introduced, compared to already existing products/ services	Ricardian Toolkit for IPR & Transaction Management Strategies & Automation under Social Manufacturing frameworks. Ricardian Toolkit is a visual authoring tool to define a set of simple, yet relevant, rules that are involved in the context of Design Thinking process stages for product co-creation. The toolkit captures all the legal terms and conditions between manufacturers, cMDFs and customers, then uses input data to determine when those conditions have been met and a business collaboration is authorized using smart contracts and blockchain technology.

Target customers	maker communities, SMEs, manufacturers, creative industries, industry 4.0, Banking, Government Management
Market Trends/Public Acceptance	The global Smart Contracts market size is projected to reach USD 345.4 Million by 2026, from USD 106.7 Million in 2019, at a CAGR of 18.1% during the forecast period 2021-2026.
Legal or normative or ethical requirements (need for authorizations, compliance to standards, norms, etc.)	Planned to be compliant with existing standards
Competitors	Monax Industries, Monetas, Blockstream, Coinbase, Bitfinex, BlockCypher, Chain, Coinify ApS, BitPay, GoCoin. The added value of Ricardian Toolkit is the development of a visual IPR authoring tool, enabling the integration between Smart Contracts under a social manufacturing framework within a digital platform allowing activities between makers and cMDFs to exchange innovative ideas and actions by guaranteeing the legality of the entire process.
Time to market	1-3 years after the end of the project
Foreseen Product/Service Price	30,000€
Status of IPR: Background (type and partner owner)	CERTH
Status of IPR: Foreground (type and partner owner)	CERTH
Exploitation: Sources of financing foreseen after the end of the project	Licencing, Service, Pay per use, Other

3.5 Early Analysis of the Innovation Results

The section collects all the Innovation /scientific and technical results and the identified exploitable methods. Specific ways to exploit each of the result have been specified. This list will be further elaborated at the end of the project to consider the modification of any results.

Table 4 Analysis of Innovation Results according to their respective exploitation methods

Innovation Result	Description	Related deliverable (s)	Confidentiality level	Exploitation methods
IR.2.1	iPRODUCE Social Manufacturing Vision and Reference model: structure and role of cMDFs in local communities and offered functions, services and stakeholder roles	D2.6,2.7,2.8	Public	• Vision and Extensible model for social manufacturing, to be used for inspiring further innovation and take up. • Open innovation environment built under a digital transformation for offering tools and services, based on IPR protection, governance mechanisms and regulations for circular economies.
IR.3.1	Workflow automation - orchestration of the design and production process	D3.6, D3.7, D4.1, D4.2	Public	• Software platform for use by all actors participating in the processes modelled • Public deliverable to be used as reference for the modelling and orchestration of additional processes

IR.3. 2	Software interface to the production machines inside the iPRODUCE CMDFs	D3.6-D3.7	Public	Software connectors to industrial systems and machines. It is a reusable technology, since many of the makerspaces use similar technologies/ brands of equipment. Will be used to link the iPRODUCE technologies to specific user/implementation scenarios, that are representative of the operation of makerspaces and cMDFs
IR.3.3	Digital twin development tool	D3.6-D3.7	Public	Toolkit offered to all actors involved with cMDFs for use in training and educational activities. The Toolkit will be exploited as an open-source resource through publications on popular open-source platforms
IR.3.4	AR toolkit for training	D3.6-D3.7	Public	Software tool released as open source to relevant actors
IR.3.5	Training Support Tool	D3.6, D3.7	Public	Enables users to create training tutorials. This is a repetitive activity of makerspaces towards their users. It is intended to be offered to makerspaces as a free tool
IR.4.1	Data structures for the description of makers, consumers and products in the context of social manufacturing	D4.3-D4.4	Co	Descriptions of data formats for use by all actors to coordinate information usage. The result is reusable, given the repetitive nature of the information exchanged in the makerspace environment (processes and materials for specific consumer products tend to be repetitive in nature)
IR.4.2	IDP & Semantic Reasoner	D4.3-D4.4	Co	Software platform offered to all actors; used to integrate components
IR.4.3	OpIS data repository	D4.3-D4.4	Co	Implements the data structures for the description of makers and products. The structure can be replicated among different cMDFs and makerspaces. It is a component that follows the exploitation paths of the OpIS platform
IR.4.4	Marketplace for open innovation and user interaction	D4.5, D4.6	Co	Software platform offered for all actors of the relevant cMDFs & their communities. It is an open-source platform with functionalities tailored to the functions of the maker community. Will be offered as a solution to relevant stakeholders
IR.4.5	Matchmaking tool & Agile Network creation	D4.7-D4.8	Co	Search features to be Integrated with any Marketplace. Within the project the Exploitation will be based on SaaS model where licences will be awarded to the digital platform or marketplace providers
IR.5.1	Live Prototyping Service	D5.1, D5.2, D5.11, D5.12	Public	Fast prototyping and innovation realization offered as a service, organized and managed by makerspace members. Exploited as a

				commercial service by selected cMDFs
IR.5.2	GDP as social community	D5.3, D5.4	Pu/Co	Software platform for use by different stakeholders participating in product definition and design
IR.5.3	NLP for verbal interaction with users (in Math Modeling)	D5.3, D5.4	Pu/Co	Used to understand the requirements of the end-users, as a pre-release/ guide towards a commercial product
IR.5.4	Application of Generative Design to 3D / 2D Layouting	D5.3, D5.4	Pu/Co	Software components to be used in the GDP to assist users in their decisions about product design and prototyping
IR.5.5	Video Intelligence	D4.1, D5.4, D3.7	Pu/Co	Software and cloud service for video materials to be used for trainings support
IR.5.6	AR/VR tool	D5.5, D5.6	Co	Software tool released as open source to relevant actors
IR.5.7	Data Analytics tool	D5.7, D5.8	Co	Reusable tool in other projects, which helps to develop user-profiles. Developed as a guide towards a commercial version of the tool
IR.5.8	Guidelines on waste reduction tools	D5.9, D5.10	Co	Open, reusable and extendable methodology for the evaluation of the different technological tools developed under the iPRODUCE project which could be perfectly promoted to other projects that developed new methods
IR6.1	Mobile application for the collection of user's feedback for open innovation propositions	D6.3, D6.4	Public	Software component (accompanies the iPRODUCE Marketplace platform) made available to all registered users to the OpIS (and consequently the Marketplace)
IR6.2	Mobile Betafactory Unit (MBU)	D6.2	Public	MBU is going to be offered commercially to relevant customers (after the iPRODUCE project use cases have been evaluated).
IR7.1	Business Models (BM) and case development for cMDFs	D7.2, D7.3	Public	Business Models (BM) that can be reused by the relevant actors in similar use cases to the ones described in the iPRODUCE project. These BMs describe also the guidelines of how the cMDFs can further develop their businesses through the iPRODUCE platform services.
IR7.2	Riccardian Toolkit	D7.4, D7.5	Public	Methodology and software tool described in research publications. Offered as a software tool to cMDFs and potentially other collaborative online platforms and applications.
IR8.1	Demonstration of federated cMDFs models	D8.2	Co	Methodology and structured reporting of lessons learned and evaluation of cMDF's models reusable by other projects and normal activities of the actors participating to the cMDFs
IR9.1	Evaluation methodology for	D9.1, D9.2	Public	● Reusable methodology in other projects

	cMDFs services			involved with: user-centric production, makerspaces & fablabs and organization & coordination of community-driven entities ● Reports are public and reusable by individual stakeholders ● Results may also be released as research – academic publications
IR10.1	iPRODUCE ecosystem	D6.1, D6.2	Public	Reusable methodology for engagement to be used in other projects or services

3.6 Early considerations for the IPR Registry

The innovation and exploitation manager of IPRODUCE project (ED) is responsible to design, populate and maintain an IPR Registry containing all the novelties that would come as output from the activities of all partners and work packages during IPRODUCE lifetime. The IPR Registry that will be used in IPRODUCE should capture the following information concerning each KER from all the partners of the project:

- **Information**
  - **Background (B)**: information brought to the project from existing knowledge, owned or controlled by partners in the same or related fields of the work carried out in the project.
  - **Foreground (F):** information, including all kinds of exploitable results, generated in the action by the project partners, whether or not they can be protected.

- **Exploitation**
  - **Licensing (L)**: selling using software license contract.
  - **Service (S)**: selling using service contract.
  - **Pay-per-use (PPU)**: selling a pay-per-use contract.
  - **Software (So)**: selling as software.
  - **Hardware (H)**: selling as hardware.
  - **Software as a Service (SaaS)**: selling as SaaS.
  - **Platform as a Service (PaaS)**: selling as PaaS.
  - **Consultancy (C)**: providing consultancy services.
  - **Maintenance & Support (M&S)**: providing maintenance and support services.
  - **Making (M)**: developing the products through own facilities and skills.
  - **Use (U)**: internal use of the result increasing the current know-how of the partner.
  - **Spin-off (SP)**: potential exploitation through spin-off-company.
  - **Other (O)**: other means of exploitation such as patents, publications, or communication materials (leaflets, brochures, etc.)

Table 5 is the first version of the IPR Registry that will be updated with all the KERs of IPRODUCE project and be extended in D10.10.

Table 5 IPRODUCE IPR Registry

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

	AIDIMME	LAG	VLC	FIT	ZENIT	MSB	MAT	VOSGES	EXELCAR	E@W	TS	CBS	BETAFACTORY	AIDPLEX	CERTH	ICE	SAG	EDLUX	F6S	WR
KER 1: Workflow Automation	U,O												F, M					F,So, C, O		
KER 2: Software interface															B, M&S					
KER 3: Digital twin															B, So, U					
KER 4: AR Training Toolkit				F									F, SaaS, U	B, S, PPU, O						U
KER 5: Training Support Tool													F, SaaS, U		B,F					U, O
KER 6: Data structures																B, U		B, U		
KER 7: IDP Semantic Reasoner																L				
KER8: OpIS data reposito**ry**														L, S, PPU, O			U			
KER 9: Marketplace													F, U					F,PaaS,O		B, C, O
KER 10: Matchmaking													F, U	SaaS						
KER 11: Live Prototyping Service			F	C, F, U	F								C, F, U							C, U, O
KER 12: GDP social community													U				B,C			U
KER 13: NLP for verbal interaction													U				B,O			
KER 14: Generative Design for 2d/3d layouting													U				B,O			
KER 15: Video intelligence																	B,O, S			
KER 16: AR/VR Tool													U	B, L, S, PPU						

															, O					
KER 17: Data Analytics tool								F												
KER 18: Guidelines on waste reduction tools	C, U, O									O										
KER 19: Mobile app																F,PaaS,O		U, O
KER 20: Mobile Betafactory Unit									F, S, PPU, C, U									
KER 21: Business Models									O									
KER 22: Ricardian Toolkit									C, U	B, L, S, PPU							U

4 Conclusions

This deliverable has described the methodology and the main ideas involved in the collection and analysis of the exploitable results of iPRODUCE. The potential exploitable results have been collected at different levels (project, partner) and have been linked to the relative parts of the work done in the project. The early analysis of these results has identified those with the highest potential for further market exploitation, this way identifying the Key Exploitable Results (KERs). A more comprehensive analysis of the result, the context of each innovation and the associated IPRs has been conducted for each KER by the responsible partner, leading to the association of all KERs to the respective partners in the IPR registry. Finally, all innovation results have been analysed in terms of their potential exploitation methods, this way making it easier to identify them and track them throughout the duration of the project.

This is the first version of a two-version report, with the second and final version of the Sustainability and Exploitation Plan to be produced closer to the end of the project.

5 References

[1] "Innovation Management System - CEN/TS 16555-1".

[2] Wikipedia, "Business Model Canvas," Wikipedia Foundation, Inc., [Online]. Available: https://en.wikipedia.org/wiki/Business_Model_Canvas.